

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF WATER RESOURCES

BANGLADESH WATER DEVELOPMENT BOARD



Bidding Document
For
Rehabilitation/Reconstruction and Upgrading of
Polder 32, 33, 35/1 and 35/3 under
Coastal Embankment Improvement Project, Phase-1

ICB No. : CEIP-1/ W-01

Project : Coastal Embankment Improvement Project, Phase-1 (CEIP 1)

Employer: Bangladesh Water Development Board (BWDB)

Country : Bangladesh

Issued on: 10-03-2015

5/8



বাংলাদেশ পানি উন্নয়ন বোর্ড
Bangladesh Water Development
Board

Project Management Unit
Coastal Embankment Improvement Project
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Memo No. CEIP-I/W-01/725

Date: 10-03-2015

Invitation for Bids

COUNTRY : BANGLADESH

NAME OF PROJECT : Coastal Embankment Improvement Project, Phase-I (CEIP-I)

Contract Title : Rehabilitation/Reconstruction & Upgrading of Polder 32, 33, 35/1 and 35/3 under Coastal Embankment Improvement Project, Phase-1

Reference No. : Package No.CEIP-1/W-01

The Bangladesh has received financing from the World Bank toward the cost of the Coastal Embankment Improvement Project, Phase-1(CEIP-1), and intends to apply part of the proceeds toward payments under the contract for Rehabilitation/Reconstruction & Upgrading of Polder 32, 33, 35/1 and 35/3 under Coastal Embankment Improvement Project, Phase-1, (CEIP-1).

The Bangladesh Water Development Board (BWDB) now invites sealed bids from eligible bidders for Rehabilitation/Reconstruction & Upgrading of Polders under Coastal Embankment Improvement Project, Phase-1(CEIP-1) in Upazilas Dacope, Sharankhola and Bagerhat, in the district of Khulna & Bagerhat.

The contract involves the following major items of works to be executed over a period of three (3) years;

Sl. No.	Description of Work	Quantity
1	Construction / Rehabilitation & Upgrading of Embankment	204.50 km
2	Excavation / Re-excavation of drainage channel (Average depth of excavation is 1.5 metre)	175.21 km
3	Construction of Drainage Sluices (RCB 1.5m x 1.8m size)	39 Nos.
4	Repairing of Drainage Sluices	2 Nos.
5	Construction of Flushing Inlets (RCB 0.90m x 1.20m & 0.90m x 0.90m)	41 Nos.
6	Repairing of Flushing Inlets	30 Nos.
7	Embankment Slope Protection Works	24.95 km
8	River Bank Protection Works	9.45 km
9	Dismantling of Brick Soling / Bituminous Carpeted Road. And dismantling of Drainage Sluice/Flushing Inlet	52.50 km 84 Nos.
10	Construction of Closure Dam over Nalian River	1 No.
11	Environmental Mitigation Works	Lump sum

A margin of preference of 7.5% (seven and one-half percent) shall be granted to domestic contractors, in accordance with, and subject to provisions stipulated in the Bidding Document.

Minimum Qualification Requirements of the bidder are not limited to the followings;

- i) It has access to, or has available, liquid assets, unencumbered real assets, lines of credit, and other financial means (independent of any contractual advance payment) sufficient to meet the construction cash flow requirements estimated as **US\$ 11.00 million** for the subject contract(s) net of the Bidders other commitments;
- ii) It shall have adequate sources of finance to meet the cash flow requirements on works currently in progress and for future contract commitments;
- iii) The minimum average annual construction turnover of **US\$ 50.00 (fifty) million**, calculated as total certified payments received for contracts in progress and/or completed within the last **5 (five) years**, divided by **5 (five) years**;
- iv) It has construction experience under construction contracts in the role of prime contractor, JV member, sub-contractor, or management contractor for at least the last **10 (ten) years**, starting 1st January **2005**;
- v) A minimum number of similar contracts specified below that have been satisfactorily and substantially completed as a prime contractor, joint venture member, management contractor or sub-contractor between 1st January 2005 and bid submission deadline:
 - (a) **Two (2) contracts**, each of minimum value **US\$ 80 million**;
 - Or
 - (b) **One (1) contract** of minimum value of **US\$ 160 million**;

Details of Qualification Requirements have been provided under Section 3: Evaluation and Qualification Criteria, of the Bidding Document

Bidding will be conducted through the International Competitive Bidding procedures as specified in the World Bank's Guidelines: ***Procurement of Goods, Works and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers, January 2011***, and is open to all eligible bidders as defined in the Procurement Guidelines. In addition, please refer to paragraphs 1.6 and 1.7 setting forth the World Bank's policy on conflict of interest. A Bidder shall be ineligible for the bid, if it has been debarred by any government entity of Bangladesh and the debarment notice has been published on the CPTU website

Interested eligible bidders may obtain further information from Project Director, CEIP-1, BWDB, email: sarafat.khan@gmail.com and inspect the bidding documents during office hours [09:00 to 17:00 hours] at the address given below.

A complete set of bidding documents in English may be purchased by interested eligible bidders upon the submission of a written application to the address below and upon payment of a nonrefundable fee of **BDT 24,000.00 (Bangladeshi Taka Twenty Four Thousands) or USD 300.00 (United State Dollar Three Hundred)**. The method of payment will be in the form of Demand Draft/ Pay Order issued by a scheduled bank in Bangladesh or a cashier's or certified check issued by a reputed bank in an eligible foreign country favouring Deputy Director, Central RAC, BWDB, Motijheel, Dhaka. The bidding document being voluminous one (more than 1200 sheets of drawing with each set of bidding document), delivery of bidding document by surface mail or courier or air mail shall not be made to avoid any misplacement or delay. All the interested eligible bidders (both local overseas) are advised to take hand to hand delivery of the bidding documents from the office at the address below by themselves or through their authorized representatives.

The bidding document along with a few characteristic Drawings as sample (Embankment, Structure, Bank Protection Work, Slope Protection Work, Drainage Channel and Closure Dam) of Polder No.32 (out of four Polders) will be posted in Bangladesh Water Development Board (BWDB)'s website: www.bwdb.gov.bd for the interested eligible bidders to look into.



A pre-bid meeting will be held at 11:00 AM on 01-04-2015 and on 02-04-2015 at the Conference Room of the Bangladesh Water Development Board, WAPDA Building (3rd Floor), Motijheel C/A, Dhaka-1000, Bangladesh.

Bids must be delivered to the address below on or before 23-04-2015 up to 3:00 PM (BST). Electronic bidding will not be permitted. Late bids will be rejected. Bids will be publicly opened in the presence of the bidders' designated representatives and anyone who choose to attend at the address below on 23-04-2015 at 3:30 PM (BST)

All bids must be accompanied by a Bid Security of **BDT 100.00 million or USD 1.30 million.**

The address referred to above is:

Project Monitoring Unit (PMU), CEIP-1, BWDB
Attention: **Md. Sarafat Hossain Khan, Project Director**
Street Address: **Road No. 24(CWN), Gulshan-2**
House & Floor number: **House No. 15 (4th Floor)**
City: **Dhaka**; ZIP Code: **Dhaka-1212**
Country: **Bangladesh.**
Tel: **+88-02-9899363**
Fax: **+88-02-9899325**
Web site: www.bwdb.gov.bd

Summary Description

PART 1 BIDDING PROCEDURES

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This Section provides relevant information to help Bidders prepare their bids. Information is also provided on the submission, opening, and evaluation of bids and on the award of Contracts

Section II - Bid Data Sheet (BDS) ----- 25-28

This Section includes provisions that are specific to each procurement and that supplement Section I, Instructions to Bidders.

Section III - Evaluation and Qualification Criteria without prequalification ----- 29-43

This Section includes the criteria to determine the lowest evaluated bid and the qualifications of the Bidder to perform the contract.

Section IV - Bidding Forms ----- 44-130

This Section includes the forms which are to be completed by the Bidder and submitted as part of his Bid.

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This section contains information regarding eligible countries.

Section VI – Bank Policy – Corrupt and Fraudulent Practices----- 132-133

This Section provides the Bidders with the reference to the Bank's policy in regard to corrupt and fraudulent practices applicable to this process.

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This Section contains the Specification, the Drawings, and supplementary information that describe the Works to be procured.

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This Section contains the general clauses to be applied in all contracts.

Section IX - Particular Conditions (PC) -- -----343-348

This Section consists of Part A, Contract Data, which contains data, and Part B, Specific Provisions, which contains clauses specific to each contract. The contents of this Section supplement the General Conditions and shall be prepared by the Employer.

Section X - Annex to the Particular Conditions - Contract Forms ----- 349-355

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PART 1 – BIDDING PROCEDURES

Section I. Instructions to Bidders



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Section I. Instructions to Bidders

A. General

1. **Scope of Bid**
 - 1.1 In connection with the Invitation for Bids specified in the Bid Data Sheet (BDS), the Employer, as specified in the BDS, issues these Bidding Documents for the procurement of Works as specified in Section VII, Works Requirements. The name, identification, and number of lots (contracts) of this International Competitive Bidding (ICB) process are specified in the BDS.
 - 1.2 Throughout these Bidding Documents:
 - (a) the term "in writing" means communicated in written form and delivered against receipt;
 - (b) except where the context requires otherwise, words indicating the singular also include the plural and words indicating the plural also include the singular; and
 - (c) "day" means calendar day.
2. **Source of Funds**
 - 2.1 The Borrower or Recipient (hereinafter called "Borrower") **specified in the BDS** has received or has applied for financing (hereinafter called "funds") from the International Bank for Reconstruction and Development or the International Development Association (hereinafter called "the Bank") in an amount **specified in the BDS**, toward the project named **in the BDS**. The Borrower intends to apply a portion of the funds to eligible payments under the contract(s) for which these Bidding Documents are issued.
 - 2.2 Payment by the Bank will be made only at the request of the Borrower and upon approval by the Bank, and will be subject, in all respects, to the terms and conditions of the Loan (or other financing) Agreement. The Loan (or other financing) Agreement prohibits a withdrawal from the Loan (or other financing) 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. No party other than the Borrower shall derive any rights from the Loan (or other financing) Agreement or have any claim to the proceeds of the Loan (or other financing).
3. **Corrupt and Fraudulent Practices**
 - 3.1 The Bank requires compliance with its policy in regard to corrupt and fraudulent practices as set forth in Section VI.
 - 3.2 In further pursuance of this policy, Bidders shall permit and shall cause its agents (whether declared or not), sub-contractors, sub-consultants, service providers, or suppliers and any personnel thereof, to permit the Bank to inspect all accounts, records and other documents relating to any prequalification process, bid submission, and contract performance (in the case of award), and to have them audited by auditors appointed by the Bank.

4. Eligible Bidders

- 4.1 A Bidder may be a firm that is a private entity, a government-owned entity—subject to ITB 4.5—or any combination of such entities in the form of a joint venture (JV) under an existing agreement or with the intent to enter into such an agreement supported by a letter of intent. In the case of a joint venture, all members shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms. The JV shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the members of the JV during the bidding process and, in the event the JV is awarded the Contract, during contract execution. **Unless specified in the BDS**, there is no limit on the number of members in a JV.
- 4.2 A Bidder shall not have a conflict of interest. Any Bidder found to have a conflict of interest shall be disqualified. A Bidder may be considered to have a conflict of interest for the purpose of this bidding process, if the Bidder:
- (a) directly or indirectly controls, is controlled by or is under common control with another Bidder; or
 - (b) receives or has received any direct or indirect subsidy from another Bidder; or
 - (c) has the same legal representative as another Bidder; or
 - (d) has a relationship with another Bidder, directly or through common third parties, that puts it in a position to influence the bid of another Bidder, or influence the decisions of the Employer regarding this bidding process; or
 - (e) participates in more than one bid in this bidding process. Participation by a Bidder in more than one Bid will result in the disqualification of all Bids in which such Bidder is involved. However, this does not limit the inclusion of the same subcontractor in more than one bid; or
 - (f) any of its affiliates participated as a consultant in the preparation of the design or Specifications of the works that are the subject of the bid; or
 - (g) any of its affiliates has been hired (or is proposed to be hired) by the Employer or Borrower as Engineer for the Contract implementation; or
 - (h) would be providing goods, works, or non-consulting services resulting from or directly related to consulting services for the preparation or implementation of the project specified in the BDS ITB 2.1 that it provided or were provided by any affiliate that directly or indirectly controls, is controlled by, or is under common control with that firm; or
 - (i) has a close business or family relationship with a professional staff of the Borrower (or of the project implementing agency, or of a recipient of a part of the loan) who: (i) are directly or indirectly involved in the preparation of the bidding documents or specifications of the contract, and/or the bid evaluation process of such contract; or (ii) would be involved



in the implementation or supervision of such contract unless the conflict stemming from such relationship has been resolved in a manner acceptable to the Bank throughout the procurement process and execution of the contract.

- 4.3 A Bidder may have the nationality of any country, subject to the restrictions pursuant to ITB 4.7. A Bidder shall be deemed to have the nationality of a country if the Bidder is constituted, incorporated or registered in and operates in conformity with the provisions of the laws of that country, as evidenced by its articles of incorporation (or equivalent documents of constitution or association) and its registration documents, as the case may be. This criterion also shall apply to the determination of the nationality of proposed sub-contractors or sub-consultants for any part of the Contract including related Services.
- 4.4 A Bidder that has been sanctioned by the Bank in accordance with the above ITB 3.1, including in accordance with the Bank's Guidelines on Preventing and Combating Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants ("Anti-Corruption Guidelines"), shall be ineligible to be prequalified for, bid for, or be awarded a Bank-financed contract or benefit from a Bank-financed contract, financially or otherwise, during such period of time as the Bank shall have determined. The list of debarred firms and individuals is available as **specified in the BDS**.
- 4.5 Bidders that are Government-owned enterprises or institutions in the Employer's Country may participate only if they can establish that they (i) are legally and financially autonomous (ii) operate under commercial law, and (iii) are not dependent agencies of the Employer. To be eligible, a government-owned enterprise or institution shall establish to the Bank's satisfaction, through all relevant documents, including its Charter and other information the Bank may request, that it: (i) is a legal entity separate from the government (ii) does not currently receive substantial subsidies or budget support; (iii) operates like any commercial enterprise, and, inter alia, is not obliged to pass on its surplus to the government, can acquire rights and liabilities, borrow funds and be liable for repayment of its debts, and can be declared bankrupt; and (iv) is not bidding for a contract to be awarded by the department or agency of the government which under their applicable laws or regulations is the reporting or supervisory authority of the enterprise or has the ability to exercise influence or control over the enterprise or institution.
- 4.6 A Bidder shall not be under suspension from bidding by the Employer as the result of the operation of a Bid-Securing Declaration.
- 4.7 Firms and individuals may be ineligible if so indicated in Section V and (a) as a matter of law or official regulations, the Borrower's country prohibits commercial relations with that country, provided that the Bank is satisfied that such exclusion does not preclude effective competition for the supply of goods or the contracting of works or services required; or (b) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, the Borrower's country prohibits any import of goods or contracting of works or services from that country, or any payments to any country,



person, or entity in that country.

- 4.8 This bidding is open only to prequalified Bidders unless **specified in the BDS**.
- 4.9 A Bidder shall provide such evidence of eligibility satisfactory to the Employer, as the Employer shall reasonably request.
- 5. Eligible Materials, Equipment, and Services**
- 5.1 The materials, equipment and services to be supplied under the Contract and financed by the Bank may have their origin in any country subject to the restrictions specified in Section V, Eligible Countries, and all expenditures under the Contract will not contravene such restrictions. At the Employer's request, Bidders may be required to provide evidence of the origin of materials, equipment and services.

B. Contents of Bidding Documents

- 6. Sections of Bidding Documents**
- 6.1 The Bidding Documents consist of Parts 1, 2, and 3, which include all the Sections specified below, and which should be read in conjunction with any Addenda issued in accordance with ITB 8.

PART 1 Bidding Procedures

- Section I. Instructions to Bidders (ITB)
- Section II. Bid Data Sheet (BDS)
- Section III. Evaluation and Qualification Criteria
- Section IV. Bidding Forms
- Section V. Eligible Countries
- Section VI. Bank Policy-Corrupt and Fraudulent Practices

PART 2 Works Requirements

- Section VII. Works Requirements

PART 3 Conditions of Contract and Contract Forms

- Section VIII. General Conditions (GC)
- Section IX. Particular Conditions (PC)
- Section X. Contract Forms

- 6.2 The Invitation for Bids issued by the Employer is not part of the Bidding Documents.
- 6.3 Unless obtained directly from the Employer, the Employer is not responsible for the completeness of the Bidding Documents, responses to requests for clarification, the minutes of the pre-Bid meeting (if any), or Addenda to the Bidding Documents in accordance with ITB 8. In case of any contradiction, documents obtained directly from the Employer shall prevail.
- 6.4 The Bidder is expected to examine all instructions, forms, terms, and specifications in the Bidding Documents and to furnish with its bid all information and documentation as is required by the Bidding Documents.

7. Clarification of Bidding Documents, Site Visit, Pre-Bid Meeting

- 7.1 A Bidder requiring any clarification of the Bidding Documents shall contact the Employer in writing at the Employer's address **specified in the BDS** or raise its enquiries during the pre-bid meeting if provided for in accordance with ITB 7.4. The Employer will respond in writing to any request for clarification, provided that such request is received no later than fourteen (14) days prior to the deadline for submission of bids. The Employer shall forward copies of its response to all Bidders who have acquired the Bidding Documents in accordance with ITB 6.3, including a description of the inquiry but without identifying its source. If so specified in the BDS, the Employer shall also promptly publish its response at the web page identified in the BDS. Should the clarification result in changes to the essential elements of the Bidding Documents, the Employer shall amend the Bidding Documents following the procedure under ITB 8 and ITB 22.2.
- 7.2 The Bidder is advised to visit and examine the Site of Works and its surroundings and obtain for itself on its own responsibility 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.
- 7.3 The Bidder and any of its personnel or agents will be granted permission by the Employer to enter upon its premises and lands for the purpose of such visit, but only upon the express condition that the Bidder, its personnel, and agents will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the inspection.
- 7.4 If so specified in the BDS, the Bidder's designated representative is invited to attend a pre-bid meeting. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.
- 7.5 The Bidder is requested to submit any questions in writing, to reach the Employer not later than one week before the meeting.
- 7.6 Minutes of the pre-bid meeting, if applicable, including the text of the questions asked by Bidders, without identifying the source, and the responses given, together with any responses prepared after the meeting, will be transmitted promptly to all Bidders who have acquired the Bidding Documents in accordance with ITB 6.3. Any modification to the Bidding Documents that 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 ITB 8 and not through the minutes of the pre-bid meeting. Nonattendance at the pre-bid meeting will not be a cause for disqualification of a Bidder.

8. Amendment of Bidding Documents

- 8.1 At any time prior to the deadline for submission of bids, the Employer may amend the Bidding Documents by issuing addenda.

- 8.2 Any addendum issued shall be part of the Bidding Documents and shall be communicated in writing to all who have obtained the Bidding Documents from the Employer in accordance with ITB 6.3. The Employer shall also promptly publish the addendum on the Employer's web page in accordance with ITB 7.1.
- 8.3 To give Bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer should extend the deadline for the submission of bids, pursuant to ITB 22.2

C. Preparation of Bids

- 9. Cost of Bidding**
- 9.1 The Bidder shall bear all costs associated with the preparation and submission of its Bid, and the Employer shall not be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.
- 10. Language of Bid**
- 10.1 The Bid, as well as all correspondence and documents relating to the bid exchanged by the Bidder and the Employer, shall be written in the language **specified in the BDS**. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages in the language **specified in the BDS**, in which case, for purposes of interpretation of the Bid, such translation shall govern.
- 11. Documents Comprising the Bid**
- 11.1 The Bid shall comprise the following:
- (a) Letter of Bid and Appendix to Bid, in accordance with ITB 12;
 - (b) completed schedules as required, including priced Bill of Quantities, in accordance with ITB 12 and 14;
 - (c) Bid Security or Bid-Securing Declaration, in accordance with ITB 19.1;
 - (d) alternative bids, if permissible, in accordance with ITB 13;
 - (e) written confirmation authorizing the signatory of the Bid to commit the Bidder, in accordance with ITB 20.2;
 - (f) documentary evidence in accordance with ITB 17 establishing the Bidder's continued qualified status or, if post-qualification applies, as specified in accordance with ITB 4.8, the Bidder's qualifications to perform the contract if its Bid is accepted;
 - (g) Technical Proposal in accordance with ITB 16; and
 - (h) any other document **required in the BDS**.
- 11.2 In addition to the requirements under ITB 11.1, bids submitted by a JV shall include a copy of the Joint Venture Agreement entered into by all members. Alternatively, a letter of intent to execute a Joint Venture Agreement in the event of a successful bid shall be signed by all members and submitted with the bid, together with a copy of the proposed Agreement.

- 11.3 The Bidder shall furnish in the Letter of Bid information on commissions and gratuities, if any, paid or to be paid to agents or any other party relating to this Bid.
- 12. Letter of Bid and Schedules**
- 12.1 The Letter of Bid and Schedules, including the Bill of Quantities, shall be prepared using the relevant forms furnished in Section IV, Bidding Forms. The forms must be completed without any alterations to the text, and no substitutes shall be accepted except as provided under ITB 20.2. All blank spaces shall be filled in with the information requested.
- 13. Alternative Bids**
- 13.1 **Unless otherwise specified in the BDS**, alternative bids shall not be considered.
- 13.2 When alternative times for completion are explicitly invited, a statement to that effect **will be included in the BDS**, as will the method of evaluating different times for completion.
- 13.3 Except as provided under ITB 13.4 below, Bidders wishing to offer technical alternatives to the requirements of the Bidding Documents must first price the Employer's design as described in the Bidding Documents and shall further provide all information necessary for a complete evaluation of the alternative by the Employer, including drawings, design calculations, Specifications, breakdown of prices, and proposed construction methodology and other relevant details. Only the technical alternatives, if any, of the lowest evaluated Bidder conforming to the basic technical requirements shall be considered by the Employer.
- 13.4 **When specified in the BDS**, Bidders are permitted to submit alternative technical solutions for specified parts of the Works, and such parts **will be identified in the BDS**, as will the method for their evaluating, and described in Section VII, Works Requirements.
- 14. Bid Prices and Discounts**
- 14.1 The prices and discounts (including any price reduction) quoted by the Bidder in the Letter of Bid and in the Bill of Quantities shall conform to the requirements specified below.
- 14.2 The Bidder shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items against which no rate or price is entered by the Bidder shall be deemed covered by the rates for other items in the Bill of Quantities and will not be paid for separately by the Employer. An item not listed in the priced Bill of Quantities shall be assumed to be not included in the Bid, and provided that the Bid is determined substantially responsive notwithstanding this omission, the average price of the item quoted by substantially responsive bidders will be added to the bid price and the equivalent total cost of the bid so determined will be used for price comparison.
- 14.3 The price to be quoted in the Letter of Bid, in accordance with ITB 12.1, shall be the total price of the Bid, excluding any discounts offered.
- 14.4 The Bidder shall quote any discounts and the methodology for their application in the Letter of Bid, in accordance with ITB 12.1.



- 14.5 **Unless otherwise specified in the BDS** and the Contract, the rates and prices quoted by the Bidder are subject to adjustment during the performance of the Contract in accordance with the provisions of the Conditions of Contract. In such a case, the Bidder shall furnish the indices and weightings for the price adjustment formulae in the Schedule of Adjustment Data and the Employer may require the Bidder to justify its proposed indices and weightings.
- 14.6 If so specified in ITB 1.1, bids are being invited for individual lots (contracts) or for any combination of lots (packages). Bidders wishing to offer discounts for the award of more than one Contract shall specify in their bid the price reductions applicable to each package, or alternatively, to individual Contracts within the package. Discounts shall be submitted in accordance with ITB 14.4, provided the bids for all lots (contracts) are opened at the same time.
- 14.7 All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause, as of the date 28 days prior to the deadline for submission of bids, shall be included in the rates and prices and the total Bid Price submitted by the Bidder.
- 15. Currencies of Bid and Payment**
- 15.1 The currency(ies) of the bid and the currency(ies) of payments shall be **as specified in the BDS**.
- 15.2 Bidders may be required by the Employer to justify, to the Employer's satisfaction, their local and foreign currency requirements, and to substantiate that the amounts included in the unit rates and prices and shown in the Schedule of Adjustment Data in the Appendix to Bid are reasonable, in which case a detailed breakdown of the foreign currency requirements shall be provided by Bidders.
- 16. Documents Comprising the Technical Proposal**
- 16.1 The Bidder shall furnish a Technical Proposal including a statement of work methods, equipment, personnel, schedule and any other information as stipulated in Section IV – Bidding Forms, in sufficient detail to demonstrate the adequacy of the Bidder's proposal to meet the work requirements and the completion time.
- 17. Documents Establishing the Qualifications of the Bidder**
- 17.1 In accordance with Section III, Evaluation and Qualification Criteria, to establish that the Bidder continues to meet the criteria used at the time of prequalification, the Bidder shall provide in the corresponding information sheets included in Section IV, Bidding Forms, updated information on any assessed aspect that changed from that time, or if post-qualification applies as specified in ITB 4.8, the Bidder shall provide the information requested in the corresponding information sheets included in Section IV, Bidding Forms.
- 17.2 If a margin of preference applies as specified in accordance with ITB 33.1, domestic Bidders, individually or in joint ventures, applying for eligibility for domestic preference shall supply all information required to satisfy the criteria for eligibility specified in accordance with ITB 33.1.
- 17.3 Any change in the structure or formation of a Bidder after being prequalified and invited to Bid (including, in the case of a JV, any change in the structure or formation of any member thereto) shall be subject to the written approval of the Employer prior to the

deadline for submission of Bids. Such approval shall be denied if (i) a Bidder proposes to associate with a disqualified Bidder or in case of a disqualified joint venture, any of its members; (ii) as a consequence of the change, the Bidder no longer substantially meets the qualification criteria set forth in Section III, Qualification Criteria and Requirements; or (iii) in the opinion of the Employer, the change may result in a substantial reduction in competition. Any such change should be submitted to the Employer not later than fourteen (14) days after the date of the Invitation for Bids.

18. Period of Validity of Bids

- 18.1 Bids shall remain valid for the period **specified in the BDS** after the bid submission deadline date prescribed by the Employer in accordance with ITB 22.1. A bid valid for a shorter period shall be rejected by the Employer as non responsive.
- 18.2 In exceptional circumstances, prior to the expiration of the bid validity period, the Employer may request Bidders to extend the period of validity of their bids. The request and the responses shall be made in writing. If a bid security is requested in accordance with ITB 19, it shall also be extended for twenty-eight (28) days beyond the deadline of the extended validity period. A Bidder may refuse the request without forfeiting its bid security. A Bidder granting the request shall not be required or permitted to modify its bid, except as provided in ITB 18.3.
- 18.3 If the award is delayed by a period exceeding fifty-six (56) days beyond the expiry of the initial bid validity, the Contract price shall be determined as follows:
- (a) In the case of fixed price contracts, the Contract price shall be the bid price adjusted by the factor **specified in the BDS**.
 - (b) In the case of adjustable price contracts, no adjustment shall be made.
 - (c) In any case, bid evaluation shall be based on the bid price without taking into consideration the applicable correction from those indicated above.

19. Bid Security

- 19.1 The Bidder shall furnish as part of its bid, either a Bid-Securing Declaration or a bid security **as specified in the BDS**, in original form and, in the case of a bid security, in the amount and currency **specified in the BDS**.
- 19.2 A Bid-Securing Declaration shall use the form included in Section IV, Bidding Forms.
- 19.3 If a bid security is specified pursuant to ITB 19.1, the bid security shall be a demand guarantee in any of the following forms at the Bidder's option:
- (a) an unconditional guarantee issued by a bank or financial institution (such as an insurance, bonding or surety company);
 - (b) an irrevocable letter of credit;
 - (c) a cashier's or certified check; or
 - (d) another security **specified in the BDS**,

from a reputable source from an eligible country. If the unconditional guarantee is issued by a financial institution located outside the Employer's Country, the issuing financial institution shall have a correspondent financial institution located in the Employer's Country to make it enforceable. In the case of a bank guarantee, the bid security shall be submitted either using the Bid Security Form included in Section IV, Bidding Forms, or in another substantially similar format approved by the Employer prior to bid submission. The bid security shall be valid for twenty-eight (28) days beyond the original validity period of the bid, or beyond any period of extension if requested under ITB 18.2.

- 19.4 If a bid security or Bid Securing Declaration is specified pursuant to ITB 19.1, any bid not accompanied by a substantially responsive bid security or Bid-Securing Declaration shall be rejected by the Employer as non responsive.
- 19.5 If a bid security is specified pursuant to ITB 19.1, the bid security of unsuccessful Bidders shall be returned as promptly as possible upon the successful Bidder's signing the Contract and furnishing the performance security pursuant to ITB 42.
- 19.6 The bid security of the successful Bidder shall be returned as promptly as possible once the successful Bidder has signed the Contract and furnished the required performance security.
- 19.7 The bid security may be forfeited or the Bid-Securing Declaration executed:
- (a) if a Bidder withdraws its bid during the period of bid validity specified by the Bidder on the Letter of Bid, or any extension thereto provided by the Bidder; or
 - (b) if the successful Bidder fails to:
 - (i) sign the Contract in accordance with ITB 41; or
 - (ii) Furnish a performance security in accordance with ITB 42.
- 19.8 The bid security or the Bid-Securing Declaration of a JV shall be in the name of the JV that submits the bid. If the JV has not been legally constituted into a legally enforceable JV at the time of bidding, the bid security or the Bid-Securing Declaration shall be in the names of all future members as named in the letter of intent referred to in ITB 4.1 and ITB 11.2.
- 19.9 If a bid security is **not required in the BDS** pursuant to ITB 19.1, and
- (a) if a Bidder withdraws its bid during the period of bid validity specified by the Bidder on the Letter of Bid, or
 - (b) if the successful Bidder fails to sign the Contract in accordance with ITB 41; or furnish a performance security in accordance with ITB 42;

the Borrower may, **if provided for in the BDS**, declare the Bidder ineligible to be awarded a contract by the Employer for a period of time **as stated in the BDS**.

20. Format and Signing of Bid

- 20.1 The Bidder shall prepare one original of the documents comprising the bid as described in ITB 11 and clearly mark it "ORIGINAL." Alternative bids, if permitted in accordance with ITB 13, shall be clearly marked "ALTERNATIVE." In addition, the Bidder shall submit copies of the bid, in the number **specified in the BDS** and clearly mark them "COPY." In the event of any discrepancy between the original and the copies, the original shall prevail.
- 20.2 The original and all copies of the bid shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Bidder. This authorization shall consist of a written confirmation **as specified in the BDS** and shall be attached to the bid. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the bid where entries or amendments have been made shall be signed or initialed by the person signing the bid.
- 20.3 In case the Bidder is a JV, the Bid shall be signed by an authorized representative of the JV on behalf of the JV, and so as to be legally binding on all the members as evidenced by a power of attorney signed by their legally authorized representatives.
- 20.4 Any inter-lineation, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the bid.

D. Submission and Opening of Bids

21. Sealing and Marking of Bids

- 21.1 The Bidder shall enclose the original and all copies of the bid, including alternative bids, if permitted in accordance with ITB 13, in separate sealed envelopes, duly marking the envelopes as "ORIGINAL", "ALTERNATIVE" and "COPY." These envelopes containing the original and the copies shall then be enclosed in one single envelope.
- 21.2 The inner and outer envelopes shall:
- (a) bear the name and address of the Bidder;
 - (b) be addressed to the Employer in accordance with ITB 22.1;
 - (c) bear the specific identification of this bidding process specified in the BDS 1.1; and
 - (d) bear a warning not to open before the time and date for bid opening.
- 21.3 If all envelopes are not sealed and marked as required, the Employer will assume no responsibility for the misplacement or premature opening of the bid.

22. Deadline for Submission of Bids

- 22.1 Bids must be received by the Employer at the address and no later than the date and time **specified in the BDS**. **When so specified in the BDS**, bidders shall have the option of submitting their bids electronically. Bidders submitting bids electronically shall follow the electronic bid submission procedures **specified in the BDS**.
- 22.2 The Employer may, at its discretion, extend the deadline for the submission of bids by amending the Bidding Documents in accordance with ITB 8, in which case all rights and obligations of

the Employer and Bidders previously subject to the deadline shall thereafter be subject to the deadline as extended.

23. Late Bids

- 23.1 The Employer shall not consider any bid that arrives after the deadline for submission of bids, in accordance with ITB 22. Any bid received by the Employer after the deadline for submission of bids shall be declared late, rejected, and returned unopened to the Bidder.

24. Withdrawal, Substitution, and Modification of Bids

- 24.1 A Bidder may withdraw, substitute, or modify its bid after it has been submitted by sending a written notice, duly signed by an authorized representative, and shall include a copy of the authorization in accordance with ITB 20.2, (except that withdrawal notices do not require copies). The corresponding substitution or modification of the bid must accompany the respective written notice. All notices must be:
- (a) prepared and submitted in accordance with ITB 20 and ITB 21 (except that withdrawals notices do not require copies), and in addition, the respective envelopes shall be clearly marked "WITHDRAWAL," "SUBSTITUTION," "MODIFICATION," and
 - (b) received by the Employer prior to the deadline prescribed for submission of bids, in accordance with ITB 22.
- 24.2 Bids requested to be withdrawn in accordance with ITB 24.1 shall be returned unopened to the Bidders.
- 24.3 No bid may be withdrawn, substituted, or modified in the interval between the deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Letter of Bid or any extension thereof.

25. Bid Opening

- 25.1 Except in the cases specified in ITB 23 and 24, the Employer shall publicly open and read out in accordance with ITB 25.3 all bids received by the deadline, at the date, time and place **specified in the BDS**, in the presence of Bidders' designated representatives and anyone who choose to attend. Any specific electronic bid opening procedures required if electronic bidding is permitted in accordance with ITB 22.1, shall be **as specified in the BDS**.
- 25.2 First, envelopes marked "WITHDRAWAL" shall be opened and read out and the envelope with the corresponding bid shall not be opened, but returned to the Bidder. No bid withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at bid opening. Next, envelopes marked "SUBSTITUTION" shall be opened and read out and exchanged with the corresponding bid being substituted, and the substituted bid shall not be opened, but returned to the Bidder. No bid substitution shall be permitted unless the corresponding substitution notice contains a valid authorization to request the substitution and is read out at bid opening. Envelopes marked "MODIFICATION" shall be opened and read out with the corresponding bid. No bid modification shall be permitted unless the corresponding modification notice contains a valid authorization to request the modification and is read out at bid opening. Only bids that are opened and read out at bid opening shall be considered further.

- 25.3 All other envelopes shall be opened one at a time, reading out: the name of the Bidder and whether there is a modification; the total Bid Price, per lot (contract) if applicable, including any discounts and alternative bids; the presence or absence of a bid security, if required; and any other details as the Employer may consider appropriate. Only discounts and alternative bids read out at bid opening shall be considered for evaluation. The Letter of Bid and the Bill of Quantities are to be initialed by representatives of the Employer attending bid opening in the manner **specified in the BDS**. The Employer shall neither discuss the merits of any bid nor reject any bid (except for late bids, in accordance with ITB 23.1).
- 25.4 The Employer shall prepare a record of the bid opening that shall include, as a minimum: the name of the Bidder and whether there is a withdrawal, substitution, or modification; the Bid Price, per lot (contract) if applicable, including any discounts and alternative bids; and the presence or absence of a bid security, if one was required. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders.

E. Evaluation and Comparison of Bids

- 26. Confidentiality**
- 26.1 Information relating to the evaluation of bids and recommendation of contract award shall not be disclosed to Bidders or any other persons not officially concerned with the bidding process until information on Contract award is communicated to all Bidders in accordance with ITB 40.
- 26.2 Any attempt by a Bidder to influence the Employer in the evaluation of the bids or Contract award decisions may result in the rejection of its bid.
- 26.3 Notwithstanding ITB 26.2, from the time of bid opening to the time of Contract award, if a Bidder wishes to contact the Employer on any matter related to the bidding process, it shall do so in writing.
- 27. Clarification of Bids**
- 27.1 To assist in the examination, evaluation, and comparison of the bids, and qualification of the Bidders, the Employer may, at its discretion, ask any Bidder for a clarification of its bid, given a reasonable time for a response. Any clarification submitted by a Bidder that is not in response to a request by the Employer shall not be considered. The Employer's request for clarification and the response shall be in writing. No change, including any voluntary increase or decrease, in the prices or substance of the bid shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the bids, in accordance with ITB 31.
- 27.2 If a Bidder does not provide clarifications of its bid by the date and time set in the Employer's request for clarification, its bid may be rejected.

28. Deviations, Reservations, and Omissions

28.1 During the evaluation of bids, the following definitions apply:

- (a) "Deviation" is a departure from the requirements specified in the Bidding Documents;
- (b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Bidding Documents; and
- (c) "Omission" is the failure to submit part or all of the information or documentation required in the Bidding Documents.

29. Determination of Responsiveness

29.1 The Employer's determination of a bid's responsiveness is to be based on the contents of the bid itself, as defined in ITB11.

29.2 A substantially responsive bid is one that meets the requirements of the Bidding Documents without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that,

- (a) if accepted, would:
 - (i) affect in any substantial way the scope, quality, or performance of the Works specified in the Contract; or
 - (ii) limit in any substantial way, inconsistent with the Bidding Documents, the Employer's rights or the Bidder's obligations under the proposed Contract; or
- (b) if rectified, would unfairly affect the competitive position of other Bidders presenting substantially responsive bids.

29.3 The Employer shall examine the technical aspects of the bid submitted in accordance with ITB 16, Technical Proposal, in particular, to confirm that all requirements of Section VI, Works Requirements have been met without any material deviation, reservation or omission.

29.4 If a bid is not substantially responsive to the requirements of the Bidding Documents, it shall be rejected by the Employer and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.

30. Nonmaterial Nonconformities

30.1 Provided that a bid is substantially responsive, the Employer may waive any nonconformities in the Bid.

30.2 Provided that a bid is substantially responsive, the Employer may request that the Bidder submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities in the bid related to documentation requirements. Requesting information or documentation on such nonconformities shall not be related to any aspect of the price of the Bid. Failure of the Bidder to comply with the request may result in the rejection of its Bid.

30.3 Provided that a bid is substantially responsive, the Employer shall rectify quantifiable nonmaterial nonconformities related to the Bid Price. To this effect, the Bid Price shall be adjusted, for comparison purposes only, to reflect the price of a missing or non-conforming item or component. The adjustment shall be made using the method specified in Section III, Evaluation and Qualification Criteria.

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| 31. Correction of Arithmetical Errors | <p>31.1 Provided that the bid is substantially responsive, the Employer shall correct arithmetical errors on the following basis:</p> <ul style="list-style-type: none"> (a) if there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected, unless in the opinion of the Employer there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price shall be corrected; (b) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and (c) if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a) and (b) above. <p>31.2 Bidders shall be requested to accept correction of arithmetical errors. Failure to accept the correction in accordance with ITB 31.1, shall result in the rejection of the Bid.</p> |
| 32. Conversion to Single Currency | <p>32.1 For evaluation and comparison purposes, the currency(ies) of the Bid shall be converted into a single currency as specified in the BDS.</p> |
| 33. Margin of Preference | <p>33.1 Unless otherwise specified in the BDS, a margin of preference for domestic bidders¹ shall not apply.</p> |
| 34. Subcontractors | <p>34.1 Unless otherwise stated in the BDS, the Employer does not intend to execute any specific elements of the Works by subcontractors selected in advance by the Employer.</p> <p>34.2 In case of Prequalification, the Bidder's Bid shall name the same specialized subcontractor as submitted in the prequalification application and approved by the Employer.</p> <p>34.3 In case of Postqualification, the Employer may permit subcontracting for certain specialized works as indicated in Section III 4.2. When subcontracting is permitted by the Employer, the specialized sub-contractor's experience shall be considered for evaluation. Section III describes the qualification criteria for sub-contractors.</p> <p>34.4 Bidders may propose subcontracting up to the percentage of total value of contracts or the volume of works as specified in the BDS.</p> |
| 35. Evaluation of Bids | <p>35.1 The Employer shall use the criteria and methodologies listed in this Clause. No other evaluation criteria or methodologies shall be permitted.</p> |

¹ An individual firm is considered a domestic bidder for purposes of the margin of preference if it is registered in the country of the Employer, has more than 50 percent ownership by nationals of the country of the Employer, and if it does not subcontract more than 10 percent of the contract price, excluding provisional sums, to foreign contractors. JVs are considered as domestic bidders and eligible for domestic preference only if the individual member firms are registered in the country of the Employer or have more than 50 percent ownership by nationals of the country of the Employer, and the JV shall be registered in the country of the Borrower. The JV shall not subcontract more than 10 percent of the contract price, excluding provisional sums, to foreign firms. JVs between foreign and national firms will not be eligible for domestic preference.

- 35.2 To evaluate a bid, the Employer shall consider the following:
- (a) the bid price, excluding Provisional Sums and the provision, if any, for contingencies in the Summary Bill of Quantities, but including Daywork items, where priced competitively;
 - (b) price adjustment for correction of arithmetic errors in accordance with ITB 31.1;
 - (c) price adjustment due to discounts offered in accordance with ITB 14.4;
 - (d) converting the amount resulting from applying (a) to (c) above, if relevant, to a single currency in accordance with ITB 32;
 - (e) price adjustment due to quantifiable nonmaterial nonconformities in accordance with ITB 30.3;
 - (f) the additional evaluation factors are specified in Section - III, Evaluation and Qualification Criteria;
- 35.3 The estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be taken into account in bid evaluation.
- 35.4 If these Bidding Documents allows Bidders to quote separate prices for different lots (contracts), the methodology to determine the lowest evaluated price of the lot (contract) combinations, including any discounts offered in the Letter of Bid Form, is specified in Section III, Evaluation and Qualification Criteria.
- 35.5 If the bid, which results in the lowest Evaluated Bid Price, is seriously unbalanced or front loaded in the opinion of the Employer, 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, taking into consideration the schedule of estimated Contract payments, the Employer may require that the amount of the performance security be increased at the expense of the Bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract.
- 36. Comparison of Bids**
- 36.1 The Employer shall compare the evaluated prices of all substantially responsive bids established in accordance with ITB 35.2 to determine the lowest evaluated bid.
- 37. Qualification of the Bidder**
- 37.1 The Employer shall determine to its satisfaction whether the Bidder that is selected as having submitted the lowest evaluated and substantially responsive bid either continues to meet (if prequalification applies) or meets (if postqualification applies) the qualifying criteria specified in Section III, Evaluation and Qualification Criteria.
- 37.2 The determination shall be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, pursuant to ITB 17.1.
- 37.3 An affirmative determination shall be a prerequisite for award of the Contract to the Bidder. A negative determination shall result in disqualification of the bid, in which event the Employer shall

proceed to the next lowest evaluated bid to make a similar determination of that Bidder's qualifications to perform satisfactorily.

38. Employer's Right to Accept Any Bid, and to Reject Any or All Bids

- 38.1 The Employer reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to contract award, without thereby incurring any liability to Bidders. In case of annulment, all bids submitted and specifically, bid securities, shall be promptly returned to the Bidders.

F. Award of Contract

39. Award Criteria

- 39.1 Subject to ITB 38.1, the Employer shall award the Contract to the Bidder who has been determined to be the lowest evaluated bid and is substantially responsive to the Bidding Documents, provided further that the Bidder is determined to be qualified to perform the Contract satisfactorily.

40. Notification of Award

- 40.1 Prior to the expiration of the period of bid validity, the Employer shall notify the successful Bidder, in writing, that its bid has been accepted. The notification letter (hereinafter and in the Conditions of Contract and Contract Forms called the "Letter of Acceptance") shall specify the sum that the Employer will pay the Contractor in consideration of the execution and completion of the Works (hereinafter and in the Conditions of Contract and Contract Forms called "the Contract Price"). At the same time, the Employer shall also notify all other Bidders of the results of the bidding and shall publish in *UNDB online* the results identifying the bid and lot (contract) numbers and the following information:

- (i) name of each Bidder who submitted a Bid;
- (ii) bid prices as read out at Bid Opening;
- (iii) name and evaluated prices of each Bid that was evaluated;
- (iv) name of bidders whose bids were rejected and the reasons for their rejection; and
- (v) name of the successful Bidder, and the Price it offered, as well as the duration and summary scope of the contract awarded.

- 40.2 Until a formal contract is prepared and executed, the notification of award shall constitute a binding Contract.

- 40.3 The Employer shall promptly respond in writing to any unsuccessful Bidder who, after notification of award in accordance with ITB 40.1, requests in writing the grounds on which its bid was not selected.

41. Signing of Contract

- 41.1 Promptly upon notification, the Employer shall send the successful Bidder the Contract Agreement.
- 41.2 Within twenty-eight (28) days of receipt of the Contract Agreement, the successful Bidder shall sign, date, and return it to the Employer.

**42. Performance
Security**

- 42.1 Within twenty-eight (28) days of the receipt of notification of award from the Employer, the successful Bidder shall furnish the performance security in accordance with the General Conditions of Contract, subject to ITB 35.5, using for that purpose the Performance Security Form included in Section X, Contract Forms, or another form acceptable to the Employer. If the performance security furnished by the successful Bidder is in the form of a bond, it shall be issued by a bonding or insurance company that has been determined by the successful Bidder to be acceptable to the Employer. A foreign institution providing a bond shall have a correspondent financial institution located in the Employer's Country.
- 42.2 Failure of the successful Bidder to submit the above-mentioned Performance Security or sign the Contract shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security. In that event the Employer may award the Contract to the next lowest evaluated Bidder whose offer is substantially responsive and is determined by the Employer to be qualified to perform the Contract satisfactorily.



A handwritten signature or mark in blue ink, consisting of a stylized 'S' followed by a cross-like symbol.

Section II. Bid Data Sheet

A. Introduction	
ITB 1.1	The number of the Invitation for Bids is: CEIP-1/ICB-01/W-01/725 Date 10-03-215
ITB 1.1	The Employer is: Bangladesh Water Development Board (BWDB) represented by: The Project Director, Coastal Embankment Improvement Project, Phase-1 (CEIP-1), BWDB House No. 15, Road No.24(CWN), Gulshan-2, Dhaka-1212, Bangladesh
ITB 1.1	The name of the ICB is: Rehabilitation and Upgrading of Polder 32, 33, 35/1 & 35/3 under CEIP-1 The identification number of the ICB is: CEIP-1/ W-01 The number and identification of contracts comprising this ICB is: One (1).
ITB 2.1	The Borrower is: The People's Republic of Bangladesh.
ITB 2.1	Loan or Financing Agreement amount: USD 400.00 million
ITB 2.1	The name of the Project is: Coastal Embankment Improvement Project, Phase-I (CEIP-1).
ITB 4.1	Maximum number of members in the JV shall be: Three (3)
ITB 4.4	A list of debarred firms and individuals is available on the Bank's external website: http://www.worldbank.org/debarr. A Bidder shall also be ineligible for the bid, if the Bidder has been debarred by any government entity of Bangladesh and the debarment notice has been published on the CPTU website
ITB 4.8	This Bidding process is not subject to prequalification..
B. Bidding Documents	
ITB 7.1	For clarification purposes only, the Employer's address is: Attention: The Project Director, CEIP-1, BWDB Street Address: Road No. 24(CWN), Gulshan-2 House & Floor number: House No. 15 (4th Floor) City: Dhaka; ZIP Code: Dhaka-1212 Country: Bangladesh. Telephone: +88-02-9899363 Facsimile number: +88-02-9899325 Electronic mail address: sarafat.khan@gamil.com
ITB 7.1	Web page: www.bwdb.gov.bd

ITB 7.4	A Pre-Bid meeting will take place at the following two (2) consecutive date, time and place: Date: 01-04-2015 Time: 11:00 AM. and Date: 02-04-2015 Time: 11:00 AM. Place: Conference Room of Bangladesh Water Development Board, WAPDA Building (3rd Floor), Motijheel C/A, Dhaka-1000, Bangladesh. A site visit conducted by the Employer shall not be organized.
C. Preparation of Bids	
ITB 10.1	The language of the bid is English. All correspondence exchange shall be in English language. Language for translation of supporting documents and printed literature is English.
ITB 11.1 (h)	The Bidder shall submit with its bid the following additional documents: None
ITB 13.1	Alternative bids shall not be permitted .
ITB 13.2	Alternative times for completion will not be permitted .
ITB 13.4	Alternative technical solutions shall be permitted for the following parts of the Works: None
ITB 14.5	The prices quoted by the Bidder shall be subject to adjustment during the performance of the contract in accordance with the provision of the condition of contract.
ITB 15.1	The currency(ies) of the bid and the payment currency(ies) shall be in accordance with Alternative A as described below: Alternative A (Bidders to quote entirely in local currency): (a) The unit rates and the prices shall be quoted by the Bidder in the Bill of Quantities, entirely in Bangladesh Taka (BDT), the name of the currency of the Employer's country, and further referred to as "the local currency". A Bidder expecting to incur expenditures in other currencies for inputs to the Works supplied from outside the Employer's country (referred to as "the foreign currency requirements") shall indicate in the Appendix to Bid - Table C, the percentage(s) of the Bid Price (excluding Provisional Sums), needed by the Bidder for the payment of such foreign currency requirements, limited to no more than three foreign currencies. (b) The rates of exchange to be used by the Bidder in arriving at the local currency equivalent and the percentage(s) mentioned in (a) above shall be specified by the Bidder in the Appendix to Bid - Table C, and shall apply for all payments under the Contract so that no exchange risk will be borne by the successful Bidder.
ITB 18.1	The bid validity period shall be 119 (One hundred and nineteen) days
ITB 18.3 (a)	The bid price shall be adjusted by the following factor: Not applicable

ITB 19.1	A bid security shall be required. The amount and currency of the bid security shall be BDT 100.00 million or USD 1.30 million
ITB 19.3 (a)	An unconditional guarantee issued by a bank as bid security: Acceptable
ITB 19.3 (b)	An irrevocable letter of credit as bid security: Not acceptable
ITB 19.3 (c)	A cashier's or certified check as bid security: Acceptable
ITB 19.3 (d)	Other types of acceptable securities: None
ITB 20.1	In addition to the original of the bid, the number of copies is: three(3) + 1 soft copy in CD (PDF Format) / flash drive (as PDF file with copying provision)
ITB 20.2	The written confirmation of authorization to sign on behalf of the Bidder shall consist of: A Power of Attorney duly authenticated by Notary Public
D. Submission and Opening of Bids	
ITB 22.1	For <u>bid submission purposes</u> only, the Employer's address is: Attention: The Project Director, CEIP-1, BWDB Street Address: Road No. 24(CWN), Gulshan-2 House & Floor number: House No. 15 (4th Floor) City: Dhaka; ZIP Code: Dhaka-1212 Country: Bangladesh. The deadline for bid submission is: Date: 23-04-2015 Time: 3:00 PM (BST) Bidders shall not have the option of submitting their bids electronically.
ITB 25.1	The bid opening shall take place at: Street Address: Road No. 24 (CWN), Gulshan-2 House & Floor number: House No. 15 (4th Floor) City: Dhaka; ZIP Code: Dhaka-1212 Country: Bangladesh. Date: : 23-04-2015 Time: 3:30 PM (BST) Electronic Bid Opening Procedures : Not Applicable
ITB 25.3	The Letter of Bid and Bill of Quantities shall be initialed by Three (3) representatives of the Employer attending Bid opening. Each Bid shall be initialed by all representatives and shall be numbered, any modification to the unit or total price shall be initialed by the Representative of the Employer.

E. Evaluation, and Comparison of Bids	
ITB 32.1	The currency that shall be used for bid evaluation and comparison purposes to convert all bid prices expressed in various currencies into a single currency is: Bangladesh Taka (BDT) The source of exchange rate shall be: Sonali Bank, Bangladesh The date for the exchange rate shall be: 23-04-2015. The currency(ies) of the Bid shall be converted into a single currency in accordance with the procedure under Alternative A that follows: Alternative A: Bidders quote entirely in local currency For comparison of bids, the Bid Price, corrected pursuant to Clause 31, shall first be broken down into the respective amounts payable in various currencies by using the exchange rates specified by the bidder in accordance with Sub-Clause 15.1. In the second step, the Employer will convert the amounts in various currencies in which the Bid Price is payable (excluding Provisional Sums but including Day work where priced competitively) to the single currency identified above at the selling rates established for similar transactions by the authority specified and on the date stipulated above.
ITB 33.1	A margin of preference shall apply. The application methodology of margin of preference is defined in Section III – Evaluation and Qualification Criteria
ITB 34.1	At this time the Employer does not intend to execute certain specific parts of the Works by sub-contractors selected in advance.
ITB 34.4	a) Contractor's proposed subcontracting: Maximum percentage of subcontracting permitted is: 35% of the total contract amount b) Bidders planning to subcontract more than 10% of the contract amount shall specify, in the Letter of Bid, the activity (ies) or parts of the works to be subcontracted (as allowed by the Employer specified at Section III, Item 2.5(ii)) along with complete details of the sub-contractors and their qualification and experience. The qualification and experience of the sub-contractors must meet the minimum criteria for the relevant work to be sub-contracted failing which such sub-contractors will not be permitted to participate. c) Sub-contractors' qualification and experience will not be considered for evaluation of the Bidder. The Bidder on its own (without taking into account the qualification and experience of the sub-contractor) should meet the qualification criteria.

Section III

Evaluation and Qualification Criteria

Without prequalification

This Section contains all the criteria that the Employer shall use to evaluate bids and qualify Bidders. In accordance with ITB 35 and ITB 37, no other methods, criteria and factors shall be used. The Bidder shall provide all the information requested in the forms included in Section IV (Bidding Forms).

Wherever a Bidder is required to state a monetary amount, Bidders should indicate the USD equivalent using the rate of exchange determined as follows:

- For construction turnover or financial data required for each year - Exchange rate prevailing on the last day of the respective calendar year (in which the amounts for that year is to be converted) was originally established.

- Value of single contract - Exchange rate prevailing on the date of the contract.

Exchange rates shall be taken from the publicly available source identified in the ITB 32.1. Any error in determining the exchange rates in the Bid may be corrected by the Employer.

1. Domestic Preference

A margin of preference of 7.5% (seven and one-half percent) shall be granted to domestic contractors, in accordance with, and subject to, the following provisions:

- (a) Contractors applying for such preference shall provide, as part of the data for qualification, such information, including details of ownership, as shall be required to determine whether, according to the classification established by the Borrower and accepted by the Bank, a particular contractor or group of contractors qualifies for a domestic preference.
- (b) The preference and the method that will be followed in the evaluation and comparison of bids to give effect to such preference are as follows:
 - i) An individual firm will be considered a domestic bidder for purposes of the margin of preference if it is registered in the country of the Employer, has more than 50 percent ownership by nationals of the country of the Employer, and if it does not subcontract more than 10 percent of the contract price, excluding provisional sums, to foreign contractors.
 - ii) JVs will be considered as domestic bidders and eligible for domestic preference only if the individual member firms are registered in the country of the Employer or have more than 50 percent ownership by nationals of the country of the Employer, and the JV shall be registered in the country of the Borrower. The JV shall not subcontract more than 10 percent of the contract price, excluding provisional sums, to foreign firms. JVs between foreign and national firms will not be eligible for domestic preference.
- (c) After bids have been received and reviewed by the Borrower, responsive bids shall be classified into the following groups:
 - i) Group A: bids offered by domestic contractors eligible for the preference.
 - ii) Group B: bids offered by other contractors.

All evaluated bids in each group shall, as a first evaluation step, be compared to determine the lowest bid, and the lowest evaluated bids in each group shall be further compared with each other. If, as a result of this comparison, a bid from Group A is the lowest, it shall be selected for the award. If a bid from Group B is the lowest, as a second evaluation step, all bids from Group B shall then be further compared with the lowest evaluated bid from Group A. For the purpose of this further comparison only, an amount equal to 7.5% (seven and one-half percent) of the respective bid price corrected for arithmetical errors, including unconditional discounts and excluding provisional sums and the cost of day works, if any, shall be added to the evaluated price offered in each bid from Group B. If the bid from Group A is the lowest, it shall be selected for award. If not, the lowest evaluated bid from Group B based on the first evaluation step shall be selected.

2 Evaluation

In addition to the criteria listed in ITB 35.2 (a) – (e) the following criteria shall apply:

2.1 Assessment of adequacy of Technical Proposal with Requirements:

Evaluation of the Bidder's Technical Proposal will include an assessment of the Bidder's technical capacity to mobilize key equipment and personnel for the contract consistent with its proposal regarding work methods, scheduling, and material sourcing in sufficient detail and fully in accordance with the requirements stipulated in **Section VII** Works Requirements.

2.2 Multiple Contracts, if permitted under ITB 35.4, will be evaluated as follows: Not applicable.

2.3 Alternative Completion Times, if permitted under ITB 13.2, will be evaluated as follows: **Not permitted.**

2.4 Technical alternatives, if permitted under ITB 13.4, will be evaluated as follows: **Not permitted.**

2.5 Subcontractor

Only the specific experience of subcontractors for works permitted by the Employer will be considered. The general experience and financial resources of the subcontractors shall not be added to those of the Bidder for purposes of qualification of the Bidder.

The subcontractors proposed shall be fully qualified for their work proposed, and meet the following criteria:

- (i) For proposals for subcontracting components of the Works amounting to more than 10 percent of the Contract Price, the bidder shall provide details of the activities (as specified below in serial (ii)), in which he would be subcontracting. The ceiling for subcontractor's participation is 35% of total contract amount.
- (ii) The Employer allows following components for subcontracting;
 - 1. Excavation / Re-excavation of Drainage Channel, Bill No.03 included in the Bill of Quantities (BoQ);
 - 2. Repairing of Drainage Sluices, Bill No.05 and Repairing of Flushing Inlets, Bill No.07 included in the Bill of Quantities(BoQ);
 - 3. Embankment Slope Protection Work, Bill No.08 included in the Bill of Quantities (BoQ);
 - 4. Dismantling of Brick Soling, Bituminous Carpeting Road, Drainage Sluice, Flushing Inlet and Salvage of Concrete Block/Boulder, Bill No.10 included in the Bill of Quantities(BoQ); and
 - 5. Manufacturing, supplying and Installation of M.S. Vertical lift gate, Flap gate as included in the Bill of Quantities under Bill No.04, Item No.4.22 & 4.23 and Bill No.06, Item No.6.21 & 6.22
 - 6. Supply of Construction Materials as per Specifications
- (iii) The subcontractors shall meet the requirements as specified hereunder to carry out the work components mentioned above under para 2.5(ii);

1. Excavation / Re-excavation of Drainage Channel, Bill No.03

Minimum Year of Experience in Similar Works (Canal/ Channel/River excavation/re-excavation)	Minimum volume of earth excavated in a single year	Other Requirements
10	0.33 million m ³	Must possess update trade licence, TIN Certificate, VAT Certificate

2. Repairing of Drainage Sluices, Bill No.05 and Repairing of Flushing Inlets, Bill No.07

Minimum Year of Experience in Similar Works (Construction and reconstruction of regulators, sluices, bridges)	Minimum Nos. of Structures(regulators, sluices, bridges) constructed/ reconstructed in a single year	Other Requirements
10	10	Must possess update trade licence, TIN Certificate, VAT Certificate

3. Embankment Slope Protection Work, Bill No.08

Minimum Year of Experience in Similar Works (Protective works of embankment or Construction of Groyne / RCC Spur	Minimum works accomplished in a single year	Other Requirements
10	River Bank Protection/ Embankment Slope Projection work covering a Slope Area (River Bank/ Embankment) of minimum 120,000 m² Or Groyne of involving Earthwork of 20,000 m³ armoured with hard materials Or RCC Spur (with RCC Piling) of Volume of RCC Works minimum 1200 m³ armoured with hard materials	Must possess update trade licence, TIN Certificate, VAT Certificate

4. Dismantling of Brick Soling, Bituminous Carpeting Road, Drainage Sluice, Flushing Inlet and Salvage of Concrete Block/Boulder, Bill No.10

Minimum Year of Experience in Similar Works (Brick Soling, Bituminous Carpeting Road, Drainage Sluice, Flushing Inlet)	Minimum works accomplished in a single year	Other Requirements
	i) Dismantling of CC/ RCC Works & ii) Dismantling of Road Carpeting/ Herring Bone Bond Road Surface	

10	i) 12,000 m ³ & ii) 50,000 m ²	Must possess update trade licence, TIN Certificate, VAT Certificate
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5. Manufacturing, supplying and Installation of M.S. Vertical lift gate, Flap gate

Minimum Year of Experience in Similar Works (Manufacturing, supplying and Installation of M.S. Vertical lift gate, Flap gate)	Minimum of Gates manufactured and installed in a single year (Minimum Size: 0.90mx1.20m)	Other Requirements
10	55	Must possess update trade licence, TIN Certificate, VAT Certificate

6. Supply of Construction Materials as per specifications

Minimum Year of Experience in Supply of Construction Materials	Minimum quantities supplied in a single year	Other Requirements
10	Sand- 36000 m ³ Cement – 8000 M.ton Stone- 23000 m ³ M.S. Rod- 400 ton Brick- 3,000,000 Nos. Hard Rock- 30000 m ³	Must possess update trade licence, TIN Certificate, VAT Certificate

- (iv) The Bidder shall furnish the document of qualification and experience of each subcontractor with its bid

3. Qualification

Eligibility and Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All Parties Combined	Each Member	One Member	
1. Eligibility							
1.1	Nationality	Nationality in accordance with ITB 4.3	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Forms ELI – 1.1 and 1.2, with attachments
1.2	Conflict of Interest	No conflicts of interest in accordance with ITB 4.2	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Letter of Bid
1.3	Bank Eligibility	Not having been declared ineligible by the Bank, as described in ITB 4.4, 4.5, 4.6 and 4.7	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Letter of Bid
1.4	Government Owned Entity of the Borrower country	Meets conditions of ITB 4.5	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Forms ELI – 1.1 and 1.2, with attachments
1.5	United Nations resolution or Borrower’s country law	Not having been excluded as a result of prohibition in the Borrower’s country laws or official regulations against commercial relations with the Bidder’s country, or by an act of compliance with UN Security Council resolution, both in accordance with ITB 4.7 and Section V.	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Forms ELI – 1.1 and 1.2, with attachments

Eligibility and Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All Parties Combined	Each Member	One Member	
2. Historical Contract Non-Performance							
2.1	History of Non-Performing Contracts	Non-performance of a contract ² did not occur as a result of contractor default since 1 st January 2012	Must meet requirement	Must meet requirements	Must meet requirement ³	N/A	Form CON-2
2.2	Suspension Based on Execution of Bid Securing Declaration by the Employer or withdrawal of the Bid within Bid validity	Not under suspension based on execution of a Bid Securing Declaration pursuant to ITB 4.6 or withdrawal of the Bid pursuant ITB 19.9.	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Bid Submission Form
2.3	Pending Litigation	Bidder's financial position and prospective long term profitability sound according to criteria established in 3.1 below and assuming that all pending litigation will be resolved against the Bidder	Must meet requirement	N/A	Must meet requirement	N/A	Form CON – 2
2.4	Litigation History	No consistent history of court/arbitral award decisions against the Bidder ⁴ since 1 st January 2010	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Form CON – 2

² Non performance, as decided by the Employer, shall include all contracts where (a) non performance was not challenged by the contractor, including through referral to the dispute resolution mechanism under the respective contract, and (b) contracts that were so challenged but fully settled against the contractor. Non performance shall not include contracts where Employers decision was overruled by the dispute resolution mechanism. Non performance must be based on all information on fully settled disputes or litigation, i.e. dispute or litigation that has been resolved in accordance with the dispute resolution mechanism under the respective contract and where all appeal instances available to the Bidder have been exhausted.

³ This requirement also applies to contracts executed by the Bidder as JV member.

⁴ The Bidder shall provide accurate information on the letter of Bid about any litigation or arbitration resulting from contracts completed or ongoing under its execution over the last five years. A consistent history of court/arbitral awards against the Bidder or any member of a joint venture may result in disqualifying the Bidder.

Eligibility and Qualification Criteria		Compliance Requirements					Documentation
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All Parties Combined	Each Member	One Member	
3. Financial Situation and Performance							
3.1	Financial Capabilities	(i) The Bidder shall demonstrate that it has access to, or has available, liquid assets, unencumbered real assets, lines of credit, and other financial means (independent of any contractual advance payment) sufficient to meet the construction cash flow requirements estimated as US\$ 11.00 million for the subject contract(s) net of the Bidders other commitments (ii) The Bidders shall also demonstrate, to the satisfaction of the Employer, that it has adequate sources of finance to meet the cash flow requirements on works currently in progress and for future contract commitments. (iii) The audited balance sheets or, if not required by the laws of the Bidder's country, other financial statements acceptable to the Employer, for the last 5(five) years shall be submitted and must demonstrate the current soundness of the Bidder's financial position and indicate its prospective long-term profitability.	Must meet requirement	Must meet requirement	N/A	N/A	Form FIN – 3.1, with attachments
			Must meet requirement	Must meet requirement	N/A	N/A	
			Must meet requirement	N/A	Must meet requirement	N/A	
3.2	Average Annual Construction Turnover	Minimum average annual construction turnover of US\$ 50.00 (fifty) million , calculated as total certified payments received for contracts in progress and/or completed within the last 5(five) years, divided by 5 (five) years	Must meet requirement	Must meet requirement	Must meet 20%(twenty percent) of the requirement	Must meet 40% (Forty percent) of the requirement	Form FIN – 3.2

Eligibility and Qualification Criteria			Compliance Requirements			Documentation	
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All Parties Combined	Each Member	One Member	
4. Experience							
4.1 (a)	General Construction Experience	Experience under construction contracts in the role of prime contractor, JV member, sub-contractor, or management contractor for at least the last 10(ten) years, starting 1 st January 2005	Must meet requirement	N/A	Must meet requirement	N/A	Form EXP – 4.1
4.2 (a)	Specific Construction & Contract Management Experience	(i) A minimum number of similar ⁵ contracts specified below that have been satisfactorily and substantially ⁶ completed as a prime contractor, joint venture member ⁷ , management contractor or sub-contractor ⁷ between 1st January 2005 and bid submission deadline: (i) Two (2) contracts, each of minimum value US\$ 80 million; Or (ii) One (1) contract of minimum value of US\$ 160 million;	Must meet requirement	Must meet requirement ⁸	N/A	N/A	Form EXP 4.2(a)

⁵ The similarity shall be based on the physical size, complexity, methods/technology and/or other characteristics of river/road /railway as described in Section VII, Work's Requirements. Summation of number of small value contracts (less than the value specified under requirement) to meet the overall requirement will not be accepted.

⁶ Substantial completion shall be based on 80% or more works completed under the contract.

⁷ For contracts under which the Bidder participated as a joint venture member or sub-contractor, only the Bidder's share, by value, shall be considered to meet this requirement.

⁸ In the case of JV, the value of contracts completed by its members shall not be aggregated to determine whether the requirement of the minimum value of a single contract has been met. Instead, each contract performed by each member shall satisfy the minimum value of a single contract as required for single entity. In determining whether the JV meets the requirement of total number of contracts, only the number of contracts completed by all members each of value equal or more than the minimum value required shall be aggregated.

Eligibility and Qualification Criteria							
Eligibility and Qualification Criteria				Compliance Requirements			Documentation
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All Parties Combined	Each Member	One Member	
4.2 (b)		For the above and any other contracts completed and under implementation as prime contractor, joint venture member, management contractor or sub-contractor ⁹ on or after the first day of the calendar year during the period stipulated in 4.2 (a) above, a minimum construction experience in the following key activities successfully completed ¹⁰ :					
4.2(b).i)	Embankment (Dyke/Road embankment/Railway Embankment)	Rehabilitation/Reconstruction and Upgrading of Embankment of minimum annual production rate in a single year of 1.5 million m³ of Earthwork (compacted to 90% dry density at optimum water content)	Must meet requirement	Must meet requirement	Must meet 20%(Twenty percent) of the requirement	Must meet 40% (Forty percent) of the requirement	Form EXP – 4.2 (b)
4.2(b).ii)	Hydraulic Structure (Regulator/ Sluice/Barrage/ Spillway/Bridge)	Reinforced Cement Concrete (RCC) work in hydraulic structures of minimum annual production rate in a single year of 6000 m³	Must meet requirement	Must meet requirement	Must meet 20%(Twenty percent) of the requirement	Must meet 40% (Forty percent) of the requirement	Form EXP – 4.2 (b)
4.2(b).iii)	Protective Works	River Bank Protection/Embankment Slope Projection work covering a Slope Area (River Bank/ Embankment) of minimum 130,000 m² in a single year using hard materials (CC Block/ Hard Rock / Stone Boulders) in Launching Apron and Slope	Must meet requirement	N/A	N/A	Must meet requirement	Form EXP – 4.2 (b)

⁹ For contracts under which the Bidder participated as a joint venture member or sub-contractor, only the Bidder's share shall be counted to meet this requirement.

¹⁰ Volume, number or rate of production of any key activity can be demonstrated in one or more contracts combined if executed during same time period. The rate of production shall be the annual production rate for the key construction activity (or activities).

Eligibility and Qualification Criteria							
Eligibility and Qualification Criteria				Compliance Requirements			Documentation
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All Parties Combined	Each Member	One Member	
	Or River Training Works Groyne : minimum length 200 m	Volume of Earthwork involved, minimum 40,000 m³ armored with hard materials (CC Block/ Hard Rock/ Stone Boulders) in a single year,	Must meet requirement	N/A	N/A	Must meet requirement	Form EXP – 4.2 (b)
	Or RCC Spur minimum length 300 m	RCC Spur (with RCC Piling) of Volume of RCC Works minimum 2500 m³ armored with hard materials (CC Block/ Hard Rock/ Stone Boulders) in a single year,	Must meet requirement	N/A	N/A	Must meet requirement	Form EXP – 4.2 (b)
4.2(b). iv)	Closure Dam	Closure Dam across a flowing Tidal River of minimum depth of water 10m involving earth fill volume of minimum 250,000 m³ fortified with hard materials completed in one dry season.,	Must meet requirement	N/A	N/A	Must meet requirement	Form EXP – 4.2 (b)
	Or Hydro Power Dam / Break Water Construction	Hydro Power Dam/Break Water Construction of minimum height 13m of minimum volume 250,000 m³	Must meet requirement	N/A	N/A	Must meet requirement	

3.1 Personnel

The Bidder must demonstrate that it has the personnel for the key positions that meet the following requirements:

Sl. No.	Position	Years of experience (Min ^m .)	Educational Qualification (Min ^m .)	No.	Years of experience in Similar Works
1	Project Manager ¹	15	Masters in Engg. (Civil/WR/Coastal / Hydraulics)	1	7
2	Project Engineer	15	Bachelor in Engg. (Civil/WR)	4	5
3	Project Engineer	15	Bachelor in Engg. (Mech.)	1	5
4	Material / Quality Control Engineer ²	10	Bachelor in Engg. (Civil)	3	5
5	Quantity Surveyor	10	Bachelor in Engg. (Civil)	2	4
6	Construction Supervisor	15	Diploma in Engg.(Civil)	8	5

¹Proposed Project Manager would have worked as Project Manager for at least seven (7) years of which international experience should be a minimum of three (3) years. In case of JV, the Project Manager shall be from the organization of the Authorized Representative of the JV.

²Proposed Material/Quality Control Engineers would have worked as Material /Quality Control Engineer for at least five (5) years of which international experience should be a minimum of two (2) years

The ruling language and language for communications being English as stated in Sub-Clause 1.4 of the Contract Data in Section IX – Particular Conditions, the Contractor's above key personnel shall have to be fluent in English.

The proposed personnel for the above key positions shall be evaluated against the minimum criteria stated for each as above. The Bidder may propose additional staff, as deemed necessary, which shall however not be evaluated for determining the acceptability of the offered bid. Further, at least 50% of the deployed key staff must be from the Bidder's own organization as single entity or all members of the JV combined.

The Bidder shall provide details of the proposed personnel and their experience records using Forms PER-1 and PER-2 included in Section IV, Bidding Forms.

3.2 Equipment

The Bidder must demonstrate that it owns or have proven access to hire or lease of the key equipment listed hereafter:

No.	Equipment Type and Characteristics	Min ^m . Capacity / dimension	Min ^m . No(s). / Set(s)
A. Critical Plant and Equipment			
01	Excavator	160 HP, Reach-7.0 m, and Bucket Capacity- 1 m ³	12 (Twelve)
02	Bull Dozer	260 HP, Blade Capacity 5 m ³	12 (Twelve)
03	Dump Truck	(i) Capacity-30 ton; and (ii) Capacity-10 ton	(i) 68 (sixty-eight); and (ii) 40 (forty)

No.	Equipment Type and Characteristics	Min ^m . Capacity / dimension	Min ^m . No(s). / Set(s)
04	Pay Loader	170 HP, and Bucket Capacity 3 m ³	Eight (8).
05	Motor Grader	200 HP, Blade width - 3.6 m	Four (4)
06	Vibratory Roller	130 HP, Drum Type, and Operating Weight-10 ton	16 (sixteen)
07	Generator	(i) 250 KW; and (j) 90 KW	(i) Five (5); and (ii) Eight (8)
08	Vibro Hammer for Sheet Piling	120 HP, 6.5 ton	Six (6)
09	i) Concrete Batching Plant ii) Concrete Transit Mixer iii) Concrete Pump	i) 25 m ³ / hour ii) Concrete output- 3 m ³ , Drum rotation (rpm) - 0-21 iii) Vertical pumping height: 0-15 m, Horizontal pumping distance:0-75 m, and Pumping rate- 15 m ³ /hr.	i) Four (4) ii) Eight (8) iii) Five (5)
10	Water Tanker	2,000 litre	Five (5)
11	Stone Crusher	Engine 130 HP, Crushing Capacity: 80 ton/hr.	One (1)
12	Flat top barge / pontoon for dumping Hard Rock / C.C. Block	Barge 10m x 6m, capacity 100 ton	Four (4)
13	Flat top barge equipped with crane and positioning system for monitoring placing of hard materials	Barge: 15m x 6m; capacity 100 ton; and Crane capacity 3 ton	Four (4)
14	Tug boat	700 HP	Eight (8)
15	Long boom Crane	Boom 30m and capacity 30 ton	Four (4)
16	Double drum power driven mooring winches	200 ton (floating)	Four (4)
B: Minor Plant and Equipment			
01	Hand operated soil compactor	0.40 ton	12 (Twelve)
02	Concrete mixer machine with appropriate size of hopper	0.4 m ³ Capacity.	25 (Twenty Five)
03	Concrete vibrator machine	Standard Nozzle (dia. 12 mm - 50 mm)	90 (ninety)
04	Flipper delta type anchor	1.5 ton	Eight (8)
05	Power driven country boat	20 ton	Four (4)
06	Power driven country boat for inspection and diving team	10 ton	Two (2)
07	Generator for site electrification	6 KW	36 (Thirty-six)
08	Power pump	30 ltr/sec.	56 (Fifty-six)
09	Water pump	60 ltr/sec	30 (Thirty)
10	Sand Piling Equipment	One (1) Ton Hammer	55 (fifty-five)

No.	Equipment Type and Characteristics	Min ^m . Capacity / dimension	Min ^m . No(s). / Set(s)
11	Rotary/Percussion type drilling Rig with all accessories for RCC Cast in Situ Bored Pile	Minimum 600 mm dia	Two (2)
12	Sub-surface dewatering system	As per requirement	25 (Twenty-five)
Documentation equipment			
01.	Digital Camera	Minimum 10 megapixel with recording date and time	Four (4)
02.	Professional Digital Video Camera	With capture card-SNAZZI, USB-2.0 DVD	Four (4)
03.	Desktop Computer	80 GB	Four (4)
04.	Multifunction color printer-cum-copier and scanner	Paper size: A-3 size	Four (4)
Survey Equipment			
01.	ADCP	Frequency-2400 KHz; Profiling Range- minimum four (4) m	Two (2)
02.	Survey boat	Power driven 50 HP minimum	Four (4) of each
03.	Digital Echo Sounder	-	
04.	DGPS	-	
05.	Total Station	-	
06.	Prism	-	
07.	Optical Level	-	
08.	Side Scan Sonar with accessories		
09.	Rugged Water proof Military Standard Computer with 2 to 4 Serial port	500 GB	
10.	Leveling instrument		
11.	Theodolite		
Diving Equipment			
01.	All necessary equipment	-	Six (6)

The Bidder shall provide further details of proposed items of equipment using Form EQU in Section IV, Bidding Forms.

At least 40% of Critical Plant and Equipment listed above should be owned by the bidder alone as single entity or all members of the JV combined. The bidder, in support of the above, shall produce documentary evidence.

In case of hiring equipment, the bidder must provide relevant documents from the respective organization.

Section IV

Bidding Forms



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Letter of Bid

Date: _____

ICB No.: _____

Invitation for Bid No.: _____

Alternative No.: _____

To: _____

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (ITB 8) _____;
- (b) We meet the eligibility requirements and have no conflict of interest in accordance with ITB 4;
- (c) We have not been suspended nor declared ineligible by the Employer based on execution of a Bid Securing Declaration in the Employer's country in accordance with ITB 4.6.
- (d) We offer to execute in conformity with the Bidding Documents the following Works:

- (e) The total price of our Bid, excluding any discounts offered in item (f) below is:

- (f) The discounts offered and the methodology for their application are:
 - i) The discounts offered are: _____
 - ii) The exact method of calculations to determine the net price after application of discounts is shown below: _____;
- (g) Our bid shall be valid for a period of _____ days after the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- (h) If our bid is accepted, we commit to obtain a performance security in accordance with the Bidding Documents;
- (i) We are not participating, as a Bidder or as a subcontractor, in more than one bid in this bidding process in accordance with ITB 4.2(e), other than alternative bids submitted in accordance with ITB 13;
- (j) We, including any of our subcontractors or suppliers for any part of the contract, have not been declared ineligible by the Bank, under the Employer's country laws or official regulations or by an act of compliance with a decision of the United Nations Security Council;
- (k) We have paid, or will pay the following commissions, gratuities, or fees with respect to the bidding process or execution of the Contract:



Name of Recipient	Address	Reason	Amount
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

(If none has been paid or is to be paid, indicate "none.")

- (m) We understand that this bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed; and
- (n) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive.
- (o) We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf will engage in any type of fraud and corruption.

Name of the Bidder*_____

Name of the person duly authorized to sign the Bid on behalf of the Bidder**_____

Title of the person signing the Bid_____

Signature of the person named above_____

Date signed _____ day of _____, _____

* In the case of the Bid submitted by joint venture (JV) specify the name of the JV as Bidder

** Person signing the Bid shall have the power of attorney given by the Bidder to be attached with the Bid

Appendix to Bid

Schedule of Adjustment Data

[In Tables A, B, and C, the Bidder shall (a) indicate its amount of local currency payment, (b) indicate its proposed source and base values of indices for the different foreign currency elements of cost, (c) derive its proposed weightings for local and foreign currency payment, and (d) list the exchange rates used in the currency conversion.

The works of 10 (ten) Bills of the BoQ (**under Bill No.2 through Bill No.11**) are subject to price adjustment and are clustered in 6 (six) Groups. The Groups comprising the Bill/Bills, Index Code/Abbreviations of the Element and corresponding adjustable Coefficient used in the Adjustment Tables [Table A (A.1 through A.6) and Table B (Table B.1 through B.6)] are described in the following Table:

Group No.	Bill/ Bills of Works under the Group	Index Code/ Abbreviation	Element Name	Price Adjustment Coefficient	Remarks
Group No.01	Bill No.02	La	Labour	B	i) The numerical number assigned to the each of the Coefficient in the following Tables is referred to the Group No. under which the Bill No./Bill Nos. of the Bill of Quantities (BoQ) is /are comprised; e.g. D4 is the Coefficient of Element Machinery & Equipment for Group No.04: Bill No.05 & Bill No.07 (Repairing of Drainage Sluice & Repairing of Flushing Inlets) ii) 'A' is the Nonadjustable fixed Coefficient
		Fu	Fuel	C	
Group No.02	Bill No.03 & Bill No.10	ME	Machinery & Equipment	D	
Group No.03	Bill No.04 & Bill No.06	Sa	Sand	E	
		Ce	Cement	F	
Group No.04	Bill No.05 & Bill No.07	St	Stone	G	
Group No.05	Bill No.08 & Bill No.11	RS	Reinforcing Steel	H	
				I	
Group No.06	Bill No.09	SP	Steel Plate/Angle	J	
		Br	Brick	K	
		HR	Hard Rock		

Table A.1: Local Currency**Group No.01: Bill No.02 (Construction / Re-sectioning of Embankment)**

Index code*	Index description	Source of index	Base value and date**	Bidder's related currency amount	Bidder's proposed weighting
A	Nonadjustable	—	-	—	A: 0.200
La	Labour	Monthly Statistical Bulletin of Bangladesh (MSBB) as updated from time to time and published by Bangladesh Bureau of Statistics (BBS) under Ministry of Planning (MoP), Government of Bangladesh (GoB)..			*B1: 0.170- 0.190
Fu	Fuel	Authorized dealer of the Eastern Refineries for High Speed Diesel (HSD)			*C1: 0.250- 0.280
ME	Machinery & Equipment	Bidder shall specify			*D1: 0.350- 0.370
			Total:		

“A” is the Nonadjustable fixed Coefficient = 0.20.

* Bidder will specify a value within the range given in the Table above such that the total weighting = 1.00

** These details will be entered by Employer, while signing the Contract Agreement, based on values exist on the month for submission of bid.

Table A.2: Local Currency**Group No.02: Bill No.03 & Bill No.10 (Excavation / Re-excavation of Drainage Channel & Dismantling of Brick Soling / Bituminous Carpeting Road)**

Index code*	Index description	Source of index	Base value and date**	Bidder's related currency amount	Bidder's proposed weighting
A	Nonadjustable	—	---	—	A: 0.200
La	Labour	MSBB as updated from time to time and published by BBS, under MoP, GoB.			*B2: 0.520- 0.540
Fu	Fuel	Authorized dealer of the Eastern Refineries for High Speed Diesel (HSD)			*C2: 0.130- 0.150
ME	Machinery & Equipment	Bidder shall specify			*D2: 0.120- 0.140
			Total:		

“A” is the Nonadjustable fixed Coefficient = 0.20.

* Bidder will specify a value within the range given in the Table above such that the total weighting = 1.00

** These details will be entered by Employer, while signing the Contract Agreement, based on values exist on the month for submission of bid

Table A.3: Local Currency**Group No.03: Bill No.04 & Bill No.06 (Construction of Drainage Sluices & Construction of Flushing Inlets)**

Index code*	Index description	Source of index	Base value and date****	Bidder's related currency amount	Bidder's proposed weighting
	Nonadjustable	—	----	—	A: 0.200
La	Labour	MSBB as updated from time to time and published by BBS, under MoP, GoB..			*B3: 0.200- 0.210
Fu	Fuel	Authorized dealer of the Eastern Refineries for High Speed Diesel (HSD)			*C3: 0.040- 0.050
ME	Machinery & Equipment	Bidder shall specify			*D3: 0.040- 0.050
Sa	Sand	MSBB as updated from time to time and published by BBS, under MoP, GoB..			*E3: 0.110- 0.120
Ce	Cement	-Do-			*F3: 0.07- 0.080
**St	Stone	Average whole sale price of stone at Chhatak, Sylhet			*G3: 0.070- 0.080
***RS	Reinforcing Steel	MSBB as updated from time to time and published by BBS, under MoP, GoB..			*H3: 0.09-0.100
SP	Steel Plate/Angle	Bidder shall mention			*I3: 0.120- 0.130
Br	Brick	MSBB as updated from time to time and published by BBS, under MoP, GoB..			*J3: 0.020- 0.030
			Total:		

“A” is the Nonadjustable fixed Coefficient = 0.20.

* Bidder will specify a value within the range given in the Table above such that the total weighting = 1.00

** The Price Index / Rate of Stone of sizes ranging from 75 mm – 200 mm shall be taken for all stone sizes.

*** The Price Index / Rate of Reinforcing Steel (RS) / Iron Bars of different diameters shall be taken as the same as that of 10 mm diameter bars

**** These details will be entered by Employer, while signing the Contract Agreement, based on values exist on the month for submission of bid.

Table A.4: Local Currency**Group No.04: Bill No.05 & Bill No. 07 (Repairing of Drainage Sluices & Repairing of Flushing Inlets)**

Index code*	Index description	Source of index	Base value and date***	Bidder's related currency amount	Bidder's proposed weighting
	Nonadjustable	—	----	—	A: 0.200
La	Labour	MSBB as updated from time to time and published by BBS, under MoP, GoB.			*B4: 0.420- 0.440
Fu	Fuel	Authorized dealer of the Eastern Refineries for High Speed Diesel (HSD)			*C4: 0.050- 0.060
ME	Machinery & Equipment	Bidder shall specify			*D4: 0.040- 0.050
Sa	Sand	MSBB as updated from time to time and published by BBS, under MoP, GoB.			*E4: 0.040- 0.050
Ce	Cement	-Do-			*F4: 0.060- 0.070
**St	Stone	Average whole sale price of stone at Chhatak, Sylhet			*G4: 0.070- 0.080
SP	Steel Plate/Angle	Bidder shall mention			*I4: 0.040- 0.050
Br	Brick	MSBB as updated from time to time and published by BBS, under MoP, GoB..			*J4 0.040-050
			Total:		

“A” is the Nonadjustable fixed Coefficient = 0.20

*Bidder will specify a value within the range given in the Table above such that the total weighting = 1.00

**The Price Index / Rate of Stone (St) of sizes ranging from 75mm – 200mm shall be taken for all stone sizes.

*** These details will be entered by Employer, while signing the Contract Agreement, based on values exist on the month for submission of bid.

Table A.5: Local Currency

Group No.05 :Bill No.08 & Bill No.11: (Embankment Slope Protection Work and Construction of Closure Dam)

Index code*	Index description	Source of index	Base value and date***	Bidder's related currency amount	Bidder's proposed weighting
	Nonadjustable	—	----	—	A: 0.200
La	Labour	MSBB as updated from time to time and published by BBS, under MoP, GoB..			*B5: 0.260-0.270
Fu	Fuel	Authorized dealer of the Eastern Refineries for High Speed Diesel (HSD)			*C5: 0.020-0.030
ME	Machinery & Equipment	Bidder shall specify			*D5: 0.020-0.030
Sa	Sand	MSBB as updated from time to time and published by BBS, under MoP, GoB.			*E5: 0.060-0.070
Ce	Cement	-Do-			*F5: 0.150-0.170
**St	Stone	Average whole sale price of stone at Chhatak, Sylhet			*G5: 0.220-0.230
Br	Brick	MSBB as updated from time to time and published by BBS, under MoP, GoB.			*J5: 0.030-0.040
Total:					

“A” is the Nonadjustable fixed Coefficient = 0.20.

*Bidder will specify a value within the range given in the Table above such that the total weighting = 1.00

**The Price Index/Rate of Stone of sizes ranging from 75mm – 200 mm shall be taken for all stone sizes.

***These details will be entered by Employer, while signing the Contract Agreement, based on values exist on the month for submission of bid.

Table A.6: Local Currency**Group No.06: Bill No.09 (River Bank Protection Work)**

Index code*	Index description	Source of index	Base value and date***	Bidder's related currency amount	Bidder's proposed weighting
	Nonadjustable	—	-----	—	A: 0.200
La	Labour	MSBB as updated from time to time and published by BBS, under MoP, GoB.			*B6: 0.150-0.160
Fu	Fuel	Authorized dealer of the Eastern Refineries for High Speed Diesel (HSD)			*C6: 0.050-0.060
ME	Machinery & Equipment	Bidder shall specify			*D6: 0.050-0.060
Sa	Sand	MSBB as updated from time to time and published by BBS, under MoP, GoB..			*E6: 0.010-0.020
Ce	Cement	-Do-			*F6: 0.020-0.030
**St	Stone	Average whole sale price of stone at Chhatak, Sylhet			*G6 : 0.030-0.040
HR	Hard Rock	Madhapara Granite Mining Company Limited , Parbatipur, in Dinajpur District under the Ministry of Power, Energy & Mineral Resources.			*K6: 0.45-0.47
			Total:		

“A” is the Nonadjustable fixed Coefficient = 0.20.

*Bidder will specify a value within the range given in the Table above such that the total weighting = 1.00

**The Price Index/Rate of Stone of sizes ranging from 75mm – 200 mm shall be taken for all stone sizes.

***These details will be entered by Employer, while signing the Contract Agreement, based on values exist on the month for submission of bid.

Table B.1: Foreign Currency

State type: [If Bidder wishes to quote in more than one foreign currency (*up to three currencies permitted*) then this table should be repeated for each foreign currency.]

Group No.01: Bill No.02 (Construction / Re-sectioning of Embankment)

Index code	Index description	Source of index	**Base value and date	Bidder's related source currency in type / amount	Equivalent in FC1	Bidder's proposed weighting
	Nonadjustable	—	—	—	----	A: 0.200
La	Labour	Monthly Statistical Bulletin of Bangladesh (MSBB) as updated from time to time and published by Bangladesh Bureau of Statistics (BBS) under Ministry of Planning (MoP), Government of Bangladesh (GoB).				*B1: 0.170- 0.190
Fu	Fuel	Authorized dealer of the Eastern Refineries for High Speed Diesel (HSD)				*C1: 0.250- 0.280
ME	Machinery & Equipment	Bidder shall specify				*D1: 0.350- 0.370
			Total:			

"A" is the Nonadjustable fixed Coefficient = 0.20.

*Bidder will specify a value within the range given in the Tables above such that the total weighting = 1.00

**These details will be entered by Employer, while signing the Contract Agreement, based on values exist on the month for submission of bid.

Table B.2: Foreign Currency

Group No.02: Bill No.03 & Bill No.10 (Excavation / Re-excavation of Drainage Channel & Dismantling of Brick Soling/Bituminous Carpeting Road)

Index code	Index description	Source of index	**Base value and date	Bidder's related source currency in type / amount	Equivalent in FC1	Bidder's proposed weighting
	Nonadjustable	----	----	—		A: 0.200
La	Labour	MSBB as updated from time to time and published by BBS, under MoP, GoB.				*B2: 0.520-0.540
Fu	Fuel	Authorized dealer of the Eastern Refineries for High Speed Diesel (HSD)				*C2: 0.130- 0.150
ME	Machinery & Equipment	Bidder shall specify				*D2: 0.120- 0.140
			Total:			

"A" is the Nonadjustable fixed Coefficient = 0.20.

*Bidder will specify a value within the range given in the Tables above such that the total weighting = 1.00

**These details will be entered by Employer, while signing the Contract Agreement, based on values exist on the month for submission of bid.

Table B.3: Foreign Currency

Group No.03: Bill No.04 & Bill No.06 (Construction of Drainage Sluices & Construction of Flushing Inlets)

Index code	Index description	Source of index	****Base value and date	Bidder's related source currency in type / amount	Equivalent in FC1	Bidder's proposed weighting
	Nonadjustable	—	----	—		A: 0.200
La	Labour	MSBB as updated from time to time and published by BBS, under MoP, GoB.				*B3: 0.200-0.210
Fu	Fuel	Authorized dealer of the Eastern Refineries for High Speed Diesel (HSD)				*C3: 0.040-0.050
ME	Machinery & Equipment	Bidder shall specify				*D3: 0.040-0.050
Sa	Sand	MSBB as updated from time to time and published by BBS, under MoP, GoB.				*E3: 0.110-0.120
Ce	Cement	-Do-				*F3: 0.07-0.080
**St	Stone	Average whole sale price of stone at Chhatak, Sylhet				*G3: 0.070-0.080
***R S	Reinforcing Steel	MSBB as updated from time to time and published by BBS, under MoP, GoB.				*H3: 0.09-0.100
SP	Steel Plate/Angle	Bidder shall specify				*I3: 0.120-0.130
Br	Brick	MSBB as updated from time to time and published by BBS under MoP, GoB.				*J3: 0.020-0.030
			Total:			

“A” is the Nonadjustable fixed Coefficient = 0.20.

*Bidder will specify a value within the range given in the Table above such that the total weighting = 1.00

** The Price Index/Rate of Stone of sizes ranging from 75mm – 200 mm shall be taken for all stone sizes.

***The Price Index / Rate of Reinforcing Steel (RS) / Iron Bars of different diameter shall be taken as the same as that of 10mm diameter bars

****These details will be entered by Employer, while signing the Contract Agreement, based on values exist on the month for submission of bid.

Table B.4: Foreign Currency**Group No.04: Bill No.05 & Bill No.07 (Repairing of Drainage Sluices & Repairing of Flushing Inlets)**

Index code	Index description	Source of index	***Base value and date	Bidder's related source currency in type/amount	Equivalent in FC1	Bidder's proposed weighting
	Nonadjustable	—	-----	—		A: 0.200
La	Labour	MSBB as updated from time to time and published by BBS, under MoP, GoB..				*B4: 0.420- 0.440
Fu	Fuel	Authorized dealer of the Eastern Refineries for High Speed Diesel (HSD)				*C4: 0.050-0.060
ME	Machinery & Equipment	Bidder shall specify				*D44 0.040- 0.050
Sa	Sand	MSBB as updated from time to time and published by BBS, under MoP, GoB.				*E4: 0.040- 0.050
Ce	Cement	-Do-				*F4: 0.060-0.070
**St	Stone	Average whole sale price of stone at Chhatak, Sylhet				*G4: 0.070-0.080
SP	Steel Plate/Angle	Bidder shall specify				*I4: 0.040-0.050
Br	Brick	MSBB as updated from time to time and published by BBS, under MoP, GoB.				*J4 0.040-0.050
			Total:			

“A” is the Nonadjustable fixed Coefficient = 0.20

*Bidder will specify a value within the range given in the Table above such that the total weighting = 1.00

** The Price Index/Rate of Stone of sizes ranging from 75mm – 200 mm shall be taken for all stone sizes.

***These details will be entered by Employer, while signing the Contract Agreement, based on values exist on the month for submission of bid.

Table B.5: Foreign Currency

Group No.05: Bill No.8 & Bill No.11 (Embankment Slope Protection Work & Construction of Closure Dam)

Index code	Index description	Source of index	***Base value and date	Bidder's related source currency in type/amount	Equivalent in FC1	Bidder's proposed weighting
	Nonadjustable	—	-----	—		A: 0.200
La	Labour	MSBB as updated from time to time and published by BBS, under MoP, GoB..				*B5: 0.260-0.270
Fu	Fuel	Authorized dealer of the Eastern Refineries for High Speed Diesel (HSD)				*C5: 0.020-0.030
M E	Machinery & Equipment	Bidder shall specify				*D5: 0.020-0.030
Sa	Sand	MSBB as updated from time to time and published by BBS, under MoP, GoB.				*E5: 0.060-0.070
Ce	Cement	-Do-				*F5: 0.150-0.170
**S t	Stone	Average whole sale price of stone at Chhatak, Sylhet				*G5: 0.220-0.230
Br	Brick	MSBB as updated from time to time and published by BBS, under MoP, GoB.				*J5: 0.030-0.040
			Total:			1.00

“A” is the Nonadjustable fixed Coefficient = 0.20.

*Bidder will specify a value within the range given in the Table above such that the total weighting = 1.00

** The Price Index/Rate of Stone of sizes ranging from 75mm – 200 mm shall be taken for all stone sizes.

***These details will be entered by Employer, while signing the Contract Agreement, based on values exist on the month for submission of bid.

Table B.6: Foreign Currency**Group No.06 : Bill No.09 (River Bank Protection Work)**

Index code	Index description	***Source of index	***Base value and date	Bidder's related source currency in type/amount	Equivalent in FC1	Bidder's proposed weighting
	Nonadjustable	—	-----	—		A: 0.200
La	Labour	MSBB as updated from time to time and published by BBS, under MoP, GoB.				*B6: 0.150-0.160
Fu	Fuel	Authorized dealer of the Eastern Refineries for High Speed Diesel (HSD)				*C6: 0.050-0.060
ME	Machinery & Equipment	Bidder shall specify				*D6: 0.050-0.060
Sa	Sand	MSBB as updated from time to time and published by BBS, under MoP, GoB.				*E6: 0.010-0.020
Ce	Cement	-Do-				*F6: 0.020-0.030
**St	Stone	Average whole sale price of stone at Chhatak, Sylhet				*G6 : 0.030-0.040
HR	Hard Rock	Madhapara Granite Mining Company Limited, Parbatipur, in Dinajpur District under the Ministry of Power, Energy & Mineral Resources.				*K6: 0.45-0.47
			Total:			

“A” is the Nonadjustable fixed Coefficient = 0.20.

*Bidder will specify a value within the range given in the Table above such that the total weighting = 1.00

**The Price Index/Rate of Stone of sizes ranging from 75mm – 200 mm shall be taken for all stone sizes.

***These details will be entered by Employer, while signing the Contract Agreement, based on values exist on the month for submission of bid.

Table C1. Summary of Payment Currencies

Table: Alternative A

For Group No.01: Bill No.02 (Construction/Re-sectioning of Embankment)

Name of payment currency	A Amount of currency	B Rate of exchange to (local currency)	C Local currency equivalent $C = A \times B$	D Percentage of Net Bid Price (NBP) $\frac{100 \times C}{NBP}$
Local currency <u>BDT</u>		1.00		
Foreign currency #1 _____				
Foreign currency #2 _____				
Foreign currency # _____				
Bid Price				100.00
Provisional sums in BDT	Nil		Nil	
TOTAL BID PRICE				

Table C2. Summary of Payment Currencies

Table: Alternative A

Group No.02: Bill No.03 & Bill No.10 (Excavation / Re-excavation of Drainage Channel & Dismantling of Brick Soling/Bituminous Carpeting Road)

Name of payment currency	A Amount of currency	B Rate of exchange to (local currency)	C Local currency equivalent $C = A \times B$	D Percentage of Net Bid Price (NBP) $\frac{100 \times C}{NBP}$
Local currency BDT		1.00		
Foreign currency #1 _____				
Foreign currency #2 _____				
Foreign currency # _____				
Bid Price				100.00
Provisional sums in BDT	Nil		Nil	
TOTAL BID PRICE				



Table C3. Summary of Payment Currencies

Table: Alternative A

Group No.03: Bill No.04 & Bill No.06 (Construction of Drainage Sluices & Flushing Inlets)

Name of payment currency	A Amount of currency	B Rate of exchange to (local currency)	C Local currency equivalent $C = A \times B$	D Percentage of Net Bid Price (NBP) $\frac{100 \times C}{NBP}$
Local currency _____		1.00		
Foreign currency #1 _____				
Foreign currency #2 _____				
Foreign currency # _____				
Bid Price				100.00
Provisional sums in BDT	Nil		Nil	
TOTAL BID PRICE				

Table C4. Summary of Payment Currencies

Table: Alternative A

Group No.04: Bill No.05 & Bill No.07 (Repairing of Drainage Sluices & Flushing Inlets)

Name of payment currency	A Amount of currency	B Rate of exchange to (local currency)	C Local currency equivalent $C = A \times B$	D Percentage of Net Bid Price (NBP) $\frac{100 \times C}{NBP}$
Local currency <u>BDT</u>		1.00		
Foreign currency #1 _____				
Foreign currency #2 _____				
Foreign currency # _____				
Bid Price				100.00
Provisional sums in BDT	Nil		Nil	
TOTAL BID PRICE				



Table C5. Summary of Payment Currencies

Table: Alternative A

Group No.05: Bill No.8 & Bill No.11 (Embankment Slope Protection Work and Construction of Closure Dam)

Name of payment currency	A Amount of currency	B Rate of exchange to (local currency)	C Local currency equivalent $C = A \times B$	D Percentage of Net Bid Price (NBP) $\frac{100 \times C}{NBP}$
Local currency <u>BDT</u>		1.00		
Foreign currency #1 _____				
Foreign currency #2 _____				
Foreign currency # _____				
Bid Price				100.00
Provisional sums in BDT	Nil		Nil	
TOTAL BID PRICE				

Table C6. Summary of Payment Currencies

Table: Alternative A

Group No.06: Bill No.09 (River Bank Protection Work)

Name of payment currency	A Amount of currency	B Rate of exchange to (local currency)	C Local currency equivalent $C = A \times B$	D Percentage of Net Bid Price (NBP) $\frac{100 \times C}{NBP}$
Local currency <u>BDT</u>		1.00		
Foreign currency #1 _____				
Foreign currency #2 _____				
Foreign currency # _____				
Bid Price				100.00
Provisional sums in BDT	Nil		Nil	
TOTAL BID PRICE				

Bill of Quantities

A. Preamble

The Bill of Quantities shall be read in conjunction with the Instructions to Bidders, General and Special Conditions of Contract, Specifications, and Drawings.

2. The quantities given in the Bill of Quantities are estimated and provisional, and are given to provide a common basis for bidding. The basis of payment will be the actual quantities of work ordered and carried out, as measured by the Contractor and verified by the Engineer and valued at the rates and prices bid in the priced Bill of Quantities, where applicable, and otherwise at such rates and prices as the Engineer may fix within the terms of the Contract.

3. The rates and prices bid in the priced Bill of Quantities shall, except insofar as it is otherwise provided under the Contract, include all Constructional Plant, labour, supervision, materials, erection, maintenance, insurance, profit, taxes, and duties, together with all general risks, liabilities, and obligations set out or implied in the Contract.

4. A rate or price shall be entered against each item in the priced Bill of Quantities, whether quantities are stated or not. The cost of Items against which the Contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities.

5. The whole cost of complying with the provisions of the Contract shall be included in the Items provided in the priced Bill of Quantities, and where no Items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related Items of Work.

6. General directions and descriptions of work and materials are not necessarily repeated nor summarized in the Bill of Quantities. References to the relevant sections of the Contract documentation shall be made before entering prices against each item in the priced Bill of Quantities.

7. Provisional Sums included and so designated in the Bill of Quantities shall be expended in whole or in part at the direction and discretion of the Engineer in accordance with Sub-Clause 13.5 and Clause 13.6 of the General Conditions.

8. The method of measurement of completed work for payment shall be in accordance with *procedures* described in the Specifications under Part 2, Section VII: Work Requirement

9. Any arithmetic errors in computation or summation will be corrected by the Employer as follows:

- (a) where there is a discrepancy between amounts in figures and in words, the amount in words will govern; and
- (b) where there is a discrepancy between the unit rate and the total amount derived from the multiplication of the unit price and the quantity, the unit rate as quoted will govern, unless in the opinion of the Employer, there is an obviously gross misplacement of the decimal point in the unit price, in which event the total amount as quoted will govern and the unit rate will be corrected.

10. Rock is defined as all materials that, in the opinion of the Engineer, require blasting, or the use of metal wedges and sledgehammers, or the use of compressed air drilling for their removal, and that cannot be extracted by ripping with a tractor of at least 150 brake hp with a single, rear-mounted, heavy-duty ripper.

B. Work Items

1. The Bill of Quantities contains the following works:

Bill No. 1 – General Mobilization

Bill No. 2 – Construction/Re-sectioning of Embankment

Bill No. 3 – Excavation/Re-excavation of Drainage Channel

Bill No. 4 – Construction of Drainage Sluices

Bill No. 5 – Repairing of Drainage Sluices

Bill No. 6 – Construction of Flushing Inlet

Bill No. 7 – Repairing of Flushing Inlet

Bill No. 8 – Embankment Slope Projection Work

Bill No. 9 – River Bank Protection Work

Bill No. 10 – Dismantling of Brick Soling/Bituminous Carpeting road, Drainage Sluice / Flushing Sluice

Bill No. 11 – Construction of closure-dam

Daywork Schedule

Environmental Mitigation Works (Provisional Sum)

Physical and Price Contingency (Provisional Sum)

2. Bidders shall price the Bill of Quantities in local currency only and shall indicate in the Appendix to Bid the percentage expected for payment in foreign currency or currencies.

Abbreviations: The following Abbreviations have been used in the Bill of Quantities for the units of measurement:

Unit	Abbreviation
Millimeter	mm
Meter	m
Square Millimeter	mm ² or sq.mm
Square Meter	m ² or sq.m
Hectare	ha
Cubic Millimeter	mm ³ or cu.mm
Cubic Meter	m ³ or cu.m
Kilogram	kg
Metric Ton	ton
Lump Sum	LS
Provisional Sum	PS
Number	no.
Hour	hr
Day	day
Week	wk
Month	mon

C. Daywork Schedule

General

1. Reference to Sub-Clause 13.6 of the General Conditions is made for the Dayworks. Work shall not be executed on a daywork basis except by written order of the Engineer. Bidders shall enter basic rates for daywork items in the Schedules, which rates shall apply to any quantity of daywork ordered by the Engineer. Nominal quantities have been indicated against each item of daywork, and the extended total for Daywork shall be carried forward as a Provisional Sum to the Summary Total Bid Price. Unless otherwise adjusted, payments for daywork shall be subject to price adjustment in accordance with the provisions in the Conditions of Contract.

Daywork Labour

2. In calculating payments due to the Contractor for the execution of daywork, the hours for labour will be reckoned from the time of arrival of the labour at the job site to execute the particular item of daywork to the time of return to the original place of departure, but excluding meal breaks and rest periods. Only the time of classes of labour directly doing work ordered by the Engineer and for which they are competent to perform will be measured. The time of gangers (charge hands) actually doing work with the gangs will also be measured but not the time of foremen or other supervisory personnel.
3. The Contractor shall be entitled to payment in respect of the total time that labour is employed on daywork, calculated at the rates entered by him in the **Schedule of Daywork Rates: 1. Labour**. The rates entered for labour shall be deemed to cover all direct or indirect costs to the Contractor, including (but not limited to) the amount of wages paid to such labour, transportation time, overtime, subsistence allowances, and any sums paid to or on behalf of such labour for social benefits in accordance with laws prevailing in the People's Republic of Bangladesh as well as the Contractor's profit, overheads, superintendence, liabilities, and insurances and allowances to labour, timekeeping, and clerical and office work, the use of consumable stores, water, lighting, and power; staging, scaffolding, workshops, and stores, portable power tools, manual plant, and tools; supervision by the Contractor's staff, foremen, and other supervisory personnel; duties and taxes; and charges incidental to the foregoing. Payments under this item will be made in the following currency proportions:
 - (i) foreign: _____ percent (to be stated by the bidder)¹¹
 - ii) local: _____ percent (to be stated by the bidder)

Daywork Materials

4. The Contractor shall be entitled to payment in respect of materials used for daywork (except for materials for which the cost is included in the rates quoted for labour costs as detailed heretofore), at the basic rates entered by him in the **Schedule of Daywork Rates: 2. Materials** together with an additional percentage payment on the basic rates to cover overhead charges and profit, as follows:
 - (a) the basic rates for materials shall be calculated on the basis of the invoiced price, freight, insurance, handling expenses, damage, losses, etc., and shall provide for delivery to store for stockpiling at the Site. The Basic rates shall be stated in local currency, but payment will be made in the currency or currencies expended upon presentation of supporting documentation
 - (b) the additional percentage payment shall be quoted by the bidder and applied to the equivalent local currency payments made under (a) above. Payment under this item will be made in the following currency proportions
 - (i) foreign: _____ percent (to be stated by the bidder);¹¹

¹¹ The bidder shall state the percentage in a single foreign currency equivalent and the exchange rates and official sources used.

- (II) local: _____ percent (to be stated by the bidder)
- (c) the cost of hauling materials for use on work ordered to be carried out as Daywork from the store or stockpile on the Site to the place where it is to be used will be paid in accordance with the terms for Labour and Construction in this schedule.

Daywork Contractor's Equipment

4. The Contractor shall be entitled to payments in respect of Contractor's Equipment already on Site and employed on Daywork at the rates entered by him in the **Schedule of Daywork Rates: 3. Contractor's Equipment**. Said rates shall be deemed to include due and complete allowance for depreciation, interest, indemnity, and insurance, repairs, maintenance, supplies, fuel, lubricants, and other consumables, and all overhead, profit, and administrative costs, and duties and taxes, and cost of drivers, operators, and assistants related to the use of such equipment.
5. In calculating the payment due to the Contractor for Contractor's Equipment employed on Daywork, only the actual number of working hours will be eligible for payment, except that where applicable and agreed with the Engineer, the travelling time from the part of the Site where the Contractor's Equipment was located when ordered by the Engineer to be employed on Daywork and the time for return journey thereto shall be included for payment.
6. The rental rates for Contractor's Equipment employed on Daywork shall be stated in local currency, but payments to the Contractor will be made in currency proportions, as follows:
- (a) foreign: _____ percent (to be stated by the bidder).¹¹
- (b) local: _____ percent (to be stated by the bidder).

Bill of Quantities

Coastal Embankment Improvement Project, Phase-I (CEIP-I)

Abstract BoQ of Polder 32, 33, 35/1 and 35/3

Bill No. 01:General (Page 1 of 2)

Item No.	Clause/Sub-Clause(Part 2: Section VII)	Description of Item	Unit	Quantity	Rate to be Quoted in BDT	Amount (BDT)
1.01	1.13, 1.30	Arrange temporary facilities and services for Engineers				
1.01(a)	1.29(a)	Construction of Engineer's Field offices at Khulna & Borguna, Site offices at Dacope and Rayenda and Laboratory Building at Khulna on BWDB's land and provide other facilities <u>Field Office</u> : At Khunla- 783 sqm & at Borguna - 200 sqm <u>Site Office</u> : At Dacope- 140 sqm & at Bagerhat- 140 sqm <u>Laboratory Building</u> at Khulna- 72 sqm	1 Item	Lump Sum		
1.01(b)	1.29 (b)	Refurbishment of existing BWDB's rest-houses at Dacope & Rayenda, and other facilities (i) Dacope = 167 Sqm (ii) Rayenda = 186 sqm	1 Item	Lump Sum		
1.01(c)	1.29 (c)	Provide brand new minimum 125 cc Motor Cycle with license and accessories for the Use of Engineer's personnel.	No	14		
1.01(d)	1.29 (d)	Provide brand new Speed Boat with engine minimum 75 HP and accessories, for the use of Engineer's personnel.	No	2		
Carried Forward : Sub-total of Bill No.01 of Page 1:						

Bill No. 01:General (Page 2 of 2)

Item No.	Clause/Sub-Clause(Part 2: Section VII)	Description of Item	Unit	Quantity	Rate to be Quoted in BDT	Amount (BDT)
1.01(e)	1.29 (e)	Provide brand new 4-WD cross-country vehicle (min ^m 2450 cc) & 4-WD double cabin pickup (min ^m 2400 cc) with license and accessories, for use of Engineer's personnel.				
1.01(e) i)	1.29 (e) i)	Brand new diesel operated 4-WD cross-country vehicle.	No	6		
1.01(e) ii)	1.29 (e) ii)	Brand new diesel operated 4-WD double cabin pick-up.	No	2		
1.01(f)	1.29 (f)	Provide survey equipment and soft-ware to conduct land survey, topographic survey and bathymetry etc.	1 Item	Lump Sum		
1.01(g)	1.29 (g)	Establish and operate Field Laboratory with installation of all associated equipment and personnel at Khulna BWDB Campus.	1 Item	Lump Sum		
1.02	1.20, 1.30	Contractor's Site Facilities :				
1.02(a)	1.20, 1.30(1)	Contractor's mobilization including arrangements of temporary site office, labor sheds, stores, fencing, guarding, site laboratory, Inspection Shed etc. and demobilization on completion of the contract	1 Item	Lump Sum		
1.02(b)	1.30 (2)	Install and maintain Sanitary Latrine for labours working at sites and provide potable water to all labours	Month	30		
Carried Forward : Sub-total of Bill No.01 of Page 2:						

Summary Sheet of Bill No.01: General

Carried over from Page No.	Sub-total (BDT)
1	
2	
Total of Bill No.01 Carried Forward to Summary Page No.....	



Bill No. 02:**Construction / Re-sectioning of Embankment**

Item No.	Clause / Sub-Clause (Part 2: Section VII)	Description of Item	Unit	Total Quantity for 4 Polders	Rate to be Quoted in BDT	Amount (BDT)
2.01	2.1	Earth work in constructing/ re-sectioning of embankment with earth borrowed from land and or riverbed by dredging compacted to 90% maximum dry density at optimum moisture content	Cum	5,877,718		
2.02	2.6	Fine dressing and close turfing	Sqm	4,402,050		
Total for Bill No. 02 Carried forward to Summary Page No.....						



Bill No. 03:

Excavation / Re-excavation of Drainage Channel

Item No.	Clause/Sub-Clause (Part 2: Section VII)	Description of Item	Unit	Total Quantity for 4 Polders	Rate to be Quoted in BDT	Amount (BDT)
3.01	2.3	Earth work for excavation / re-excavation of drainage channels	Cum	1249091		
Total for Bill No. 03 : Carried forward to Summary Page No.....						



Bill No. 04 (page 1 of 3):

Construction of Drainage Sluices

Item No.	Clause/Sub-Clause (Part 2: Section VII)	Description of Item	Unit	Total Quantity for 4 Polders	Rate to be Quoted in BDT	Amount (BDT)
4.01	2.7	Earth work in excavation of foundation trenches of Structures	Cum	219,634		
4.02	2.2	Construction of Coffor Dam/Ring Bundh including removal	No	39		
4.03	2.3	Earth work for excavation / re-excavation of drainage / diversion channel.	Cum	278,228		
4.04	2.8	Form work (for centering and water tight shuttering as per drawing and removing the forms after specified period).	Sqm	52,210		
4.05	2.9	Dewatering of sub-surface and surface water to attain required drawdown of ground water table and ensure dry surface of the foundation pit of hydraulic structure.				
i)	2.9.6.1 i)	1 Vent & 2 Vent of size 1.5mx1.8m	No	34		
ii)	2.9.6.1 ii)	3 Vent & 4 Vent of size 1.5mx1.8m	No	4		
iii)	2.9.6.1 iii)	6 Vent of size 1.5mx1.8m	No.	1		
Carried Forward : Sub-total of Bill No.04 of Page 1:						



Bill No. 04 (page 2 of 3)
Construction of Drainage Sluices

Item No.	Clause/Sub Clause (Part 2: Section VII)	Description of Item	Unit	Total Quantity for 4 Polders	Rate to be Quoted in BDT	Amount
4.06	2.10	Supplying at site steel sheet piles of designed sections with requisite length and properties as per Specification.	ton	642		
4.07	2.10	Driving steel sheet piles up to the approved design level including cutting, welding etc.	Sqm	6,621		
4.08	2.38.1	Lean Cement concrete (CC) (leanest mix 1:3:6) below structural concrete/ filling the gap between C.C Block	Cum	1,664		
4.09	2.11	Reinforced Cement Concrete (RCC) works in Structural member of Hydraulic Structure	Cum	16,584		
4.10	2.12	M. S. work for reinforcement with deformed M. S. bar, $f_y = 414 \text{ N/mm}^2$ (min ^m) in RCC works.	Kg	1,613,340		
4.11	2.13	M. S. work in plates, angles, dowel bars, channels, flat bars, Tees etc.	Kg	104,214		
4.12	2.14	Supplying, fitting and fixing 23 cm wide PVC water stop in expansion & construction joints	m	4,693		
4.13	2.15	Execution of Compaction Sand Pile through displacement method (30 cm dia injecting pipe).	m	89,612		
4.14	2.17, 2.17.7.1	Manufacturing and supplying C.C. Blocks with 40mm down graded stone chips, ($f'c = \text{min}^m 15.0 \text{ N/mm}^2$) for Hydraulic Structure.				
i)		i) Block size 40cm x 40cm x 20cm.	No.	106,373		
ii)		ii) Block size 30cm x 30cm x 30cm.	No.	90,898		
4.15	2.19	Supplying and placing non-woven needle punched geo-textile filter	Sqm	26,149		
4.16	2.20, 2.20.2.1	Supplying and laying sand (FM 1.0 to 1.50) as filter layers for structure	Cum	3,608		
Carried Forward : Sub-total of Bill No.04 of Page 2						

Bill No. 04 (page 3 of 3)

Construction of Drainage Sluices

Item No.	Clause / Sub-Clause (Part 2: Section VII)	Description of Item	Unit	Total Quantity for 4 Polders	Rate to be Quoted in BDT	Amount (BDT)
4.17	2.21, 2.21.2.1	Supplying and laying dry 1 st class or pick jhama khoa/chips as filter in 2(two) layers.	Cum	5,816		
4.18	2.22	Placing/Laying CC Blocks of different sizes in slope and loose apron.	Cum	4,240		
4.19	2.38.2	Dumping of C.C Block in Loose Apron of Hydraulic Structure	Cum	1,627		
4.20	2.24	Back filling in hydraulic structures with sand of FM ≥ 0.8 compacted to 30% relative density.	Cum	111,402		
4.21	2.25	Supplying and filling sand in foundation of hydraulic structures, building and in protective works with sand of FM ≥ 1.0 compacted to 50% relative density.	Cum	22,595		
4.22	2.26	Manufacturing, supplying and Installation of M.S. Vertical lift gate & hoist, gate shutter, Pedestal type lifting device including painting etc. complete. Opening size:1.50mx1.80m	No	59		
4.23	2.27	Manufacturing, supplying and Installation of M. S. Flap gate with Chain Pulley Hoist and embedded parts including painting etc. complete. Opening size:1.50mx1.80m	No	59		
4.24	2.37	Construction of R.C.C Cast in Situ Bored Piles, 500 mm dia	meter	288		
4.25	2.38.5	Construction of Cement Mortar Gauge on RCC Wall of Structure of size 150mm x 25 mm	meter	293		
Carried Forward : Sub-total of Bill No.04 of Page 3 :						

Summary Sheet of Bill No.04: Construction of Drainage Sluices

Carried over from Page No.	Sub-total (BDT)
1	
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Total of Bill No.04 Carried Forward to Summary Page No.....	

Bill No. 05 (Page 1 of 2):
Repairing of Drainage Sluices

Item No.	Clause/Sub-Clause(Part 2: Section VII)	Description of Item	Unit	Total Quantity for 4 Polders	Rate to be Quoted in BDT	Amount (BDT)
5.01	2.2	Construction of Cofferdam/Ring Bundh earth including removal	No.	2		
5.02	2.8	Form work for centering and water tight shuttering as per drawing and removing the forms after specified period.	Sqm	72		
5.03	2.34	Dewatering of Surface Water including installation of Sump Well as per Specification.	No	2		
5.04	2.11	Reinforced Cement Concrete (RCC) works in Structural Member of Hydraulic Structure	Cum	4		
5.05	2.12	M. S. work for reinforcement with deformed M. S. bar, $f_y = 414 \text{ N / mm}^2$, (min ^m) in RCC works.	Kg	819		
5.06	2.13	M. S. work in plates, angles, dowel bars, channels, flat bars, Tees etc	Kg	4,854		
5.07	2.17, 2.17.7.1	Manufacturing and supplying C.C. Blocks with 40mm down graded stone chips , ($f'c = \text{min}^m 15.0 \text{ N/mm}^2$) for Hydraulic Structure				
i)		i) Block size 40cm x 40cm x 20cm.	No	3,747		
ii)		ii) Block size 30cm x 30cm x 30cm.	No	4,911		
5.08	2.19	Supplying and placing non-woven needle punched geo-textile filter (thickness $\geq 3.00 \text{ mm}$ under pressure 2 Kpa) in hydraulic structures	Sqm	960		
5.09	2.20, 2.20.2.1	Supplying and laying sand (FM 1.0 to 1.5) as filter layers for structure	Cum	132.00		
5.10	2.21, 2.21.2.1	Supplying and laying dry 1 st class or picked Jhama khoa / chips as filter in two (2) layers.	Cum	176		
Carried Forward : Sub-total of Bill No.05 of Page 1:						

Bill No. 05 (Page 2 of 2):

Repairing of Drainage Sluices

Item No.	Clause/SubClause (Part 2: Section VII)	Description of Item	Unit	Total Quantity for 4 Polders	Rate to be Quoted in BDT	Amount (BDT)
5.11	2.22	Placing of CC Blocks of different sizes in slope and loose apron of Hydraulic Structure	Cum	198		
5.12	2.38.2	Dumping in position C.C Blocks of different sizes in loose apron/bed of Hydraulic Structure	Cum	55		
5.13	2.26	Manufacturing, supplying and Installation of M.S. Vertical lift gate & hoist, gate shutter, Pedestal type lifting device including painting etc. complete. Opening size:1.50mx1.80m	No	3		
5.14	2.27	Manufacturing, supplying and Installation of M. S. Flap gate Chain with Pulley Hoist and embedded parts including painting etc. complete. Opening size:1.50mx1.80m	No	3		
5.15	2.33	Painting of the existing steel member and gates and hoist	Sqm	100.00		
5.16	2.38.5	Construction of Cement Mortar Gauge in Sluices	Metre	7.00		
5.17	2.38.1	Lean Cement concrete (CC) (leanest mix 1:3:6) in filling the gap between C.C Block	Cum	40.00		
5.18	2.38.3	Plastering of the old concrete surface	sqm	610.00		
Carried Forward : Sub-total of Bill No.05 of Page 2:						

Summary Sheet of Bill No.05: Repairing of Drainage Sluices

Carried over from Page No.	Sub-total (BDT)
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Total Bill No.05 Carried Forward to Summary Page No.....	



Bill No.06 (Page 1 of 3)
Construction of Flushing Inlets

Item No.	Clause/SubClause (Part 2: Section VII)	Description of Item	Unit	Total Quantity for 4 Polders	Rate to be Quoted in BDT	Amount (BDT)
6.01	2.7	Earth work in excavation of foundation trenches of Structure	Cum	126,777		
6.02	2.2	Construction of Cofferdam/Ring Bundh earth including removal	No.	41		
6.03	2.3	Earth work for excavation / re-excavation of drainage / diversion	Cum	113,034		
6.04	2.8	Form work for centering and water tight shuttering as per drawing and removing the forms after specified period.	Sqm	32,724		
6.05	2.34	Dewatering of Surface Water including installation of Sump Well	No.	41		
6.06	2.10	Supplying at site steel sheet piles of designed	ton	484		
6.07	2.10	Driving steel sheet piles up to the approved design level as per Specification.	sqm	5,018		
6.08	2.38.1	Lean Cement concrete (CC) work with 25 mm down graded brick chips below structural concrete	cum	1,109		
6.09	2.11	Reinforced Cement Concrete (RCC) works in Structural member of Hydraulic Structure(minimum f'c=22 N/mm ²)	Cum	7,624		
Carried Forward : Sub-total of Bill No.06 of Page 1:						

Bill No.06 (Page 2 of 3)
Construction of Flushing Inlets

Item No.	Clause/Sub Clause (Part 2: Section VII)	Description of Item	Unit	Total Quantity for 4 Polders	Rate to be Quoted in BDT	Amount (BDT)
6.10	2.12	M. S. work for reinforcement with deformed M. S. bar, $f_y = 414 \text{ N/mm}^2$, (min ^m) in RCC works.	Kg	857,850		
6.11	2.13	M. S. work in plates, angles, dowel bars, channels, flat bars, Tees etc. as per Specification.	kg	61,783		
6.12	2.14	Supplying, fitting and fixing 23 cm wide PVC water stop	Metre	913		
6.13	2.17, 2.17.7.1	Manufacturing and supplying C.C. Blocks with 40mm down graded stone chips, ($f'c = \text{min}^m 15.0 \text{ N/mm}^2$) for Hydraulic Structure				
i)		i) Block size 40cm x 40cm x 20cm	No	56,323		
ii)		ii) Block size 30cm x 30cm x 30cm	No	76,019		
6.14	2.19	Supplying and placing non-woven needle punched geo-textile filter (thickness $\geq 3.00 \text{ mm}$ under pressure 2 Kpa) in hydraulic structures	Sqm	19,478		
6.15	2.20, 2.20.2.1	Supplying and laying sand (F.M 1.0 to 1.5) as filter layers as per specific size ranges and gradation	Cum	2,609		
6.16	2.21, 2.21.2.1	Supplying and laying dry 1st class or pick jhama chips as filter as per specific size, range and gradation	Cum	3,757		
6.17	2.22	Placing/Laying CC blocks of different sizes on the loose apron of structure and on slopes	Cum	2,986		
6.18	2.38.2	Dumping of C.C Block in Loose Apron of Hydraulic Structure	Cum	972.54		
6.19	2.24	Back filling in hydraulic structures with sand of FM ≥ 0.80 compacted to 30% relative density	Cum	33,349		
6.20	2.25	Supplying and filling sand in foundation of hydraulic structures, with sand of FM ≥ 1.0 compacted to 50% relative density.	Cum	11,428		
Carried Forward : Sub-total of Bill No.06 of Page 2:						

Bill No.06 (Page 3 of 3)
Construction of Flushing Inlets

Item No.	Clause/SubClause (Part 2: Section VII)	Description of Item	Unit	Total Quantity for 4 Polders	Rate to be Quoted in BDT	Amount (BDT)
6.21	2.26	Manufacturing, supplying and Installation of M.S. Vertical lift gate & hoist, gate shutter, Pedestal type lifting device				
i)		i) Opening size:0.90mx0.90m	No	12		
ii)		ii) Opening size:0.90mx1.20m	No	29		
6.22	2.27	Manufacturing, supplying and Installation of M. S. Flap gate with Chain Pulley Hoist and embedded parts including painting etc. complete				
i)		i) Opening size:0.90mx0.90m	No	12		
ii)		ii) Opening size:0.90mx1.20m	No	29		
6.23	2.15	Execution of Compaction Sand Pile through displacement method (30 cm dia injecting pipe)	Metre	98,094		
6.24	2.38.5	Construction of Cement Mortar Gauge on RCC Wall of Structure of size 150mm × 25 mm	Metre	220		
Carried Forward : Sub-total of Bill No.06 of Page 3:						

Summary Sheet of Bill No.06: Construction of Flushing Inlets

Carried over from Page No.	Sub-total (BDT)
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Total Bill No.06 Carried Forward to Summary Page No.....	

Bill No.07 (Page 1 of 2)
Repairing of Flushing Inlets

Item No.	Clause/SubClause (Part 2: Section VII)	Description of Item	Unit	Total Quantity for 4 Polders	Rate to be Quoted in BDT	Amount (BDT)
7.01	2.7	Earth work in excavation of foundation trenches of Structures	Cum	6323		
7.02	2.2	Construction of Coffor Dam/Ring Bundh including removal	No.	38		
7.03	2.3	Earth work for excavation / re-excavation of drainage / diversion channel	Cum	13680		
7.04	2.8	Form work for centering and water tight shuttering as per drawing and removing the forms after specified period.	Sqm	287		
7.05	2.34	Dewatering of Surface Water including installation of Sump Well	No.	38		
7.06	2.11	Reinforced Cement Concrete (RCC) works in Structural Member of Hydraulic Structure	Cum	15		
7.07	2.12	M. S. work for reinforcement with deformed M. S. bar, $f_y = 414 \text{ N / mm}^2$, (min ^m) in RCC works.	Kg	3000		
7.08	2.13	M. S. work in plates, angles, dowel bars, channels, flat bars, Tees etc	Kg	10072		
7.09	2.17, 2.17.2.1	Manufacturing and supplying C.C. Blocks with 40mm down graded stone chips , ($f'c = 15.0 \text{ N/mm}^2$) for Hydraulic Structure				
i)		i) Block size 40cm x 40cm x 20cm.	No	17425		
ii)		ii) Block size 30cm x 30cm x 30cm.	No	33966		
7.10	2.19	Supplying and placing non-woven needle punched geo-textile filter (thickness $\geq 3.00 \text{ mm}$ under pressure 2 Kpa) in hydraulic structures	Sqm	6441		
7.11	2.20, 2.20.2.1	Supplying and laying sand (FM 1.0 to 1.50) as filter layers for structure	Cum	741		
7.12	2.21, 2.21.2.1	Supplying and laying dry 1 st class or pick Jhama khoa / chips as filter in 2(two) layers.	Cum	988		
Carried Forward : Sub-total of Bill No.07 of Page 1:						

Bill No.07 (Page 2 of 2)
Repairing of Flushing Inlets

Item No.	Clause/SubClause (Part 2: Section VII)	Description of Item	Unit	Total Quantity for 4 Polders	Rate to be Quoted in BDT	Amount (BDT)
7.13	2.22	Laying CC Blocks of different sizes in slope and loose apron of Hydraulic Structure.	Cum	1167		
7.14	2.38.2	Dumping of C.C Blocks of different sizes in loose apron/bed of Hydraulic Structure	Cum	272		
7.15	2.24	Back filling in hydraulic structures with sand of FM ≥ 0.8 compacted to 30% relative density.	Cum	2708		
7.16	2.26	Manufacturing, supplying and Installation of M.S. Vertical lift gate & hoist, gate shutter, Pedestal type lifting device including painting etc. complete				
i)		i) Opening size:0.90m dia; or Opening size:0.90m x0.90m	No	24		
ii)		ii) Opening size:0.90m x1.20m	No	14		
7.17	2.27	Manufacturing, supplying and Installation of M. S. Flap gate with Chain Pulley Hoist and embedded parts including painting etc. complete.				
i)		i) Opening size:0.90m dia or Opening size:0.90m x0.90m	No	24		
ii)		ii) Opening size:0.90mx 12.0 m	No	14		
7.18	2.33	Painting of the existing steel member and gates and hoist	Sqm	580		
7.19	2.38.1	Lean Cement concrete (CC) (leanest mix 1:3:6) in filling the gap between C.C Block	Cum	333		
7.20	2.35	Manufacturing, Supplying and laying of RCC Pipe 90 cm dia	Metre	347		
7.21	2.38.3	Plastering of old surface of concrete	Sqm	4675		
Carried Forward : Sub-total of Bill No.07 of Page 2:						

Summary Sheet of Bill No.07: Repairing of Flushing Inlets

Carried over from Page No.	Sub-total (BDT)
1	
2	
Total Bill No.07 Carried Forward to Summary Page No.....	



Bill No.08

Embankment Slope Protection Work

Item No.	Clause/Sub Clause (Part 2: Section VII)	Description of Item	Unit	Total Quantity for 4 Polders	Rate to be Quoted in BDT	Amount (BDT)
8.01	2.20, 2.20.2.2	Supplying and laying sand (FM 1.0 to 1.50) as filter layers for Protective Works	Cum	41632		
8.02	2.21, 2.21.2.2	Supplying and laying dry 1 st class or pick Jhama khoa / chips as filter in 2(two) layers for Protective Work	Cum	41632		
8.03	2.19	Supplying and placing non-woven needle punched geo-textile filter (thickness $\geq$ 3.00 mm under pressure 2 Kpa) in hydraulic structures	Sqm	455012		
8.04	2.17, 2.17.7.2	Manufacturing and supplying C.C. Blocks with 40mm downgraded stone chips, (f'c = Minimum 10.5 N/mm ²) for Protective Work				
i)		i) Block size 40cm x 40cm x 40cm.	No	729950		
ii)		ii) Block size 40cm x 40cm x 20cm.	No	2676451		
8.05	2.22	Placing CC Blocks of different sizes on slope of protective work	Cum	124552		
8.06	2.38.1	Lean Cement concrete (CC) work with 25 mm downgraded brick chips below structural concrete/ filling gap	cum	335		
8.07	2.5	Earth work in cutting and filling of eroded bank of river/channel etc. to design slope	Cum	5506		
Total for Bill No. 08						
Carried forward to Summary Page No.....						

Bill No.9						
River Bank Protection Work						
Item No.	Clause/Sub-Clause (Part 2: Section VII)	Description of Item	Unit	Total Quantity for 4 Polders	Rate to be Quoted in BDT	Amount (BDT)
9.01	2.5	Earth work in cutting and filling of eroded bank of river/channel	Cum	19276		
9.02	2.20, 2.20.2.2	Supplying and laying sand (FM 1.0 to 1.50) as filter layers for Protective Works	Cum	10059		
9.03	2.21, 2.21.2.2	Supplying and laying dry 1 st class or pick Jhama khoa / chips as filter in 2(two) layers for Protective Work	Cum	10059		
9.04	2.19	Supplying and placing non-woven needle punched geo-textile filter (thickness ≥ 3.00 mm under pressure 2 Kpa) in hydraulic structures	Sqm	117154		
9.05	2.17, 2.17.7.2	Manufacturing and supplying C.C. Blocks with cement and 40mm downgraded stone chips , (f'c = minimum 10.5 N/mm ²) Block size 40cm x 40cm x 20cm	No	617892		
09.06	2.22	Placing CC Blocks of different sizes on slope of protective work	Cum	19774		
9.07	2.18	Supplying and measureable stacking of hard rock of specific size, ranges at work site.				
		Rock size: 30 cm to 40 cm,	Cum	225687		
9.08	2.23	Dumping in position Hard Rock/ /Boulders / C.C. Blocks of different sizes on river bed / slope below low water level.	Cum	205170		
9.09	2.38.4	Supplying, filling with sand of F.M ≥ 1.00 , sewing, stacking and placing new empty gunny or synthetic bag (50 kg capacity)	No	271,883		
9.10	2.38.1	Lean Cement concrete (CC) (leanest mix 1:3:6) in filling the gap between C.C Block	Cum	79		
Total for Bill No. 09						
Carried forward to Summary Page No.....						

Bill No.10: Dismantling of Brick Soling, Bituminous Carpeting Road, Drainage Sluice, Flushing Inlet and Salvage of Concrete Block/Boulder						
Item No.	Clause/Sub-Clause (Part 2: Section VII)	Description of Item		Total Quantity for 4 Polders	Rate to be Quoted in BDT	Amount (BDT)
10.01	2.2 , 2.2.2vii)	Construction of Coffor Dam/Ring Bundh including removal	No.	84		
10.02	2.28	Dismantling of CC, RCC & brick masonry works and stacking at safe distance.	Cum	16,693		
10.03	2.29	Dismantling of HBB, including stacking debris to a safe distance	sqm	144,058		
10.04	2.30	Dismantling of compacted khoa consolidation/ macadam and stacking at safe distance	Cum	28,987		
10.05	2.31	Dismantling of compacted bituminous carpeting and removing the debris to a safe distance.	sqm	48,312		
10.06	2.32	Salvaging of concrete block / boulder in different sizes from slope of embankment/ river bank and stacking the same in measurable stack	Cum	1,461		
Total for Bill No.10						
Carried forward to Summary Page No.....						



Bill No. 11:
Construction of Closure Dam

Item No.	Clause/Sub-Clause (Part 2: Section VII)	Description of Item	Unit	Total Quantity for 4 Polders	Rate to be Quoted in BDT	Amount (BDT)
11.01	2.4	Construction of Closure Dam over Nalian River with approach embankment	Lump-Sum	1 Item		
Total for Bill No.11 Carried forward to Summary Page No.....						

Schedule of Daywork
01: Labour

Item No.	Description of Item	Unit	Nominal Quantity	Rate to be Quoted in BDT	Amount (BDT)
01.	Ganger/Head man	hour	500		
02.	Skilled labour	hour	4000		
03.	Unskilled Labour	hour	5,000		
04	Mason	hour	500		
05	Carpenter	hour	500		
06	Electrician	hour	200		
Sub-Total					
Total of Daywork- 01: Labour Carried forward to Daywork Summary Page No.....					

Schedule of Daywork**02: Material**

Item No.	Description of Item	Unit	Nominal Quantity	Rate to be Quoted in BDT	Amount (BDT)
01.	Geo-textile (thickness 3 mm under pressure 2 Kpa)	m ²	5,000		
02.	Geo-bag (250 Kg)	No.	10,000		
03.	Synthetic bag 75 kg	No	50,000		
04	Hard Rock				
	i) 20 cm to 30 cm	m ³	1,000		
	ii) 30 cm to 40 cm	m ³	1000		
05.	Bamboo	No.	1,000		
06.	Tents	No.	100		
Sub-Total					
Allow ____ percent of Subtotal for Contractor's overhead, profit, etc., in accordance with paragraph 4(b) of Daywork Schedule					
Total of Daywork- 02: Materials					
Carried forward to Daywork Summary Page No.....					

Schedule of Daywork

03: Contractor's Equipment

Item No.	Description of Item	Unit	Nominal Quantity	Rate to be Quoted in BDT	Amount (BDT)
1	Excavator 160 HP, 1 m ³	Hour	200		
2	Bulldozer 260 HP, Blade Capacity 5 m ³	Hour	200		
3	Dump Truck – capacity 10 ton	Hour	200		
4	Pay loader 170 HP, Bucket Capacity 3 m ³	Hour	200		
5	Speed boat	Hour	1000		
6	Barge 15m x 6m equipped with Crane	Hour	500		
7	Tug Boat , 700 HP	Hour	500		
Total of Daywork- 03: Contractor's Equipment					
Carried forward to Daywork Summary Page No.....					

Daywork Summary

	<i>Amount (BDT)</i>	<i>% Foreign</i>
1. Total for Daywork: 01: Labour		
2. Total for Daywork: 02: Materials		
3. Total for Daywork: 03: Contractor's Equipment		
Total for Daywork (Provisional Sum)		
Carried forward to Bid Summary, p. _____		

Specified Provisional SumEnvironmental Mitigation Works

Item No.	Clause / Sub-Clause (Part 2: Section VII)	Description of Item	Unit	Total Quantity for 4 Polders	Amount In BDT
01	1.27	Emergency works for breach of Embankment and damaged structures	1 Item	Sum	40,000,000.00
02		Crop compensation to the direct looser land owner /share croppers of construction sites/damage due to dredge spoils	1 Item	Sum	5,400,000.00
03		Waste disposal arrangement at construction site	1 Item	Sum	3,500,000.00
04		Water quality monitoring	1 Item	Sum	2,800,000.00
05		Air and noise quality monitoring analysis	1 Item	Sum	3,000,000.00
06		Soil and water salinity monitoring cost	1 Item	Sum	2,000,000.00
07		Conservation and stocking of threatened fish species	1 Item	Sum	3,500,000.00

Summary of Specified Provisional Sums

<i>Item no.</i>	<i>Description</i>	<i>Amount</i>
01	Emergency works for breach of Embankment and damaged structures	40,000,000.00
02	Crop compensation to the direct looser land owner /share croppers of construction sites/damage due to dredge spoils	5,400,000.00
03	Waste disposal arrangement at construction site	3,500,000.00
04	Water quality monitoring	2,800,000.00
05	Air and noise quality monitoring analysis	3,000,000.00
06	Soil and water salinity monitoring cost	2,000,000.00
07	Conservation and stocking of threatened fish species	3,500,000.00
Total for Specified Provisional Sums		60,200,000.00
Carried forward to Grand Summary, p. _____		



Physical and Price Contingency Provisional Sum

Description of Item	Unit	Amount (BDT)
Physical and Price Contingencies	Provisional Sum	300,000,000.00

Grand Summary

Contract Name:

Contract No.:

<i>General Summary</i>	<i>Page</i>	<i>Amount</i>
Bill No. 1: General Mobilization		
Bill No. 2: Construction/Re-sectioning of Embankment		
Bill No. 3: Excavation/Re-excavation of Drainage Channel		
Bill No. 4: Construction of Drainage Sluice		
Bill No. 5: Repairing of Drainage Sluice		
Bill No. 6: Construction of Flushing Inlets		
Bill No. 7: Repairing of Flushing Inlets		
Bill No. 8: Embankment Slope Protection Work		
Bill No.9: River Bank Protection Work		
Bill No.10: Dismantling of brick soling/bituminous carpeting road		
Bill No.11: Construction of closure-dam		
Sub-total of Bills (Bill No.01 to Bill No.11)	(A)	
Total of Daywork (Provisional Sum)	(B)	
Total of Specified Provisional Sum to the Sub-Total	(C)	60,200,000.00
Total of Bills and Provisional Sums (A+B+C)	(D)	
Add Provisional Sum for Physical and Price Contingencies	(E)	300,000,000.00
Bid Price (D+E) (Carried forward to Letter of Bid)	(F)	
All Provisional Sums are to be expended in whole or in part at the direction and discretion of the Engineer in accordance with Sub-Clause 13.5 and Clause 13.6 of Part I of the Conditions of Contract.		

Technical Proposal

- **Site Organization**
- **Method Statement**
- **Mobilization Schedule**
- **Construction Schedule**
- **Equipment**
- **Others**



Site Organization

The bidder must have site organization for efficient and timely execution of work as per construction schedule provided herein. He will setup such group of competent personnel with the approval of the Engineer. **Each group** shall include the following minimum key personnel to be deployed for **Each polder** for field works. Such groups may be required to be supplemented with additional competent personnel when instructed by the Engineer.

For Execution of Work:

SI No.	Position	No.
01.	Project Manager	1
02.	Project Engineer (Civil/WR)	1
03.	Project Engineer (Mechanical) (Intermittent)	1
04.	Quality Control/Material Engineers (Intermittent)	1
05.	Construction Supervisors	2

The contractor may rearrange the groups according to the quantum of works in the polders with the approval of the "Engineer".

For Field Laboratory:

Sl. No.	Position	Nos
01	Quality Control/Material Engineer	1
02.	Laboratory Assistants	3
03.	Laboratory Attendants	6

Method Statement

Bidders shall submit a detailed work methodology (statement of work methods) showing deployment of equipment, personnel schedule and any other information in sufficient detail to demonstrate the adequacy of the bidder's proposal to meet the works requirements and the completion time. The proposed work plan (activity bar chart), based on the above, and should also be included with the bid.

In the Method Statement, the bidder shall include details of pooled resources of all JV partners commensurate to their shares. Proposed resources of JV partners shall mandatorily be deployed at the site.

The methodology that are practiced in Bangladesh Water Development Board (BWDB) for successful implementation of different types of works are outlined below as guidance to the bidders. The bidders may prepare method statement on their own in the light stated below. Such work methodology shall include but not limited to the following main components separately along with the other activities.

i) Construction/Re-sectioning of embankment

Stretch wise step by step in chronological order, description of all the activities up to deposition earth over embankment and compaction in layers including laboratory tests shall be included. Such step by step description should include the deployment plan for manpower and equipment (capacity, number). Description should also include the basic computation of the yield per day along with the calculation related to involvement of manpower & equipment for borrowing earth, compaction and disposal of each construction site and total per day covering all the construction stretches shall be included.

The construction/re-sectioning works of embankment need to be synchronized with the excavation/re-excavation drainage channel in order to use the suitable excavated material for construction of embankment. So, the methodology should include this aspect.

ii) Excavation/Re-excavation of Drainage Channel

Stretch wise step by step in chronological order, description of all the activities up to deposition of spoil earth over bank/other suitable places as per Specification shall be included. Such step by step description should include the deployment plan for manpower and equipment (capacity, number) area wise for handling and disposal. Description should also include the basic computation of the yield per day along with the calculation related to involvement of manpower & equipment for excavation of earth from channel and disposal of each construction site and total per day covering all the construction stretches shall be included

A separate paragraph shall be included for stretch by stretch maintenance of the worksite keeping it dry and accessible round the clock to pass it safely from upstream to downstream. Such description should also include the monthly deployment schedule of equipment (capacity, number & yield) and over the contract, where & how the same will be utilized.

iii) Protection work (Slope of Embankment/River Bank)

This activity shall include the production, handling of C.C. blocks, procurement of hard rock and geo-textile filter including location of stockyards. Procedures of sequential dumping of hard rock/Geo-bags within the available limited time (in dry period while river water level remains within the LWL) including placement of geo-textile filter and C.C. block along with the other activities shall be spelt out in the Methodology. Plan for execution per day stretch wise and total covering all the construction stretches shall be mentioned, duly supported by resources-based calculation related to involvement of manpower & equipment.

iv) Construction of Drainage Sluices and Flushing Sluices

The methodology shall include step by step all the activities right from excavation of foundation trenches with simultaneous putting of cofferdam / ring bundh up to construction of Approach Road. Construction of the hydraulic Structures in each Polder are be carried out in Phases over the intended construction period of three (3) years. Methods of dewatering system which is the key activity in successful completion of a hydraulic structure shall be described in details including requirement of manpower and equipment.

v) Construction of Closure Dam over Nalian River.

The methodology shall include step by step all the activities right from transportation, furnishing, installation, safe operation and maintaining of all equipment including deployment operators, mechanics, supply of power,

fuel, lubricants, spares, repairing and procurement of all materials, labors required for closing the river with protective works, tying two ends of the Closure Dam with the existing dyke by constructing approach embankment as per design and other temporary works required for the execution of the works throughout and removal of the equipment and temporary works at the end of the closing. It shall be supported by calculation related to involvement of manpower & equipment. The method statement shall clearly describe the approach and technique of final closing of the river considering all the unforeseen parameters. Closing of the channel in full section must be planned to be accomplished at period of the leanest flow of the River within a single season.

vi) Others

The methodology shall include but not limited to the following aspects;

- a) Mobilization
- b) Constructions of Camps
- c) Addressing Environmental Safeguards
- d) Disposal of Unserviceable Materials

Mobilization Schedule

Immediately on receipt of the letter to commence works from the Employer, the Contractor has to mobilize the manpower, material and equipment in accordance with the approved work program and as agreed with the Engineer, on site within a period of one (1) month required for carrying out the following works/activities. Before doing so, the contractor will furnish a list of mobilization schedule for the said works/activities to the Engineer for his approval.

1. Arrangement of Land
2. Schedule for Procurement of Material
3. Schedule for Procurement of Equipment
4. Construction of Labor Camp
5. Construction of temporary stores.
6. Building office for his personnel.
7. Living accommodation for his staff.
8. Fencing, providing lights and guard.
9. Equipment for use in construction site and crane for loading & unloading
10. Arranging transport for his staff.
11. Arranging electricity & water
12. Construction of Engineer's Office Building.
13. Establish Soil and Concrete Laboratory.
14. Establish Bench Marks with reference to existing Bench marks at nearby places.
15. Other works as per requirement & approval of the Engineer.



Construction Schedule

The bidder is to submit his own Construction Schedule considering its resources/equipment.
A tentative Construction Schedule prepared by the Employer is appended for bidder's guidance only.

Actual Construction Schedule for the Contract shall be followed when prepared by the contractor and approved by the Engineer

A handwritten signature or mark in blue ink, consisting of stylized characters that appear to be 'S' and 'H' with a diagonal line through them.

Coastal Embankment Improvement Project Phase - 1 (CEIP-1)
First Year Activities

SI No.	Description	June	July	Aug.	Sep.	Oct.	Non.	Dec.	Jan.	Feb.	Mar.
A	Start of work / activities by the contractor										
1	Award of Contract & Signing of Contract	Signing of the Contract									
2	Mobilization of contractor to site.										
3	Submission of construction programme of works by contractor.										
4	Submit monthly progress report at the end of month.				Cont						
5	Submission of list of equipment & manpower to the Engineer in-charge.										
B	Contractor's site facilities & Engineer's facilities										
(a)	Construction of temporary stores.				Cont						
(b)	Building office for his personel.										
(c)	Living accommodation for his staff outside limits.										
(d)	Fencing providing lights and guard.										
(e)	Procurement of Equipment for use in construction site and crane for loading & unloading.										
(f)	Arranging transport for his staff.				Cont						
(g)	Arranging electricity & water.				Cont						
(h)	Construction Engineer's Office Building.										
(i)	Provide Engineer's Transport				Cont						
(j)	Eatabilish Soil and Concrete Laboratory and Conduct Testing				Cont						
C	Survey Work										
(i)	Establish bench marks with reference to existing bench marks at site.				Cont						
(ii)	Random check by the quality control staff.				Cont						

The contractor shall submit the survey data to the Engineer every month. After the award of contract, actual construction programme shall be followed

IDENTIFICATION OF POLDERS

Coastal Embankment Improvement Project Phase - 1 (C)

Indicative Construction Schedule in

32 - - - 35/1
33 - - - 35/3 - . -

Polders 32 , 33, 35/1 & 35/3

SI No.	Description	1st Year										2nd Year					
		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
1	Re-sectioning of Embankment																
2	Construction of Retierd Embankment																
3	Construction of Drainage Sluices																
4	Construction of Flushing Inlets																
5	Bank Protection Works	Procurement of Materials										Procurement of Materials and Manufacturing of CC Block					
6	Slope Protection of Embankment	Procurement of Materials										Procurement of Materials and Manufacturing of CC Block					
7	Re-excavation of Drainage Channels																
8	Construction of Closure Dam					Procurement of Materials , construction of CC Blocks etc.											
9	Repairing of Drainages Sluices																
10	Repairing of Flushing Inlets																
11	Dismantling of Road (km)																
12	Demolish of Drainage Sluice and Flushing Inlets																
13	Survey work for Polders																
(i)	Establish bench marks with reference to existing bench marks at site, provide lay out /control points for works of all activities																
(ii)	Random check by the quality control staff																

IDENTIFICATION OF POLDERS

32 - - - - - 35/1
 33 - - - - - 35/3 - - - - -

Coastal Embankment Improvement Project Phase - 1 (CEIP-1) Indicative Construction Schedule in Polders

Polders 32 , 33, 35/1 & 35/3

SI No.	Description	2nd Year						3rd Year					
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
1	Re-sectioning of Embankment												
2	Construction of Retierd Embankment												
3	Construction of Drainage Sluices												
4	Construction of Flushing Inlets												
5	Bank Protection Works												
6	Slope Protection of Embankment												
7	Re-excavation of Drainage Channels												
8	Construction of Closure Dam												
9	Repairing of Drainages Sluices												
10	Repairing of Flushing Inlets												
11	Dismantling of Road												
12	Demolish of Drainage Sluice and Flushing Inlets												
13	Survey work for Polders												
(i)	Establish bench marks with reference to existing bench marks at site, provide lay out												

Coastal Embankment Improvement Project Phase - 1 (CEIP-1)

Indicative Construction Schedule in Polders

Polders 32 , 33, 35/1 & 35/3

IDENTIFICATION OF POLDERS

32 - - - - - 35/1 - - - - -
 33 - - - - - 35/3 - - - - -

SI No.	Description	3rd Year					
		Jan	Feb	Mar	Apr	May	June
1	Re-sectioning of Embankment	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -
2	Construction of Retierd Embankment	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -
3	Construction of Drainage Sluices	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -
4	Construction of Flushing Inlets	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -
5	Bank Protection Works						
6	Slope Protection of Embankment	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -
7	Re-excavation of Drainage Channels	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -
8	Construction of Closure Dam						
9	Repairing of Drainages Sluices						
10	Repairing of Flushing Inlets						
11	Dismantling of Road	- - - - -	- - - - -	- - - - -			
12	Demolish of Drainage Sluice and Flushing Inlets	- - - - -	- - - - -	- - - - -			
13	Survey work for Polders	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -
(i)	Random check by the quality control staff	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -
14	Site Clearance and Clean Up	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -

Form EQU: Equipment

The bidder shall provide adequate information to demonstrate clearly that it has the capability to meet the requirements for the key equipment listed in Section III, Evaluation and Qualification Criteria. A separate Form shall be prepared for each item of equipment listed, or for alternative equipment proposed by the Bidder.

Item of equipment		
Equipment information	Name of manufacturer	Model and power rating
	Capacity	Year of manufacture
Current status	Current location	
	Details of current commitments	
Source	Indicate source of the equipment ☐ Owned ☐ Rented ☐ Leased ☐ Specially manufactured	

Omit the following information for equipment owned by the Bidder.

Owner	Name of owner	
	Address of owner	
	Telephone	Contact name and title
	Fax	Telex
Agreements	Details of rental / lease / manufacture agreements specific to the project	

Personnel

Form PER-1: Proposed Personnel

Bidders should provide the names of suitably qualified personnel to meet the specified requirements stated in Section III. The data on their experience should be supplied using the Form below for each candidate.

1.	Title of position*
	Name
2.	Title of position*
	Name
3.	Title of position*
	Name
4.	Title of position*
	Name

*As listed in Section III.



Form PER-2: Resume of Proposed Personnel

Name of Bidder		
Position		
Personnel information	Name	Date of birth
	Professional qualifications	
Present employment	Name of employer	
	Address of employer	
	Telephone	Contact (manager / personnel officer)
	Fax	E-mail
	Job title	Years with present employer

Summarize professional experience over the last 20 years, in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

From	To	Company / Project / Position / Relevant technical and management experience



Bidders Qualification without prequalification

To establish its qualifications to perform the contract in accordance with Section III (Evaluation and Qualification Criteria) the Bidder shall provide the information requested in the corresponding Information Sheets included hereunder.



Form ELI -1.1**Bidder Information Form**

Date: _____
 ICB No. and title: _____
 Page _____ of _____ pages

Bidder's name
In case of Joint Venture (JV), name of each member:
Bidder's actual or intended country of registration: <i>[indicate country of Constitution]</i>
Bidder's actual or intended year of incorporation:
Bidder's legal address [in country of registration]:
Bidder's authorized representative information Name: _____ Address: _____ Telephone/Fax numbers: _____ E-mail address: _____
1. Attached are copies of original documents of ☐ Articles of Incorporation (or equivalent documents of constitution or association), and/or documents of registration of the legal entity named above, in accordance with ITB 4.3. ☐ In case of JV, letter of intent to form JV or JV agreement, in accordance with ITB 4.1. ☐ In case of Government-owned enterprise or institution, in accordance with ITB 4.5 documents establishing: • Legal and financial autonomy • Operation under commercial law • Establishing that the Bidder is not dependent agency of the Employer
2. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership.

Form ELI -1.2**Bidder's JV Information Form
(to be completed for each member of Bidder's JV)**

Date: _____

ICB No. and title: _____

Page _____ of _____ pages

Bidder's JV name: _____

JV member's name: _____

JV member's country of registration: _____

JV member's year of constitution: _____

JV member's legal address in country of constitution: _____

JV member's authorized representative information

Name: _____

Address: _____

Telephone/Fax numbers: _____

E-mail address: _____

1. Attached are copies of original documents of

- ☐ Articles of Incorporation (or equivalent documents of constitution or association), and/or registration documents of the legal entity named above, in accordance with ITB 4.3.
- ☐ In case of a Government-owned enterprise or institution, documents establishing legal and financial autonomy, operation in accordance with commercial law, and absence of dependent status, in accordance with ITB 4.5.

2. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership.



Form CON – 2

Historical Contract Non-Performance, Pending Litigation and Litigation History

Bidder's Name: _____

Date: _____

JV Member's Name _____

ICB No. and title: _____

Page _____ of _____ pages

Non-Performed Contracts in accordance with Section III, Evaluation and Qualification Criteria			
☐ Contract non-performance did not occur since 1 st January 2012 specified in Section III, Evaluation and Qualification Criteria, Sub-Factor 2.1.			
☐ Contract(s) not performed since 1 st January <i>[insert year]</i> specified in Section III, Evaluation and Qualification Criteria, requirement 2.1			
Year	Non-performed portion of contract	Contract Identification	Total Contract Amount (current value, currency, exchange rate and US\$ equivalent)
<i>[insert year]</i>	<i>[insert amount and percentage]</i>	Contract Identification: <i>[indicate complete contract name/number, and any other identification]</i> Name of Employer: <i>[insert full name]</i> Address of Employer: <i>[insert street/city/country]</i> Reason(s) for non-performance: <i>[indicate main reason(s)]</i>	<i>[insert amount]</i>
Pending Litigation, in accordance with Section III, Qualification Criteria and Requirements			
☐ No pending litigation in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.3.			
☐ Pending litigation in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.3 as indicated below.			

Year of dispute	Amount in dispute (currency)	Contract Identification	Total Contract Amount (currency), USD Equivalent (exchange rate)
		Contract Identification: _____ Name of Employer: _____ Address of Employer: _____ Matter in dispute: _____ Party who initiated the dispute: _____ Status of dispute: _____	
☐ No pending litigation in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.3. ☐ Pending litigation in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.3 as indicated below.			
Year of award	Outcome as percentage of Net Worth	Contract Identification	Total Contract Amount (currency), USD Equivalent (exchange rate)
		Contract Identification: _____ Name of Employer: _____ Address of Employer: _____ Matter in dispute: _____ Party who initiated the dispute: _____ Status of dispute: _____	

Form FIN – 3.1:**Financial Situation and Performance**

Bidder's Name: _____

Date: _____

JV Member's Name: _____

ICB No. and title: _____

Page _____ of _____ pages

1. Financial data

Type of Financial information in (currency)	Historic information for previous _____ years, (amount in currency, currency, exchange rate*, USD equivalent)				
	Year 1	Year 2	Year 3	Year 4	Year 5
Statement of Financial Position (Information from Balance Sheet)					
Total Assets (TA)					
Total Liabilities (TL)					
Total Equity/Net Worth (NW)					
Current Assets (CA)					
Current Liabilities (CL)					
Working Capital (WC)					
Information from Income Statement					
Total Revenue (TR)					
Profits Before Taxes (PBT)					
Cash Flow Information					
Cash Flow from Operating Activities					

*Refer to ITB 15 for the exchange rate

2. Sources of Finance

Specify sources of finance to meet the cash flow requirements on works currently in progress and for future contract commitments.

No.	Source of finance	Amount (US\$ equivalent)
1		
2		
3		

2. Financial documents

The Bidder and its parties shall provide copies of financial statements for _____ years pursuant Section III, Evaluation and Qualifications Criteria, Sub-factor 3.1. The financial statements shall:

- (a) reflect the financial situation of the Bidder or in case of JV member , and not an affiliated entity (such as parent company or group member).
- (b) be independently audited or certified in accordance with local legislation.
- (c) be complete, including all notes to the financial statements.
- (d) correspond to accounting periods already completed and audited.

☐ Attached are copies of financial statements¹² for the _____ years required above; and complying with the requirements

¹² If the most recent set of financial statements is for a period earlier than 12 months from the date of bid, the reason for this should be justified.

Form FIN – 3.2:**Average Annual Construction Turnover**

Bidder's Name: _____

Date: _____

JV Member's Name _____

ICB No. and title: _____

Page _____ of _____ pages

		Annual turnover data (construction only)	
Year	Amount Currency	Exchange rate	USD equivalent
<i>[indicate year]</i>	<i>[insert amount and indicate currency]</i>		
Average Annual Construction Turnover *			

* See Section III, Evaluation and Qualification Criteria, Sub-Factor 3.2.

Form FIN – 3.3:**Financial Resources**

Specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines of credit, and other financial means, net of current commitments, available to meet the total construction cash flow demands of the subject contract or contracts as specified in Section III (Evaluation and Qualification Criteria)

Financial Resources		
No.	Source of financing	Amount (US\$ equivalent)
1		
2		
3		



Form FIN – 3.4:**Current Contract Commitments / Works in Progress**

Bidders and each member to a JV should provide information on their current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.

Current Contract Commitments					
No.	Name of Contract	Employer's Contact Address, Tel, Fax	Value of Outstanding Work [Current US\$ Equivalent]	Estimated Completion Date	Average Monthly Invoicing Over Last Six Months [US\$/month]
1					
2					
3					
4					
5					



Form EXP - 4.1**General Construction Experience**

Bidder's Name: _____

Date: _____

JV Member's Name _____

ICB No. and title: _____

Page _____ of _____ pages

Starting Year	Ending Year	Contract Identification	Role of Bidder
		Contract name: _____ Brief Description of the Works performed by the Bidder: _____ Amount of contract: _____ Name of Employer: _____ Address: _____	
		Contract name: _____ Brief Description of the Works performed by the Bidder: _____ Amount of contract: _____ Name of Employer: _____ Address: _____	
		Contract name: _____ Brief Description of the Works performed by the Bidder: _____ Amount of contract: _____ Name of Employer: _____ Address: _____	



Form EXP - 4.2(a)**Specific Construction and Contract Management Experience**

Bidder's Name: _____

Date: _____

JV Member's Name _____

ICB No. and title: _____

Page _____ of _____ pages

Similar Contract No.	Information			
Contract Identification				
Award date				
Completion date				
Role in Contract	Prime Contractor ☐	Member in JV ☐	Management Contractor ☐	Sub-contractor ☐
Total Contract Amount			US\$	
If member in a JV or sub-contractor, specify participation in total Contract amount				
Employer's Name:				
Address:				
Telephone/fax number				
E-mail:				

Form EXP - 4.2(a) (cont.)
Specific Construction and Contract Management Experience (cont.)

Similar Contract No.	Information
Description of the similarity in accordance with Sub-Factor 4.2(a) of Section III:	
1. Amount	
2. Physical size of required works items	
3. Complexity	
4. Methods/Technology	
5. Construction rate for key activities	
6. Other Characteristics	



Form EXP - 4.2(b)**Construction Experience in Key Activities**

Bidder's Name: _____

Date: _____

Bidder's JV Member Name: _____

Sub-contractor's Name¹³ (as per ITB 34.2 and 34.3): _____

ICB No. and title: _____

Page _____ of _____ pages

All Sub-contractors for key activities must complete the information in this form as per ITB 34.2 and 34.3 and Section III, Qualification Criteria and Requirements, Sub-Factor 4.2.

1. Key Activity No One: _____

	Information			
Contract Identification				
Award date				
Completion date				
Role in Contract	Prime Contractor ☐	Member in JV ☐	Management Contractor ☐	Sub-contractor ☐
Total Contract Amount			US\$	
Quantity (Volume, number or rate of production, as applicable) performed under the contract per year or part of the year	Total quantity in the contract (i)	Percentage participation (ii)	Actual Quantity Performed (i) x (ii)	
Year 1				
Year 2				
Year 3				
Year 4				
Employer's Name:				

¹³ If applicable

	Information
Address:	
Telephone/fax number	
E-mail:	

2. Activity No. Two

3.

	Information
Description of the key activities in accordance with Sub-Factor 4.2(b) of Section III:	



Form of Bid Security

(Demand Guarantee)

Beneficiary: _____

Invitation for Bids No: _____

Date: _____

BID GUARANTEE No.: _____

Guarantor: _____

We have been informed that _____ (hereinafter called "the Applicant") has submitted or will submit to the Beneficiary its bid (hereinafter called "the Bid") for the execution of _____ under Invitation for Bids No. _____ ("the IFB").

Furthermore, we understand that, according to the Beneficiary's conditions, bids must be supported by a bid guarantee.

At the request of the Applicant, we, as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of _____ (_____) upon receipt by us of the Beneficiary's complying demand, supported by the Beneficiary's statement, whether in the demand itself or a separate signed document accompanying or identifying the demand, stating that either the Applicant:

- (a) has withdrawn its Bid during the period of bid validity set forth in the Applicant's Letter of Bid ("the Bid Validity Period"), or any extension thereto provided by the Applicant; or
- (b) having been notified of the acceptance of its Bid by the Beneficiary during the Bid Validity Period or any extension thereto provided by the Applicant, (i) has failed to execute the contract agreement, or (ii) has failed to furnish the performance security, in accordance with the Instructions to Bidders ("ITB") of the Beneficiary's bidding document.

This guarantee will expire: (a) if the Applicant is the successful bidder, upon our receipt of copies of the contract agreement signed by the Applicant and the performance security issued to the Beneficiary in relation to such contract agreement; or (b) if the Applicant is not the successful bidder, upon the earlier of (i) our receipt of a copy of the Beneficiary's notification to the Applicant of the results of the bidding process; or (ii) twenty-eight days after the end of the Bid Validity Period.

Consequently, any demand for payment under this guarantee must be received by us at the office indicated above on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758.

[signature(s)]



Form of Bid-Securing Declaration

Date: _____

Bid No.: _____

Alternative No.: _____

To:

We, the undersigned, declare that:

We understand that, according to your conditions, bids must be supported by a Bid-Securing Declaration.

We accept that we will automatically be suspended from being eligible for bidding in any contract with the entity that invited Bids for the period of time of _____ starting on _____, if we are in breach of our obligation(s) under the bid conditions, because we:

- (a) have withdrawn our Bid during the period of bid validity specified in the Letter of Bid; or
- (b) having been notified of the acceptance of our Bid by the Employer during the period of bid validity, (i) fail or refuse to execute the Contract, if required, or (ii) fail or refuse to furnish the Performance Security, in accordance with the ITB.

We understand this Bid-Securing Declaration shall expire if we are not the successful Bidder, upon the earlier of (i) our receipt of your notification to us of the name of the successful Bidder; or (ii) twenty-eight days after the expiration of our Bid.

Name of the Bidder* _____

Name of the person duly authorized to sign the Bid on behalf of the Bidder** _____

Title of the person signing the Bid _____

Signature of the person named above _____

Date signed _____ day of _____, ____

*: In the case of the Bid submitted by joint venture specify the name of the Joint Venture as Bidder

**: Person signing the Bid shall have the power of attorney given by the Bidder attached to the Bid

[Note: In case of a Joint Venture, the Bid-Securing Declaration must be in the name of all members to the Joint Venture that submits the bid.]



Section V. Eligible Countries

Eligibility for the Provision of Goods, Works and Non Consulting Services in Bank-Financed Procurement

1. In reference to ITB 4.7 and 5.1, for the information of the Bidders, at the present time firms, goods and services from the following countries are excluded from this bidding process:

Under ITB 4.7(a) and 5.1: **Israel**

Under ITB 4.7(b) and 5.1: **None**



Section VI. Bank Policy - Corrupt and Fraudulent Practices

Guidelines for Procurement of Goods, Works, and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers, dated January 2011.

“Fraud and Corruption:

1.16 It is the Bank’s policy to require that Borrowers (including beneficiaries of Bank loans), bidders, suppliers, contractors and their agents (whether declared or not), sub-contractors, sub-consultants, service providers or suppliers, and any personnel thereof, observe the highest standard of ethics during the procurement and execution of Bank-financed contracts.¹⁴ 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” is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;¹⁵
 - (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;¹⁶
 - (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;¹⁷
 - (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;¹⁸
 - (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,

¹⁴ In this context, any action to influence the procurement process or contract execution for undue advantage is improper.

¹⁵ For the purpose of this sub-paragraph, “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.

¹⁶ For the purpose of this sub-paragraph, “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.

¹⁷ For the purpose of this sub-paragraph, “parties” refers to participants in the procurement process (including public officials) attempting either themselves, or through another person or entity not participating in the procurement or selection process, to simulate competition or to establish bid prices at artificial, non-competitive levels, or are privy to each other’s bid prices or other conditions.

¹⁸ For the purpose of this sub-paragraph, “party” refers to a participant in the procurement process or contract execution.

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 paragraph 1.16(e) below.
- (b) will reject a proposal for award if it determines that the bidder recommended for award, or any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;
- (c) will declare misprocurement and cancel the portion of the loan allocated to a contract if it determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement or the implementation of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;
- (d) will sanction a firm or individual, at any time, in accordance with the prevailing Bank's sanctions procedures,¹⁹ 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 nominated²⁰;
- (e) will require that a clause be included in bidding documents and in contracts financed by a Bank loan, requiring bidders, suppliers and contractors, and their sub-contractors, agents, personnel, consultants, service providers, or suppliers, to permit the Bank to inspect all accounts, records, and other documents relating to the submission of bids and contract performance, and to have them audited by auditors appointed by the Bank."

¹⁹ A firm or individual may be declared ineligible to be awarded a Bank financed contract upon: (i) completion of the Bank's sanctions proceedings as per its sanctions procedures, including, inter alia, cross-debarment as agreed with other International Financial Institutions, including Multilateral Development Banks, and through the application the World Bank Group corporate administrative procurement sanctions procedures for fraud and corruption; and (ii) as a result of temporary suspension or early temporary suspension in connection with an ongoing sanctions proceeding. See footnote 14 and paragraph 8 of Appendix 1 of these Guidelines.

²⁰ A nominated sub-contractor, consultant, manufacturer or supplier, or service provider (different names are used depending on the particular bidding document) is one which has either been: (i) 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.



PART 2 –WORKS REQUIREMENTS

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Section VII. Works Requirements

5/18

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Scope of Works

The project involves the following works to be executed over a period of three (3) years in four (4) polders in coastal area of Bangladesh and the Polder number are (i) 32, (ii) 33, (iii) 35/1 and (iv) 35/3 in Upazilas Dacope, Sharankhola and Bagerhat, in the district of Khulna & Bagerhat. The works are:

1. Mobilization
2. Construction / Re-sectioning of Embankment
3. Excavation / Re-excavation of drainage channel
4. Construction of Drainage Sluices (RCB 1.5m x 1.8m size)
5. Repairing of Drainage Sluices
6. Construction of Flushing Inlets (RCB 0.90m x 1.20m & 0.90m x 0.90m)
7. Repairing of Flushing Inlets
8. Embankment Slope Protection Works
9. River Bank Protection Works
10. Dismantling of Brick Soling /Bituminous Carpeting Road, dismantling of Drainage Sluice/Flushing Inlet
- 11 Construction of Closure Dam over Nalian River
- 12 Environmental Mitigation Works

Works have to be taken up in accordance with the “work programme” prepared by the contractor on the basis of his resources and subsequently approved by the Engineer.

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GENERAL REQUIREMENTS

The Section contains General Requirement of the Employer and Specifications. The work should be carried out in accordance with the approved design and specifications. If there is any changes due to site condition, the 'Engineer's instruction should govern.

The bidder shall submit its own methodology, which will be used only for bid evaluation purpose and bidder will be fully responsible for fulfillment of the contract. By providing the under mentioned informative guidelines, the Employer does not bind itself in any way whatsoever. This text may serve as general information on methodology that BWDB follows and the bidder may have the option to adopt a similar approach, if it considers appropriate without any liability to the Employer. **However, in case of Joint Venture, the major member in terms of size and experience shall be the Authorized Representative and lead the works in the field. Noncompliance of this requirement shall be taken up under the relevant Clauses including under GC Clause 15.2 treating the noncompliance as an additional events under the said Sub-Clause.**



List of Abbreviations

km	Kilometre	Lin	linear
m	Metre	Cu.	Cubic
mm	Millimeter	Sq.	Square
Ha	Hectare	g	Gram
m ² ,sqm	Square metre	ton	Metric Ton
mm ²	Square millimeter	ltr	Litre
m ³	Cubic metre	ml	Milliliter
No.	Number	s	Second
%	Percent	min	Minute
°C	Degree Centigrade	kg	Kilogram
BS	British Standard		
N	Newton	VM	Vehicle Month
ASTM	American Society for testing and materials		
USD	Currency of USA	BDT (Taka)	Bangladesh Currency
BS	British Standard	ISO	International Organization for Standardization
AASHTO	American Association of State Highway and Transportation Officials		
ACI	American Concrete Institute	AWWA	American Water Works Association
BSI	British Standards Institution	DIN	German Institute for Standardization
SSPC	Society for Protective Coatings	USBR	United States Bureau of Reclamation
AISI	American Iron and Steel Institute		
STP	Standard Test Procedure (Road & Highways Department)		

1 General

1.01 Introduction:

Since inception in 1959 to date, Bangladesh Water Development Board (BWDB) constructed 139 polders in the coastal region. These polders had been planned and designed considering protecting low lying coastal areas against tidal flooding and salinity intrusion, considering only the tidal effects but ignoring the effects of wind wave and cyclonic storm surges. This system worked well for last 40 years and 1.2 million hectares of lands are now under the protection of the coastal embankment system bringing immense benefits. Recent cyclonic storm damages and the anticipation of worse future situations on account of climate change, has caused this strategy to be revised. Additional problems have also been identified – the direct impact of sea level rise on salinity intrusion into the coastal zone as well as on polder drainage.

It is well recognized that infrastructural interventions in the coastal areas by embankments and Cyclone shelters have significantly reduced its vulnerability to natural disasters at least partially and thus the poor people have some assurance of safety to their lives and crops. However, some effectiveness of the infrastructures in most cases has been compromised through poor and inadequate maintenance and sometimes by shifting the embankments towards country sides. With the occurrence of the frequent storms in the recent period the Coastal Embankment Systems (CES) has weakened and calls for systematic restoration and upgrading.

After cyclone SIDR & AILA struck the coastal area causing severe damage to the infrastructure, lives and properties of the coastal belt, the Government of Bangladesh (GOB) obtained an IDA credit for Emergency Cyclone Recovery and Restoration Project (ECRRP, 2007) and proceeds from this credit was used to meet the expenses for preparation of the Coastal Embankment Improvement Project, Phase-1 (CEIP-1).

It had been appreciated that undertaking the rehabilitation of coastal embankment system under one or two localized projects will not bring any convincing change in such a vast area. To resolve this multi-dimensional problems a strategic approach in the name of Coastal Embankment Improvement Programme (CEIP) was felt necessary. It incorporates a longer term perspective in a programme spread over a period of 15-20 years, composed of at least 3-4 sub-phases.

The purpose of this project was to prepare the strategic plan for coastal embankment improvement program (CEIP) and for carrying out the detail feasibility study for the first program covered in CEIP-1 for reconstruction and upgrading of coastal embankments. This included detail design, preparation of Bidding Documents and implementation program for rehabilitation of judiciously selected extremely vulnerable polders.

In view of above considerations, 17 polders out of 139 have been selected for Feasibility Studies as first programme project CEIP-1 and 5 polders (P-32, P-33, P-35/1, P-35/3 and P-39/2C) out of 17 were selected for Detailed Design for implementation as a first year programme. Accordingly, detailed design of those 5(five) Polders have been prepared but finally Polder No.39/2C has been dropped from first priority list. In order to implement the infrastructures of the 4 priority polders (P-32, P-33, P-35/1 and P-35/3) a Specification has been prepared.

1.02 Drawings

1.02.1 Bidding Drawings

All the drawing of works is enclosed in separate Volume as **Annex-A to this Volume Section (Part 2 and Part 3)** of the Bidding Documents. Final drawings may be delivered to the Contractor prior to the commencement of the works before “Work Programme be submitted”.

1.02.2 Final Drawings

The drawings attached to the Bidding Documents (hereinafter referred to as “Bidding Drawings”) accompany and form part of the Contract Documents. In addition to the Bidding Drawings, Final Drawings may also be delivered by the Engineer to the Contractor for execution of work and such drawings shall thereupon become part of the Contract.

During the progress of the work, drawings may be issued by the Engineer as necessity arises considering the ground condition and other unseen factors to supplement and/or supersede the Bidding Drawings.

The Contractor shall scrutinise such drawings as issued from time to time by the Engineer. If any ambiguity, discrepancy or mistake is found in the drawings, the same shall be referred to the Engineer before proceeding with the works, and the Engineer’s decision on resolving such ambiguity, discrepancy or mistake shall be final, conclusive and binding.

1.02.3 Drawings and Calculations to be furnished by the Contractor

The Contractor shall at his own expense prepare detailed Working /Shop Drawing of the individual works (hereinafter referred to as “Working /Shop Drawing”) based on the Bidding Drawings and the Final Drawings as needed for performance of the works. All Working /Shop Drawing prepared by the Contractor shall be submitted to the Engineer for his approval. The drawings submitted by the Contractor shall be clear and complete. In addition to the above, the Contractor shall at his own expense prepare bar bending schedules as needed for the performance of the works and shall be submitted to the Engineer for approval.

Fabrication, manufacture or construction of any part of the works shall not commence until the drawings have been approved and no change shall be made to any drawings so approved. If any changes needed during construction shall be informed by sending another set of revised drawing.

1.02.4 Right to Change Design and Drawings

When additional information regarding foundation conditions become available as a result of foundation excavation and subsequent testing of soil, and if found enviable/desirable to make changes in the alignment, cross-sections, dimensions or design to address such conditions, the Employer/Engineer reserves the right to make the necessary or desirable changes in the design and drawings.

1.02.5 “As-Built” Drawings

The Contractor shall submit three (3) sets of printed “As-Built” Drawings of the completed Works along with two (2) sets of CD to the Employer before the expiration of Defect Liability Period.

The “As-Built” Drawings shall clearly show the lines and dimensions of the permanent construction actually made based on the original design and/or change of design from time to time ordered by the Engineer or proposed by the Contractor and approved by the Engineer.

1.02.6 Measurement and Payment

All costs including Contractor's margin, overhead, taxes, etc, incurred by the Contractor to provide and submit “As-Built” Drawings shall be deemed to be included in the respective items provided in the Bill of Quantities (BoQ).

1.03 Setting-Out and Survey of the Works

The Contractor shall re-survey the Base Lines, Traverse Points, Bench Marks and confirm the co-ordinates and levels of the Stations before using them for setting out the Works. The Contractor shall

immediately notify the Engineer of any discrepancies and shall agree with the Engineer any amended values to be used in the Contract, including replacement of any Stations missing from the original location.

The Contractor shall employ well-qualified and experienced surveyors for the execution of survey and setting-out works.

The Contractor shall be responsible for the setting-out centre-lines, longitudinal and cross sections of the ground, and position of the structures in accordance with the drawings. Before commencing the works for embankment, structures, protective works etc., the Contractor shall carry out topo-survey / bathymetric survey of all works and take levels for longitudinal profile and cross sections along the routes/locations in which the works are to be executed out at his own expenses. The Contractor shall use benchmarks approved by the Engineer for such survey works.

Along structures, embankments, or combination thereof, the Contractor shall install temporary benchmarks at intervals of 500m. Ground levels shall be taken jointly by the contractor and the Engineer's representative both prior to commencing and after completion of earth works.

The Contractor shall carry out Engineering survey and draw the plan and cross section for all the structures, embankments, protective works and roads as below:

- longitudinal section
- Cross-sections at an interval not exceeding 50 m or as specified by the Engineer before and after the execution of the Works. The formation level shall be taken as reference while cross-sections shall cover at least a width as necessary for the Works to be constructed, including related earthworks.

All field-books, calculations, maps, etc. of the survey activities shall be handed over to the Engineer, immediately after the completion of the survey. All field data, derived from the survey activities, entered in the field-books, shall also be entered into EXCEL spreadsheet or a compatible spreadsheet in a format approved by the Engineer. The data shall be submitted on a CD.

No separate payment shall be made to the Contractor for the works to be carried out under this Sub-Clause 1.03.

1.04 Layouts and Schedules Provisional

The locations, levels and dimensions as shown on the Drawings or given in the design data or structure schedules are subject to amendment. The Contractor will be required to undertake surveys for confirmation of alignment and levels of approach channels, flood embankments, and river bank protection works as detailed in Section VII of this Document. Details of any such amendment or confirmation of the original design will be given by the Engineer or the Engineer's Representative during the course of construction.

1.05 Suppliers of Materials

Before ordering a material for any description intended for the Works, the Contractor shall submit the name of the maker or supplier proposed and details of the place of origin and specification of the material to the Engineer for approval. If requested by Engineer, the Contractor shall supply a copy of any such order place. The Contractor shall make necessary arrangements (e.g. jetty) at the construction side where needed for loading & unloading of his equipment, materials etc.

1.06 Natural Materials

The Contractor shall make all arrangements for locating, selecting and processing natural materials to comply with the Specification and shall submit to the Engineer for approval with full information regarding

the proposed location well in advance of commencement of working of the materials. Approval of a source does not imply that all material in that source is approved.

1.07 Disruption of Local Communities

The Contractor shall take all measures necessary to avoid nuisance and disruption to local communities. In particular the Contractor shall ensure no damage is done to existing road, standing crops, pasture or woodland, trees etc. and that the Contractor's operations do not cause flooding or pollution hazards.

1.08 Temporary works

Not less than fourteen days before commencing any portion of the Works, the Contractor, if ordered, shall submit to the Engineer for his approval complete drawings of all Temporary Works the Contractor may require for the construction of that part of the Works.

Notwithstanding approval by the Engineer of any design for the Temporary Works the Contractor shall be entirely responsible for their efficiency, security and maintenance and for all obligations and risks in regard to such temporary Works which are specified or implied in the Contract

1.09 Cofferdam/Ring Bundh

The Contractor shall submit, upon request of the Engineer, Drawings showing his proposed method of Cofferdam/Ring Bundh construction. Approval of the Drawings by the Engineer will not in any way relieve the Contractor of the responsibility for the adequacy of the design for strength and stability or for the safety of the people working therein.

Unless otherwise provided, Cofferdam/Ring Bundh shall be removed after the completion of the sub-structure. Cofferdam/Ring Bundh shall be constructed so as to protect newly-cast concrete from suddenly rising water and to prevent damage to the foundation by erosion. Details in respect of specifications, construction procedures and aspects have been elaborated in Specification Clause No.2.2

1.10 Notice of Operation

The Contractor shall give full and complete written notice of all important operations, including setting out, to the Engineer sufficiently in advance to enable the Engineer to make such arrangements as the Engineer may consider necessary for inspection and for any other purpose. The Contractor shall not start any important operation without the written approval of the Engineer.

1.11 Supply of Fuel/Lubricant

The Contractor shall be responsible for arranging and ensuring that adequate supplies of high speed diesel oil, motor spirits, kerosene, lubricants and other petroleum produces are available at all times to meet his requirements for the purposes of or in connection with the contract; the Contractor's particular attention is drawn to this the effect that shortages and interruptions in the supply of fuel oils, etc likely to occur in the region at any time.

1.12 Engineer's Requirements

In the Bill of Quantities (BoQ) provision has been made for payment of the costs associated with the provision for construction of pucca (RCC roofing) buildings for Field Offices, Site Offices and Field Laboratory, Refurbishment of 2 Nos. Rest Houses including furnishing & equipping the offices; provision of 4 WD Motor vehicles and Double Cabin Pickups, Motor Cycles and Speed Boat for full time use by the Engineer's representative and establishment of Field Laboratory. Details of requirements/specifications are described in Clause No. 1.30.

All costs including Contractor's margin, overhead, taxes etc, incurred by the Contractor to provide, construct, supply, install etc in accordance with the specifications mentioned elsewhere, shall be deemed to be included in the rates/price quoted in the Bill of Quantities (Section No.01) of the

respective items. All facilities shall be ready for occupation by the Engineer within one month after receiving the instruction.

If the Contractor fails to provide this service the Engineer shall be entitled to withhold the issue of Payment Certificate until the service is resumed.

1.13 Assistance to Engineer's Staff

The Contractor shall render all necessary assistance to the Engineer's staff and shall provide for checking the Contractor's setting-out and the measurement of the Works.

The Contractor shall provide such full time or part time surveyors as may be required. The cost of all labours, surveyors, survey equipment and tools, for checking the setting-out and the measurement of the Works shall be covered by the Contractor's expense and no separate payment shall be made thereof.

1.14 Construction Programme

Within **twenty-eight (28)** days from the date of receiving of notice for Commencement of Works, the Contractor shall submit to the Engineer for approval a complete and practicable construction programme (**GCC Clause 8.3, Part 3 of the Bidding Document**) showing the orderly performance of the Works. The Construction Programme shall show in detail the proposed method of operations, including purchase and delivery of materials and equipment, as well as the construction. The Programme shall be shown in a bar chart depicting each major item of the Works on separate horizontal lines, sequence of operation and the period required for the completion of each activity. The Construction Programme shall when approved by the Engineer become a part of the Contract.

The construction programmes shall include the followings:-

- (a) the order in which the Contractor intends to carry out the Works, including the anticipated timing of each stage of design (if any), Contractor's Documents, procurement Equipment & Machinery, delivery to Site, construction, erection and testing,
- (b) each of these stages for work by each nominated Subcontractor (as defined in GCC Clause 5 [Nominated Subcontractors]),
- (c) the sequence and timing of inspections and tests specified in the Contract, and
- (d) a supporting report which includes:
 - (i) a general description of the methods which the Contractor intends to adopt, and of the major stages, in the execution of the Works, and
 - (ii) details showing the Contractor's reasonable estimate of the number of each class of Contractor's Personnel and of each type of Contractor's Equipment, required on the Site for each major stage.
 - (iii) a statement and outline layout giving the proposals for location or locations and sizes of constructional camps, accommodation, offices, workshops and stores at the Site; and details of the programme for the construction of the works from the date of receipt of the Notice to Commence, including a complete resource allocation showing the number of units and allotted times for each unit of Contractor's Equipment, Plant, materials and labour allocated for each part of the works

1.15 Reports, Meetings and Data of the Works

1.15.1 Monthly Report

The Contractor shall furnish Monthly Report to the Engineer, at the Contractor's own costs, at regular

monthly interval and in a form and number of copies determined by the Engineer, with the followings:

- a. physical progress for the preceding month and estimated progress for the reporting month;
- b. completion schedules (target and actual) based on the approved Construction Programme;
- c. inventory of construction equipment and materials on which an advance was made by the Employer as provided in the Conditions of Contract;
- d. a tabulation of construction equipment, listing the major items and pieces of equipment which were utilised for performance of the Works during the preceding month;
- e. a tabulation of employees, showing the supervisory staff and the numbers of several classes of labourers employed by the Contractor in the preceding month; report covering the Plant and materials furnished by the Contractor for the Works; and
- f. any report which may be specifically asked for by the Employer and/or the Engineer.

1.15.2 Site /Progress Meetings

The Contractor shall attend meeting fortnightly or as required to review the progress of the work whenever called by the Engineer.

1.15.3 Photographs and Videos

The Contractor shall make all arrangements to provide photographs in albums, but not pasted, showing the work progress and shall promptly supply one electronic copy and four printed copies of such photographs of 4R size, of such portions of the works in progress and/or completed as may be directed by the Engineer. Each print shall contain on its back the date and title of the view taken. The Contractor shall also take Videos of work sequences time to time and supply the same in a CD.

1.15.4 Audits by the Employer

The Contractor shall note that the Employer shall be entitled at its discretion to conduct audits in respect to :

- costs incurred in the event of termination; and any other costs that the Contractor claims from the Employer which are not specifically covered by the terms of the Contract.

The Contractor shall be obliged to keep accurate up-to-date accounts with records concerning the above items.

1.15.5 Measurement and Payment

No separate payment shall be made for preparation of all documents, correspondence, returns and reports etc., to be prepared by the Contractor and submitted to the Engineer and/or the Employer in accordance with the provisions of the Contract.

All costs including Contractor's margin, overhead, taxes, etc. incurred by the Contractor shall be deemed to be included in the unit rate of the Bill of Quantities.

1.16 Safety Measures and Public Convenience

The Contractor shall provide necessary protection for all persons and properties at all times. The Contractor shall comply with the stipulations of the safe construction methods specified in the "Safety Manual", to the extent that such provisions do not conflict with the applicable laws of Bangladesh. The Contractor shall take all necessary measures to protect the work and prevent accidents during the construction. He shall provide and maintain sufficient night-lights, barricades, guards, temporary sidewalks, temporary bridges, danger signals, watchmen and necessary alliances and safeguards to

properly protect life and property. He shall also protect all excavations, equipment and materials so that the public are not be endangered.

No separate payment shall be made to the Contractor in complying with the provisions of this Sub-Clause.

1.17 Precautions

The Contractor is to execute the Works in such a manner that he does not damage or interfere with existing services which are located in proximity to the Site. The Contractor shall be responsible for any damage or interference which may be caused to these services due to execution of the Works and shall carry out all necessary repairs at his own expense and to the satisfaction of the Engineer.

No excavating machines shall be used in the immediate surroundings of cables and/or pipe-lines, unless approved by the Engineer.

Temporary Works which have to be made in the surroundings of the system during the execution of works, shall be maintained by the Contractor and shall be removed as soon as practicable.

1.17.1 Interference with Existing Works

The Contractor shall not interfere in any way with any existing works whether they are the property of the Employer or of a third party and whether the position of such works is indicated to the Contractor by the Engineer or not, except where such interference is specifically described as part of the Works either in the Contract or in the Engineer's instructions.

The Contractor shall at his own expense provide and erect to the approval of the Engineer such supports as may be required to protect efficiently all structures or works which may be endangered by the execution of the Works and he shall remove such supports on completion of the Works or otherwise take such permanent measures as may be required by the Engineer to protect the structures or works.

1.18 Signboards

The Contractor shall erect a **Signboard** of a size of not less than 2 m by 3 m at each work site. The signboard shall be erected at a suitable place prior to the commencement of the work and to be maintained in good condition during the whole contract period. All information on the Signboard will be written in English and Bengali. Each **Signboard** shall show the following:

- the name of the Project (including Loan Number)
- the name of the Employer
- all other details of the Contract or as directed by the Engineer.

No separate payment shall be made for the provision of the **Signboard**.

1.19 Clean Up the Site

Prior to the issue of the latest Defect Liability Certificate by the Employer the Contractor shall remove from the Site all plant and equipment, tools, rubbish, concrete forms, boulders, bricks and other materials not incorporated in the permanent works.

No separate payment shall be made to the Contractor for complying with the provisions of this Sub-Clause.

1.20 Contractor's Offices, Workshops, Accommodations, Inspection Shed etc.

The Contractor shall be responsible for the land he deems necessary for his offices, stores, warehouse, motor pool, laboratory, workshops, pre-cast concrete factory, staff quarters and labour camp. Separate accommodation and toilet facilities to be kept for male and female workers. The Contractor shall be also responsible for construction, maintenance, operation of such temporary facilities as his office, stores, warehouse, motor pool, site laboratory, workshops, pre-cast concrete factory, staff quarters and labourer camps including feeding and accommodation. These facilities shall be equipped with adequate electricity and potable water supplies. Bangladesh labour law would be strictly followed in administering the workers (labours). The Contractor shall also keep sufficient first aid kit and preventive medicines of viral and waterborne diseases.

The Contractor shall also construct semi-pucca (CI roofing) Sheds at the selected construction sites as shown below to facilitate inspection of different works under the Contract by the Engineer and his staffs:

Table 1.20 : List of Semi Pucca Inspection Shed to be constructed at selected Construction Site

Sl. No.	Polder No.	Semi-pucca Shed to be installed at Construction Site (Nos.)	Remarks
1	32	3	The Sheds will ultimately be used by Water Management Organisation (WMO) in the later run
2	33	5	
3	35/1	6	
4	35/3	3	
Total Nos of Shed:		17	

Each of the Inspection Sheds shall be of minimum 60 sqm plinth area comprising 2(two) Room of size 4.25 m × 3.65 m, one veranda (1.5 m×11.25) and one Bathroom with standard fittings and fixings. The locations of the Inspection Sheds shall be decided by the Engineer while the works set in.

The Contractor shall take approval on the plan and design of the Inspection Shed from the Engineer. On completion of the contract, the Contractor shall hand over the Sheds to the Project Authority in functional condition which will be used as institutions for sustainable water management activities in the later run.

The Contractor shall submit for approval of the Engineer within fourteen (14) days from the date of the Notice for Commencement of Works, his detailed plan and/or construction drawings of his offices, stores, warehouse, motor pool, workshops, pre-cast concrete factory, staff quarters and labourer camps that he proposes to construct or rent, including his proposals for water and power supply and sewage facilities and Inspection Sheds. All buildings and facilities shall conform to the Employer's standards.

All costs including Contractor's margin, overhead, taxes, etc., incurred by the Contractor in complying with requirements of this clause shall be deemed to be included in the lump sum price of Contractor's facilities of the Bill of Quantities **(Item No.1.02)**. Payment for this item shall be made on pro-rata basis depending upon the total progress accomplished.

1.21 Quality Assurance Plan

The Contractor shall within twenty-eight (28) days from the date of the Notice to Commence submit a **Quality Assurance Plan**. The plan shall include testing schedules, list of material sources, quality control procedures and other items as required by the Engineer. The Contractor shall implement the quality control procedures in compliance with the approved Quality Assurance Plan.

1.22 Standards and Supplemental Specifications

Unless otherwise stated in the Contract, all workmanship, materials, and equipment shall comply with the relevant American, British and Bangladesh Standard viz. AASHTO, ACI, AISC, ASTM, AWS AWWA, BSI, DIN, DNA, ISO, SSPC, U.S. Fed. Spec and USBR

Wherever reference is made in the Contract to specific standards and codes to be met by the materials, Plant, and other supplies to be furnished, and work performed or tested, the provisions of the latest current edition or revision of the relevant standards and codes in effect shall apply, unless otherwise expressly stated in the contract.

1.23 Sanitation

The Contractor is to arrange for a high standard of sanitation to be maintained throughout the Camp and the Work sites. He shall construct and maintain at his own cost a system of surface drainage and waste disposal. Sanitary conveniences for the use of persons employed in the works shall be provided and maintained by the Contractor in accordance with the appropriate laws and regulations in force in Bangladesh to the extent and in such a manner and at such places as may be approved by the Engineer, and all persons connected with the works shall be obliged to use them.

1.24 Medical Arrangements and First Aid Facilities

The Contractor shall make arrangements according to the regulations in force in Bangladesh for treatment on the site of casualties and sick persons. The Contractor shall make his own arrangements for treatment of casualties on the Site in such first-aid units as may be thought necessary.

In addition, the Contractor shall manage and operate appropriate ambulances for the transportation of injured or sick employees to nearby hospitals. This facility shall be available for the Employer's, Engineer's, Subcontractors' and Contractor's personnel and workmen.

No separate payment shall be made for this provision.

1.25 Construction and Maintenance of Temporary Access Road

The Contractor shall construct and maintain the temporary access roads including temporary access bridges necessary for transportation of construction materials/ equipment & machinery and others necessary purposes related to construction works. The Contractor shall also pay compensation to the owner(s) if he constructs the temporary access roads on a privately owned land.

The public and village roads may also be used as temporary access road. The Contractor shall maintain and repair them to the satisfaction of the authorities concerned.

The Contractor shall facilitate the use of such roads for other contractors of the Project and public in a friendly co-operative manner without maintenance of the roads required by them.

All costs including Contractor's margin, overhead, taxes, etc., incurred by the Contractor in complying with requirements of this sub-clause shall be deemed to be included in the lump sum price of Contractor's facilities of the Bill of Quantities **(Item No.1.02(a))**.

1.26 Environmental Mitigation Works

The Environment is defined to mean surrounding area including human and natural resources to be affected by execution and completion of Works.

The Contractor shall take all precautions for safeguarding the environment during the course of the construction of the Works. The Contractor shall fully comply with the environmental protection mitigation measures specified in the related EIA Guidelines published by the Ministry of Environment and Forests, of Government of Bangladesh.

The Contractor shall prohibit employees from unauthorised use of explosives, poaching wildlife and cutting trees. The Contractor shall be responsible for the action of his employees. The Contractor shall plan his works in such a way that there is no spillage of petroleum products to the surface or sub-surface water. The Contractor shall provide requisite devices in all his equipment and machineries to diminish carbon dioxide coming out during operation of the equipment and machineries.

A provisional sum has been kept in the BoQ for implementation of the mitigation works in form of civil works as recommended in the EIA of the respective Polders under EMP (Environmental Mitigation Plan) of the Project. The Sum will be expended in whole or in part at the direction and discretion of the Engineer. The works are to be executed in accordance to the methodology and procedure as spelt out in the EMP of the EIA Report of the Project

Probable works as mitigation measures are as follows;

- Emergency works for breach of embankment and damaged structures
- Crop compensation to the direct loser land owner/ share cropper of construction site/damage due to dredged spoil
- Waste disposal arrangement at construction site
- Water quality monitoring
- Air and noise quality monitoring analysis
- Soil and water salinity monitoring cost
- Conservation and stocking of threatened fish species

1.27 Insurances

For fulfilling the obligations under Clause No.18 of the General Conditions of Contract (**Part 3 of the Bidding Document**), the Contractor shall maintain Insurance Coverage for Works, Contractor's Equipment, Injury to person & Damage to Property and Contractor's Personnel for the amount as specified at Contract Data of Particular Condition shall be deemed to include all the Contractor's incidental costs to providing the specified insurance.

1.28 Permits, Licenses or Approvals:

The Contractor shall, in performing the Contract, comply with the applicable Laws of Bangladesh. The Contractor shall give all notices, pay all taxes, duties and fees, and obtain all permits, licenses and approvals, as required by the applicable Laws in relation to the execution and completion of the Works and the remedying of any defects.

- 1.28.1** Contractor shall be allowed to re-export, out of Bangladesh, his equipment, including essential spare parts therefore, and any material imported by the Contractor for the sole purpose of executing the Contract, on completion of the contract. If the Contractor wishes to dispose them of locally, subject to the local laws, BWDB shall be given first preference to purchase at the negotiated price. Import and re-export of equipment, including essential spare parts will be subject to applicable laws of National Board of Revenue (NBR).

GENERAL: MOBILIZATION

1.29 Engineer's Facilities

The Contractor shall be responsible for the provision of the following facilities and services for Engineer.

- (a) Construction of Engineer's Field Office Building at Khulna and Borguna, Site Office Building at Dacope and Rayenda and a Laboratory Building at Khulna on BWDB's land of minimum floor area as shown below.

Field Office

- i) At Khulna over BWDB's Existing Office- Minimum 783 sqm
- ii) At Borguna BWDB's Office Premises- Minimum 200 sqm

Site Office

- i) At Dacope, BWDB's Office Premises- Minimum 140 sqm
- ii) At Rayenda, BWDB's Office Premises- Minimum 140 sqm

Field Laboratory

At Khulna, BWDB's Office Premises- Minimum- 72 sqm

All the Building shall be RCC Roofing. At Khulna, the existing BWDB's Office will be vertically extended by one floor as per approved plan and design (which may require modification as per requirement of the Employer; such modifications are subject to approval by the Project Director). For other buildings as specified above, the Contractor shall submit plan and design for prior approval by the Project Director through Engineer.

All the office field office buildings and site office buildings shall be provided with tiles on floor and wall (for toilet only), aluminum windows with glass panes, window grill, wooden door shutters, providing appropriate plumbing, sanitation, electrification and potable water supply facilities **(through treatment and filtering)** including supplying and fitting, fixing of **brand new air cooler (min^m of 1.5 Ton capacity) in each room**, lifting pump, erection of overhead tank etc.

The offices shall be fully equipped with standard Furniture & Fixtures and a **Refrigerator (of min^m 280 litre) and a DeFreezer (of min^m 340 litre)**. All equipment/articles / furniture & fixture must be of best quality and should have got approved beforehand by the Engineer. **Each of the buildings excepting at Khulna shall have be provided with a stand by Generator of minimum capacity of 10 KVA. For Khulna, Generator of minimum capacity of 20 KVA shall have to be provided.**

Field Office at Khulna shall be furnished with minimum of the following furniture and fixtures

- (i) 4 Drawer File Cabinet (shall be made of cold rolled steel sheet of min^m 8 mm (20 SWG) thickness reinforced with stiffeners equipped with castors made of high strength channels, nylons drawer grip and imported locking system, size: 476× 610×1425 mm)

- **24 Nos**

- (ii) Full Secretariat Table(Fixed Drawer Unit shall be made of imported best quality scratch proof and termite proof melamine faced chip board with PVC stopper & edging by automatic edge bending machine, Size: L: 5'5" × W: 2'6" × D: 2'6")

- **4 Nos.**

- (iii) Half Secretariat Tables ((Shall be made of best quality scratchproof and termite proof melamine laminated wood particle Board with 2× 1 mm thick PVC edging by automatic edge banding machine, Size of Table: L: 4'7"×W: 2'6"× H: 2'6")

- **12 Nos.**

- (iv) Executive Chair ((Manual height adjustable comfortable high back Revolving Chair with tilting facility. Chrome plated polymer cast leg with 5 Numbers Castors, The Seat shall be Foam cushioned and the Back pasted on imported Ply Wood)

- **16 Nos**

- (v) Armed Chair (fixed type armed chair constructed with 1.2 mm thick 30 & 18 mm dia unfilled tubular cold rolled mild steel structure)

- **40 Nos.**

- (vi) Side Table (Jack wood size 1'5"x 1'6"x 1'4") -**16 Nos**

- (vii) Screen for Door and Window etc.(**Best quality**)- **100 sets.**

Field Office at Borguna shall be furnished with minimum of the following furniture and fixtures;

- (i) 4 Drawer File Cabinet (shall be made of cold rolled steel sheet of min^m 8 mm (20 SWG) thickness reinforced with stiffeners equipped with castors made of high strength channels, nylons drawer grip and imported locking system, size: 476×610×1425 mm)- **12 Nos**

- (ii) Full Secretariat Table(Fixed Drawer Unit shall be made of imported best quality scratch proof and termite proof melamine faced chip board with PVC stopper & edging by automatic edge bending machine, Size: L: 5'5" × W: 2'6" × D: 2'6")

- **2 Nos**

- (iii) Half Secretariat Table (Shall be made of best quality scratchproof and termite proof melamine laminated wood particle Board with 2× 1 mm thick PVC edging by automatic edge banding machine, Size of Table: L: 4'7"×W: 2'6" × H: 2'6")

- **6 Nos**

- (iv) Executive Chair ((Manual height adjustable comfortable high back Revolving Chair with tilting facility. Chrome plated polymer cast leg with 5 Numbers Castors, The Seat shall be Foam cushioned and the Back pasted on imported Ply Wood) - **8 Nos**

- (vi) Armed Chair (fixed type armed chair constructed with 1.2 mm thick 30 & 18 mm dia unfilled tubular cold rolled mild steel structure)- **20 Nos.**

- (vi) Side Table(Jack wood size 1'5"x 1'6"x 1'4")- **8 Nos.**

- (vii) Door and Window Curtain (Best quality) - **50 sets.**

Each of the Sites Offices at Dacope and Rayenda shall be furnished with minimum of the following furniture and fixtures;

- (i) 4- Drawer File Cabinet (shall be made of cold rolled steel sheet of min^m 8 mm (20 SWG) thickness reinforced with stiffeners equipped with castors made of high strength channels, nylons drawer grip and imported locking system, size: 476×610×1425 mm - **8 Nos**
- (ii) Full Secretariat Table (Fixed Drawer Unit shall be made of imported best quality scratch proof and termite proof melamine faced chip board with PVC stopper & edging by automatic edge bending machine. Size: L: 5'5" × W: 2'6" × D: 2'6")
- **2 Nos.**
- (iii) Half Secretariat Table (Shall be made of best quality scratchproof and termite proof melamine laminated wood particle Board with 2× 1 mm thick PVC edging by automatic edge banding machine, Size of Table: L: 4'7"×W: 2'6" × H: 2'6")
- **4 Nos.**
- (iv) Executive Chair (Manual height adjustable comfortable high back Revolving Chair with tilting facility. Chrome plated polymer cast leg with 5 Numbers Castors, The Seat shall be Foam cushioned and the Back pasted on imported Ply Wood.)
- **6 Nos.**
- (v) Armed Chair (fixed type armed chair constructed with 1.2 mm thick 30 & 18 mm dia unfilled tubular cold rolled mild steel structure – **16 Nos.**
- (vi) Wooden Cot with mattress, bed-sheet, pillow, cover, curtain, blanket etc.- **1 set**
- (vii) Wooden Almirah. - **1 No**
- (viii) Dressing Table- **1 No.**
- (ix) Wooden Sofa set with foam and cover- **1 set**
- (x) Wooden Dining Table and Chair for 6 people- **1 Set**
- (xi) Door and Window Curtain (best quality) -**25 sets.**
- (xii) Wooden table -1 No

Requirement of Furniture and fixtures and other utilities for Field Laboratory is shown in **sl.(f)** herein under.

On completion of the Contract all the materials/equipment/ articles/furniture-fixture etc. will be assets of the owner.

(b) Refurbishment of existing BWDB's Rest House at Dacope and Rayenda as shown below;

At Dacope = 167 Sqm

At Rayenda = 186 sqm

The Contractor shall submit plan and design for the refurbishment works for prior approval by the Project Director through Engineer.

Refurbishing works shall include tiles on floor and wall (for toilet only), aluminum windows with glass panes, window grill, wooden door shutters, providing appropriate plumbing, sanitation, electrification and potable water supply facilities **(through treatment and filtering)** including supplying and fitting, fixing of **brand new air cooler (min^m of 1.5 Ton capacity) in each room**, lifting pump, erection of overhead tank etc.

The refurbished Rest Houses shall be fully equipped with standard Furniture & Fixtures and a **Refrigerator (of min^m 280 litre) and a Defreeze (of min^m 340 litre)**. All equipment/articles /

utensils/ furniture & fixture must be of best quality and should have got approved beforehand by the Engineer. **The Rest Houses shall be provided with a stand by Generator of minimum capacity of 10 KVA.**

Each of the Refurbished Rest Houses shall be furnished with minimum of the following Furniture and Fixtures

- (i) Wooden Cot with mattress, bed-sheet, pillow with cover, curtain, blanket etc- **4 set**
- (ii) Wooden Almirah - **4 Nos.**
- (iii) Dressing Table- **4 Nos.**
- (iv) Wooden Sofa set with foam and covers (2 seated) with front Table – **16 sets** .
- (v) Wooden Dining Table and Chair for 6 people- **1 Set**
- (vi) Curtain for Door and Window- **25 sets.**
- (vii) Wooden Table (Jack wood) - **4 Nos.**
- (viii) Armed Wooden chair- **4 No**

On completion of the Contract all the equipment/ articles/furniture-fixture etc. will be assets of the owner.

- (c) Provide requisite numbers (shown herein under) brand new licensed Motor Cycle (displacement volume min^m 125 cc) with all accessories (helmet, toolkits, etc) for the use of Engineer's personnel. The Motor Cycle shall be of 2(two) wheeled petrol operated, manufactured by Worldwide Internationally reputed Manufacturing Company, ISO certified, proven excellent performances, smooth running both on and off the road and elegant looking. Year of manufacturing of the Motor Cycle would not be earlier than 2014.

Contractor shall take approval on Brand and Specifications of the Motor Cycle from the Engineer beforehand. The Contractor shall hand over the Motor Cycle with licenses, fitness certificates (if required), insurances and other requisite certificates to the Project Authority.

Motor Cycle (displacement volume capacity min^m 125 cc) – 14 Nos

- (d) Provide 2 (two) Nos. Speed Boat with all necessary accessories (minimum 8 person capacity, with buoys & life Jackets) for the use of Engineer and his staffs. The Speed Boat shall be brand new of minimum 75 HP manufactured by Worldwide Internationally reputed Manufacturing Company, ISO certified, proven excellent performances. It shall have a fiberglass hull with canvas awning on detachable aluminum ribs, inboard steering wheel and seating capacity for a minimum of 8 passengers.

Speed Boat (minimum 75 HP & seating Capacity 8 person) - 2 Nos

The Contractor shall install ghat (platform) at each sluice /protective work sites for mooring and landing facilities of the Speed Boat. The Contractor shall hand over the Speed Boat to the Project Authority.

- (e) Provide Brand new licensed 4 WD Vehicle (Displacement Volume min^m 2450 cc) & 4 WD Double Cabin Pickup (Displacement Volume min^m 2400 cc) for full time use by the Engineer and his staff as mentioned below;
- i) The 4 WD vehicle shall be Brand new Diesel operated of displacement volume min^m 2450 cc , hard Top roofing with four (4) side doors and one (1) backside door for on and off road use of sturdy construction, manufactured by reputed International Manufacturer, ISO certified. Year of manufacturing of the vehicle would be not earlier than 2014. Seating capacity shall be of

minimum 7 (seven) persons including driver. Seats shall be made of color co-coordinated lather with high back providing lumbar support.

- 6 Nos

- ii) The 4 WD Double Cabin Pick-up shall be Brand new Diesel operated of displacement volume min^m 2400 cc , hardtop roofing, with 4 (four) side doors and with Hard Canopy manufactured by reputed International Manufacturer, ISO certified. Year of manufacturing of the vehicle would be not earlier than 2014. It shall be suitable for on and off road use and with seating capacity for at least 5 (five) persons including driver. The engine shall be 4 stroke Turbo Diesel having low noise level, efficient performance & environment friendly

– 2 Nos

The Contractor shall take prior approval on Brand and Specifications of the Vehicles from the Engineer. The Contractor shall hand over the vehicles with licenses, fitness certificates insurances cover note and other requisite certificates to the Project Authority.

- (f) Provide following survey equipment with soft-ware to conduct land survey, topographic survey and bathymetry etc and deployment of Survey team as per specifications (to be provided by the Contractor) to be approved by the Engineer

i)	ADCP with accessories (hydrological)	= 01 No
ii)	Total Station	= 02 No
iii)	Digital Echo Sounder	= 01 No
iv)	Digital Echo Sounder	= 01 No
v)	GPS	= 02 No
vi)	Optical Level	= 05 No
vii)	Computer, Desktop	= 02 No
viii)	Laptop	= 01 No
ix)	Printer	= 01 No

- (g) Establish and operate Field Laboratory with installation of all associated equipment and personnel at Khulna BWDB Campus. Testing equipment and apparatus as are needed for the performance of the tests specified in the Specifications are to be supplied by the Contractor. **After completion of the contract, the laboratory with all equipment & apparatus is to be handed over to BWDB for future use;**

i) List of furniture and equipment for the laboratory to be provided by the Contractor:

- Desk 1.5mx0.8m clothed covered with glass - 1 No
- Desk 1.2mx0.8m clothed covered with glass - 2 Nos.
- Armed cushioned chair - 3 Nos.
- Armless cushioned chair - 3 Nos.
- Rack (Wooden) - 3 Nos.

- Steel Almirah

- 1 No.

The Contractor shall equip the Field Laboratory with all the necessary equipment for smooth performance of the following (indicative) tests:

- Moisture Content
- Atterburg Limits
- Particle Size Distribution
- Modified Compaction of Soil
- In-situ density by sand replacement
- Flakiness Index
- Fineness Modulus,
- AIV,
- Slump Test
- Concrete Compressive Strength,
- Fineness of cement
- Setting time of cement
- Compressive Strength of cement.

ii) **In addition to equipment required for carrying out above tests at Field Laboratory, the Contractor shall provide the following equipment to the Engineer to carry out spot tests at sites:**

- 4 Nos. 'Speedy' moisture tester (calcium carbide type) with Chemicals
- 4 Nos. Dynamic Cone Penetrometer (DCP)
- 4 Nos. Concrete Pocket Penetrometer
- 8 Nos. Concrete Rebound Hammer (Smith Hammer)
- 2 Nos. Sieve Shaker
- 2 Sets Sieve for fine Aggregate (Brass Frame and Stainless steel cloth mesh for testing sand with trays)
- 2 Sets Sieve for Coarse Aggregate (200 mm dia. Brass Frame and Stainless steel cloth mesh for 40 mm down graded aggregates with trays).
- 3 Sets Apparatus for compaction test of earth (Sand cone, Balance, Mould etc. as required for the test)
- 4 Nos. Clegg Impact Soil Tester (50 mm, 10 kg)
- 2 Sets Modified Proctor Density/Moisture (4") Split Mould
- 6 Sets Apparatus for slump test of concrete
- 2 sets Apparatus for initial and final setting of cement - Vicat Consistency Apparatus
- 10 Nos. Hammers (28 oz. Dead Blow Hammer)
- 4 Sets Cylinder Mould (6" dia and 12" height Cylinder mould, each set comprises 6 Nos. Mould) for sampling of concrete

- 4 Nos. Steel scale (12" steel scale),
 - 4 Nos. Funnel (Aluminium funnel, use with all slump cones to assist in filling).
 - 4 Nos. Timer (Portable electric for elapsed-time indicator, interval timer and electrical apparatus on-off timer. Features time range of 60 minutes by minutes and seconds, 8" dial with two sets of numerals (use inner circle of small numerals as stop clock) and selective automatic buzzer alarm).
 - Brushes, Calculators etc.
 - Consumables: like Sodium Hexameter Phosphate, Calcium Carbide, Sulphar capping Compound, Hand gloves etc. (and other items required, if any) should be supplied on as and when required basis during the execution period.
- iii) The laboratory shall be administrated and maintained by the Contractor, including supply of electric power and water to the laboratory. The Contractor shall also provide all testing staff, labours and consumable necessary for carrying out tests.
- iv) Contractor shall bear all contingencies and charges required for testing Geo-textile, M.S Rod, Concrete Core Sampling, Hard Rock, Steel Sheet Pile/Steel Plate, SS Plate, Bronze and other materials as are specified in the specifications or any other special/additional tests ordered by Engineer under special situation from BUET, KUET or any other recognized Laboratory within the country as per direction of the Engineer.
- v) The Contractor shall perform following Tests in the Field Laboratory synchronizing the **Schedule of Test** as stipulated in the Specifications under different Items of Works:

Name of Test	Daily	Weekly	Periodically/ Change in Source
1. Soil			
Atterberg's Limit (Plastic Limit & Liquid Limit)	√		√
Grain Size Distribution	√		√
Standard Proctor Test			√
Moisture Content	√		
Dry Density	√		
2. Cement			
Fineness		√	√
Soundness			√
Initial Setting Time and Final Setting Time		√	√
Compressive Strength	√		√

Unit Weight			√
3. Sand			
Fineness Modulus & Gradation	√		√
Chemical Test			√
4. Stone Chips			
Gradation Test	√		√
Water Absorption		√	
Aggregate Impact Value (AIV)		√	√
5. Concrete			
Cylinder Test (Compressive Strength)	√		

- vi) All the costs incurred in installation, operation and maintenance of the Field Laboratory and all testing required as per schedule stipulated in the specifications of respective items including the costs of all other tests that required to be carried out at BUET, KUET or any other recognised Laboratory shall be paid in accordance with the item of Bill No.1 of BOQ.
- vii) The Contractor when requested by the Engineer or his Representative to carry out any test in the presence of the Engineer or his Representative, shall provide all necessary assistances in carrying out the tests with providing concerned Material Engineer, Laboratory Assistants and labours required to the Engineer free of charge. The Contractor shall ensure that the Engineer and his staff have unrestricted access to these facilities free of any charge

1.30 Contractor's Site Facilities

- (1) The Contractor shall be responsible for the provision, maintenance, operation and subsequent removal of the following facilities and services on site at his own expenses:
- Temporary stores (including Godowns for cement and other perishable materials), warehouse and workshop; Temporary buildings for office accommodation for his staff;
 - Living accommodation for his labour camps, sanitation of staff;
 - Fencing, lighting and guarding;
 - Crane or other means of off-loading plant and equipment, placing in temporary storage and moving from storage to equipment locations;
 - Site transport for his staff;
 - Electric supply for temporary buildings and tools;
 - Installation of deep-tube well (with treatment and filtering arrangement) and shallow-tube well

for site works and provision of adequate potable water.

- (h) Construction of Inspection Shed as detailed under **Clause No.1.20**.

All costs including Contractor's margin, overhead, taxes, etc, incurred by the Contractor in complying with requirements of this sub-clause shall be deemed to be included in the lump sum price of Contractor's site facilities of the Bill of Quantities (**Bill No.01, Item No.1.02(a)**). Payment for this item shall be made on pro-rata basis depending upon the progress accomplished.

- (2) The Contractor shall be responsible to install adequate Sanitary Toilets in each of the work sites for the labours engaged in various works under the Contract as shown in the following table so that the environment does not get polluted due open air defecation and urination by the labours. The number of facilities to be provided for each sex shall be based on the number of employees of that sex for whom the facilities are furnished. The Toilets shall be provided with continuous water supply facilities. The Contractor shall maintain the Toilets properly in such a manner so as to avoid creating a menace to health and as often as necessary or appropriate to maintain the place of employment in a sanitary condition.

Number of Labours	Minimum number of water closets ¹
1 to 15	1
16 to 35	2
36 to 55	3
56 to 80	4
81 to 110	5
111 to 150	6
Over 150	(²)

¹Where toilet facilities will not be used by women, urinals may be provided instead of water closets, except that the number of water closets in such cases shall not be reduced to less than 2/3 of the minimum specified.

²1 additional fixtures for each additional 40 employees.

The Contractor shall also be responsible under this sub-clause to provide potable water to all the labours working under him at different sites. An adequate supply of potable water shall be provided in all places of deployment of the labours. Portable containers used to dispense drinking water shall be capable of being tightly closed, and equipped with a tap. Water shall not be dipped from containers. Any container used to distribute drinking water shall be clearly marked as to the nature of its contents and not used for any other purpose. The common drinking cup is prohibited. Where single service cups (to be used but once) are supplied, both a sanitary container for the unused cups and a receptacle for disposing of the used cups shall be provided. Potable water means water that meets the standards for drinking purposes of the area or local authority having jurisdiction, or water that meets the quality standards prescribed by the U.S. Environmental Protection Agency's National Primary Drinking Water Regulations (40 CFR part 141).

All costs including Contractor's margin, overhead, taxes, etc, incurred by the Contractor in providing and maintain the services of this sub-clause shall be deemed to be included in Contractor's site facilities of the Bill of Quantities (**Item No.1.02 (b)**). Payment for this item shall be made on monthly basis depending satisfactory services. In order to be satisfied with the services as spelled out in this sub-clause, the Engineer or his representative will time to time inspect the site, carryout test of the water supplied by the Contractor and even asking the labours in respect satisfactory performance of the Contractor under the sub-clause. Negative outcomes of inspection and testing shall be the cause of withheld payment for such a period until the Contractor shows satisfactory performances

For 30 months

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2. TECHNICAL SPECIFICATION

2.1 Earthwork in Construction / Re-sectioning of Embankment

2.1.1 General

Construction/Re-sectioning of Embankment consists Clearing and Grubbing (**as detailed under Article 2.1.1.1**), stripping the base of embankment and borrow pit area, dug bailing, profiling, furnishing, placing and compacting fill materials to the lines and grades shown on the Drawings or as approved by the Engineer. It includes collecting suitable soil, throwing to a profile in layers not exceeding **230mm** in thickness, breaking clods, benching the side slopes, mechanical compaction, bailing out of water, rough dressing and 150mm cambering at the centre of the crest etc. complete as per design, specification and direction of Engineer in charge.

2.1.1.1 Clearing and Grubbing

Clearing shall consist of removal and disposal of everything above ground level including overhanging branches except those things the Engineer directs are to be left undisturbed. The material to be cleared shall include but not necessarily be limited to trees, stumps, logs, brush, undergrowth, grass, crops, loose vegetable matter and structures unless provided for elsewhere. Trees and stumps shall be cut to ground level. Clearing shall also include the removal of existing fences, remnants of buildings etc. The embankment and adjacent areas shall be left with a neat and finished appearance. No accumulation of inflammable material shall remain on or adjacent to the right-of-way.

Grubbing consists disturbance of the original ground surface as little as possible. It consists removal of all major stumps, embedded logs, tree roots and other material, except as otherwise directed by the Engineer. Holes left shall be filled with suitable material compacted in accordance to the specifications specified in Clause 2.1.5. Grubbing beneath the embankment shall be at the direction of the Engineer. In agricultural areas where the ground has been formed into ridges or dikes, the ground shall be roughly levelled or graded to form a surface suitable for embankment foundation to the satisfaction of the Engineer.

No extra payment for **“Clearing and Grubbing”** will be made. All costs thereof deemed to have been covered by the item “Earthwork in Construction / Re-sectioning of Embankment”.

2.1.2 Materials

The material to be used for Construction / Re-sectioning of Embankment shall be suitable earth and shall not contain any stumps, peat, logs, weeds, roots, clods, or any organic matter that may decay and shall be capable of being compacted to the required standard. The soil shall be with minimum 16% clay, 0-60 % silt and 0-30% sand. The material shall be tested in authorized laboratory to ascertain its grain size distribution, liquid and plasticity. Liquid limit of soil passing 0.425 mm sieve shall not exceed 50% (Atterberg Limits) and Plastic Limit passing 0.424 mm sieve shall not exceed 25% (Atterberg Limits).

The moisture content of fill materials before compaction shall be within +/- 5% of the optimum moisture content as determined in accordance with Standard Compaction Test (Modified hammer of 4.5 Kg). The clods of the earth shall be broken down to a maximum size of 100mm before compaction operation.

Before commencement of fill at any section of the embankment, the suitability of the materials shall be tested in form of the Atterberg's Limit, Grain Size Distribution, Moisture Content and Proctor Test (Standard Compaction Test). For any change in the source of fill material or change in the characteristics of soil noticed on visual examinations, all the related tests in determining suitability of the materials shall be performed before being used in the construction work of the embankment.

2.1.3 Borrow Areas

2.1.3.1 Earth Borrowed from Land

The materials to be used for embankments shall be obtained from borrow areas proposed and managed by the Contractor but approved by the Engineer. The contractor shall be bounded under this sub-clause to arrange or purchase earth from private land for fill material. The borrow area shall preferably be located on the river side of embankment and the minimum set back distance shall be **20 m** from the toe of the embankment for Sea Dyke, 10 m for Interior Dyke and 6 m for Marginal Dyke. If the Contractor choose the borrow area at the country side of the embankment, the minimum set back distance shall be **20 m** from the toe of the embankment for all type of Dyke. The maximum depth of the borrow area shall not be more than 1.5 metre. For borrowing earth more than 1.5 metre, approval of the Engineer have to be obtained. The Borrow Area has to be surrounded by putting a ring dyke to prevent the pit from being flooded by river water due to rise in water level in high tide.

2.1.3.2 Earth borrowed from riverbed by dredging

Earth borrowed from riverbed by dredging, if found suitable for construction of embankment, can be used upon prior approval of the Engineer. Under this situation, the contractor shall submit, for Engineer's approval, his methodology of borrowing earth from riverbed.. The contractor shall be fully responsible under this sub-clause to arrange Dredgers/Machinery, lease or purchase of private land for disposal of dredged spoil. The dredging area shall preferably be the river portion passes along the location of embankment to be constructed. The dredging of river bed for collecting of suitable soil shall be done following the approved cross section of the river supplied by the Engineer.

The dredged material before being used in constructing the embankments shall be retained in temporary disposal yard until its moisture content attains +10%.

The Contractor shall undertake construction of palisade works, bunds and intermediate bunds, uninterrupted and controlled passage of waste water and other activities as are required to retain the dredged material in the temporary disposal yard.

The Contractor shall carry out operation in discharging of water from the temporary heap/disposal areas without disturbance to existing works, structure, flood embankments, river bank and farm land etc. Pipelines required for disposition of fill materials shall be laid along routes and corridors approved by the Engineer. Any road or river crossings of pipelines shall be constructed so as to minimize interference of all types of traffics both during construction and operation of pipelines.

2.1.4 Construction Procedure

- i. The Contractor shall plan all fill works to allow for delays in preparing, compaction and testing for compaction, allow for drainage, stockpiling, mixing with dry material or watering to enable the material to be placed in the fill work at the appropriate moisture content for compaction to be effective, take all appropriate and necessary measures to ensure that the filling is undertaken in self-draining layers.
- ii. The Contractor shall submit to the Engineer for his approval the details of his proposed method of obtaining embankment materials at least seven (7) days ahead he intends to commence the works. The Contractor shall not commence any filling work necessary for Construction / Re-sectioning of Embankment until the Engineer's approval regarding suitability of filling materials and foundation of the embankment has been obtained.
- iii. Unsuitable material shall be stripped from the embankment foundation. The area shall then be scarified or ploughed prior to placing of any fill material.
- iv. All foundations of fill works shall be inspected and approved by the Engineer before filling commences.
- v. The embankment toe shall be marked by nicking out lines 75mm deep and 75mm wide.

- vi. The embankment height shall be raised uniformly at all stages during construction. Each layer shall have to maintain a camber at the center during filling so that rain water can drain smoothly from the top of the embankment with no pockets of stagnant water. The crest of the embankment shall be provided with 150 mm cambering at the centre.
- vii. In Re-sectioning of existing embankment, the new fill material shall be fully keyed into the old embankment by means of stripping and benching which shall be in steps, each not less than 300 mm high and 600 mm wide. Steps shall be cut in advance of the filling.
- viii. The contractor shall make model sections at 500m interval and as per requirement of the Engineer. The model sections should have a length of at least 50m and full height of the embankment. The contractor will notify the Engineer and submit a complete 'working plan' describing location of the embankment, staff and labor, tools and plants, quantity of earth work, means of handling and placing etc. No work shall be started until the Contractor's working plan has been approved in writing by the Engineer.
- ix. Notwithstanding the Engineer's approval of any of the Contractor's equipment or methods, the Contractor shall at all times be solely responsible for executing the works in accordance with the Specifications.
- x. For embankments, if the results of the field density tests show less than the specified density (90% maximum dry density at optimum moisture content with reference to laboratory density test AASHTO modified hammer, ASSHTO T 180) in a certain layer, the whole reach will be rejected and re-compaction shall be required. Successive layers shall not be placed until the layer under construction has been approved by the Engineer.
- xi. The Contractor shall provide necessary equipment, labour and transport for carrying out the sampling and testing in the Site laboratory. The soil samples shall be stored and tested at the Site laboratory under the supervision of the Engineer.

2.1.5 Mechanical Compaction

- i. Embankments shall be mechanically compacted to the lines and grades shown on the Drawings or established by the Engineer.
- ii. The material to be compacted shall be deposited in horizontal layers not more than 230 mm thick, and the distribution of materials shall be such that the compacted material will be homogeneous and free from lenses, pockets, streaks or other imperfections. The placing operations shall be such that the materials when compacted will be blended sufficiently to secure the best practicable degree of compaction, impermeability and stability, and for this reason the preceding compacted layer shall be scarified before placing the new layer.
- iii. Each layer of material shall be compacted uniformly by use of adequate and appropriate compaction equipment (bull dozer / sheep Foot Roller / Vibratory Compactor). Compaction shall be done in a longitudinal direction along the embankment and generally begin at the outer edges and progress towards the center in such a manner that each receives equal compaction effort.
- iv. The material shall be compacted to attain 90% maximum dry density at optimum moisture content with reference to laboratory density test AASHTO modified hammer (AASHTO T180). The Engineer will take samples of the material being compacted (1 sample for each 1000 square metre area compacted in each layer) and will perform tests required to determine that the compaction is meeting the requirements of these Specifications. The Contractor shall provide all necessary aid to the Engineer in obtaining representative samples for testing and performing test at no extra cost.
- v. The in situ dry density of the compacted fill shall be determined by the sand replacement method described in AAHSTO T 191 or similar approved test at locations ordered by the Engineer.

2.1.6 Schedule of Test

Following Test shall be carried out at the frequencies shown in the Table to check the suitability of materials, moisture contents of the fill material and dry density of compacted fill as per specifications;

Sl No.	Name of Test	Frequency of Test	Test Method
1	Atterberg's Limit (Plastic Limit & Liquid Limit)	1. For each source of fill material; 2. One Sample for each 10,000 Cum of fill material 3. Change in the Characteristics of the material noticed on visual examination; 4. As per direction of the Engineer	ASTM D 4318 or Equivalent
2	Grain Size Distribution	As stated above	ASTM D 422 or Equivalent
3	Standard Proctor Test	1. For each source of fill material; 2. As per direction of the Engineer	ASSTO T 180 or Equivalent
4	Moisture Content	1. For each 5000 cum of fill material 2. As per direction of Engineer	ASTM D 4346 & ASTM D 4944 or Equivalent
5	Dry Density	1. One Sample for each 1000 sqm of compacted surface in each layer 2. As per direction of Engineer	AAHSTO T 191 or Equivalent

2.1.7 Measurement

Embankment shall be measured in cubic meters based on the cross sections of accepted embankment constructed and completed in accordance with the Specifications, to the lines, levels and grades required or as directed by the Engineer.

2.1.8 Payment

Measurements for payment of construction/re-sectioning of embankment with earth borrowed from private land and or riverbed shall be made for the material placed and compacted as per specifications to the prescribed lines, grades and dimensions shown on the Drawings under BoQ Bill No.02, **Item No.2.01**. The rate includes full compensation of labour, construction equipment; arranging earth from private land/riverbed by dredging (including making all necessary measures as required), arrange land for disposal of dredged earth, hauling, compacting etc. as per specifications.

2.2 Construction of Cofferdam/ Ring Bundh

2.2.1 General

The term 'Cofferdam/ Ring Bundh' denotes any temporary or removable structure, constructed to hold the surrounding earth, water or both, out of the foundation pit whether such structure is constructed by earth, timber, steel, concrete or any combination of these. Notwithstanding any other provision made anywhere in the bidding document, the Cofferdam/ Ring Bundh under this Clause shall be constructed with the suitable earth obtained from the excavation of foundation trench of structure or borrowed earth or with combination of both as the case be in the field. The Contractor shall be fully responsible for arranging land, borrowing & carrying earth to Cofferdam / Ring bundh area with the aid of equipment/labours or any other means.

Cofferdam/Ring Bundhs shall be constructed so as to control water to preclude sliding and caving-in of the walls of the excavation. The interior dimension of cofferdam/ring bundhs shall be such as to give sufficient clearance for the construction and removal of any required forms and the inspection of the interior and to permit pumping.

Palisade works to protect the Cofferdam/ / Ring Bundh from being damaged by the wave actions/ thrusts as will be required shall be provided by the Contractor.

Unless otherwise provided, cofferdam/ring bundhs shall be removed on completion of the structure without disturbing or marring the finished work. The Engineer may order the Contractor to leave any part or the whole of the cofferdam/ring bundh in place and this shall not entitle the Contractor to claim for any additional payment.

The Contractor shall submit Drawings showing his proposed method of cofferdam/ring bundh at least ten days prior to the commencement of construction. However, the Contractor shall remain fully responsible the adequacy of the design strength and stability and the safety of the people working therein.

2.2.2 Construction Procedures

- i) The earth borrowed from the foundation pit of structure or land shall be placed along the alignment of Cofferdam / Ring Bundh in horizontal layers parallel to the finished grade not exceeding a loose thickness of 150 mm. The earth of each bucket/basket is to be placed near to the earth placed before it and spread systematically. Throwing/dumping of earth in heaps will not be allowed.
- ii) The clods of earth shall be broken down to a maximum size of 100 mm by striking the clods with the back of a spade or by other suitable method before the next bucket/basket of earth is thrown close to it. The earth shall be compacted manually using rammers made of wood, iron or concrete weighing ≥ 7 kg, fitted with shafts of about 1.5 m long. Ramming shall reduce the voids and to be continued until no further shrinkage of earth is possible by ramming.
- iii) Before commencing ramming, the moisture content of the soil shall be increased or decreased as necessary by sprinkling the soil with water or by allowing natural drying of the soil as necessary so that the ramming can achieve the compaction as specified. Both wetting and drying may be aided by furrowing the fill and then re-spreading when the moisture content is suitable.

- viii) The preceding operations shall continue layer after layer until the top of the cofferdam/ring bundh attain the desired level.
- ix) Where the Cofferdam/Ring Bundh crosses a flowing channel, a bypass /diversion channel has to be constructed to keep the flow unobstructed as per approval of the Engineer. The land required for such bypass /diversion shall have to be arranged by the contractor at his own cost.

2.2.3 Removal of Cofferdam/ Ring Bundh

The Contractor shall remove the Cofferdam/Ring Bundh after satisfactory completion of the intended structure. The contractor shall not remove the Cofferdam/Ring Bundh without written permission of the Engineer, following his satisfactory inspection of the works. Prior to the commencement of the works, the Engineer shall confirm in writing the length of cofferdam/ring bundh that are to be removed. Removed earth shall not be stockpiled within the area of drainage channel which obstruct the flow. It can be used for construction of approach embankment. The contractor shall ensure that the cofferdam/ring bundh and its associated elements are carefully and completely removed without causing any harm to the permanent works.

2.2.4 Measurement

The cofferdam/ring bundh will be measured in unit number constructed and completed for each structure in accordance with the Specifications, to the lines, levels and grades required or as directed by the Engineer.

2.2.5 Payment

Payment of Cofferdam/Ring Bundh shall be made in unit number at the rates included in the BOQ. The price includes full compensation of labour, construction equipment, hauling of earth including arrangement of land as necessary etc.

2.3 Excavation / Re-excavation of Drainage Channels

2.3.1

Excavation/Re-excavation shall mean the removal of materials to the lines, grades and specification shown on the Drawings so that channels can be re-excavated to drain out excess water unobstructed.

2.3.2 Spoil management

The Contractor shall be fully responsible to explore, identify and arrange disposal area for the spoil earth and get approved by the Engineer. Dumped earth shall be leveled, dressed and compacted in a manner not to disturb the natural drainage pattern and the environment. Spoil earth shall not be dumped within a distance of 5 m from the top edge of cutting slope of drainage channel. When disposed off along the drainage channel outside 5 meter of the top edge of cut slope, it should be dressed to match the natural drainage in such a way that draining of surface runoff/waste water flow is not obstructed and water logging /congestion does take place and also earth does not go down into the excavated channel during rain. The local people may be encouraged to take earth from the spoil banks if they need it. If the excavated materials are found suitable for construction of embankment, the contractor can use those materials on obtaining prior approval from the Engineer.

Water hyacinth and other aquatic plants coming out from the drainage channel during excavation are to be collected at some selected places and dumped in to ditches to be dug at the direction of Engineer.

2.3.3 Over excavation

Any or all excess excavation for the convenience of the Contractor or over excavation performed by the Contractor for any purpose or reasons, except as may be explicitly approved by the Engineer, shall be at the expense of the Contractor.

2.3.4 Surface drainage

Whenever a spoil bank passes across any depression or drainage channel, sufficient openings as approved by the Engineer are to be left in it to ensure unobstructed flow of surface run-off in the drainage channel. The spoil bank should be trimmed to a gentle slope across access roads to facilitate easy traffic movement and its top should be graded to a smooth surface to facilitate access.

2.3.5 Cross dam/bundh

Cross dams/bundhs are to be constructed across the drainage channels at suitable locations for surface dewatering purpose to facilitate excavation. The Contractor shall submit his proposals for location and dimensions of cross dams/bundhs to the Engineer for approval before work is permitted to commence. The Contractor shall arrange to obtain earth for the construction of cross bundhs. The bundhs shall not be removed until the bed has been dewatered, excavated and the measurement of the excavated earth completed.

2.3.6 Bailing out of water

The Contractor shall arrange installation and operation of surface pumps for bailing out accumulated water from the channel to facilitate the excavation work unhindered. Bailing out of water shall be continued until excavation or re-excavation to the design bed level and section is completed.

2.3.7 Measurement

The quantity measured for payment shall be in **cubic meters** based on the Pre-work and Post-work cross sections of accepted channel section not exceeding 50 m apart constructed and completed in accordance with the Specifications, to the depth, levels and grades required or as approved or directed by the Engineer.

2.3.8 Payment

Measurements for payment of drainage channel shall be made for the material excavated to the prescribed depth, slope, grades and dimensions shown on the Drawings or as approved or directed by the Engineer under BoQ Bill No.03; **Item No.3.01**. The unit rate shall include all costs of excavation, arranging disposal area, hauling and dumping of spoil soil at any distance, dressing and leveling of earth, putting cross dam, disposal of aquatic plants, bailing out of water, where necessary etc., including all costs of labour, materials and construction equipment.

2.4 Closure Dam

2.4.1 Description

The “**Closure Dam**” constructed across a flowing river/channel to stop the flow of a Channel / River completely is commonly an earthen structure with a hard material core inside (Sand filled Geo-Bags/ C.C Block/Boulders/ sand filled synthetic bags etc.). It requires special technique and treatment while final closing of the Channel/River takes place.

2.4.2 Design

- i) A complete set of design and drawings duly approved by the competent authority shall be made available to the Contractor which shall act as a guide for the construction of the Closure Dam and the work is to be executed in accordance with this specification.
- ii) The contractor may prepare a design and drawing for the river/channel closing on his own and submit the same to the Engineer for approval and the work is to be executed in accordance with the specifications.
- iii) In either case, the design and drawings shall not relieve the contractor from his obligations under this contract to close the flowing channel in full design section to meet the project needs.

2.4.3 Site information

Any survey works and sub-soil investigation conducted by the BWDB will be made available for the Bidder's review. The bidder may repeat the survey works and sub-soil investigations or collect additional information at his own expenses. The BWDB assumes no responsibility regarding the correctness of these data. It is the responsibility of the bidder to verify all surface and sub- surface conditions prior to submitting a Bid.

2.4.4 Contractor's Responsibilities

The contractor shall be solely responsible for the work under execution for the following tasks:

- i) The contractor shall have to collect all the requisite data, prepare plans and drawings necessary for the river closing. A detailed work programme has to be drawn for successful completion of the work.
- ii) Providing all equipment and accessories including site illumination etc. required for satisfactory execution of the work.
- iii) Transportation, furnishing, installation, safe operation and maintaining of all equipment including operators, mechanics, supply of power, fuel, lubricants, spares, repairing and all other materials, labours required for closing the channel/river with protective works, tying two ends of the Closure Dam with the existing dyke by constructing approach embankment as per design and other temporary works required for the execution of the works throughout and removal of the equipment and temporary works at the end of the breach closing.
- iv) The contractor shall provide continuous supervision of works by persons competent to recognize adverse conditions as they develop and take immediate corrective measures. The supervisors engaged by the Contractor, shall have thorough knowledge of the construction system, including the ability to suggest/make minor emergency repairs.
- v) The contractor shall be solely responsible for correctly assessing quality and the volume of fill materials required for execution of the works. The land acquired by BWDB if available may be used as borrow area upon receipt of written permission from the Engineer while such permission shall not entitle the Contractor to cause any damage to Government and public property adjacent to borrow area. The contractor shall remain bound and include in his rate under this contract to arrange/purchase private land to carry fill materials if required for satisfactory execution of the works.
- vi) The contractor shall plan and organize in such mode and manner that the work is completed in all respect within one dry season and for such accomplishment the progress must be proportionate to the time limit. The date and time for closing the flowing river shall have to be worked out by the contractor based on all surface and sub-surface conditions including the unforeseen parameters and the Engineer must be informed of such date and time at least 7(seven) days ahead which shall however in no way relieve the contractor from any of his obligations under the contract.
- vii) The contractor shall be responsible for maintenance of the work including necessary repairing and mending all kinds of damages during the period from the date of issuance of "Completion Certificate" to the date of releasing the Performing Security as per direction of the Engineer-in-charge.

2.4.5 Size of the Closure Dam

An indicative size of the Closure Dam to be constructed is described below:

Nalian Closure Dam: It is located in Polder No.32. The water to water width will be within 200 m to 250 m and of minimum average depth of water 10.00 metre (during the month of November to March). It's both ends will be tied with the existing/constructed flood dyke by approach embankment of about 400 m in length.

2.4.6 Measurement

The quantity measured for final payment shall be in unit number while the closure dam is finished to its full section as per approved design to the lines, levels and grades and in accordance with the Specifications and approved design & drawing along with completion of all ancillary works (protective work, connecting approach embankments etc.) as per approved design and accepted by the Engineer. However, progressive payment will be made at different construction stage of the Closure Dam as specified under **Sub-Clause 2.4.7** under BoQ Bill No.11; Item No.11.01

2.4.7 Payment

Payment for Closure Dam shall be made at on Lump-Sum basis as included in the Bill of Quantities (BoQ: Bill No.11; Item No.11.01). The progressive payments will be made in following method:

1. 30% payment will be made on closing the river completely and it demonstrates to withstand all the thrusts while of passing of a high tide (at full moon & new moon) and also the Closure Dam remains intact
2. Remaining 70% payment will be made after completing the Closure Dam as per design & specification with all associated works (protective work, approach embankment etc.)

The lump sum shall include all costs of all materials, equipment, labour, bailing out of water, ancillary work (protective work, approach embankment) and all temporary works etc. that are necessary to execute the works.

2.5 Cutting & Filling of Eroded Bank of River

2.5.1 General

The alignment of the revetment slope may be adjusted, subject to the approval of the Engineer, to minimize the amount of fill without compromising the stability of the existing embankment.

Cutting and filling of eroded river bank shall mean the removal/filling of materials so that revetment can be constructed to the lines, grades and dimensions shown on the Drawings. The Contractor shall prepare, submit and obtain approval from the Engineer for bank revetment plans including pegging at site showing the alignment of the proposed revetment.

2.5.2 Compaction

The eroded bank shall be cut and filled to design slope by leveling, dressing and compacting the earth in 150 mm layer by vibratory soil compactor as approved by the Engineer.

2.5.3 Spoil Earth

Excavated materials, which meet the specification of fill work, shall be utilized for the fill work and remaining materials shall be utilized for either rising of the bank elevation or ditch filling inside the slope and nearby area. Excavated material shall not be dumped at the top edge of cut slopes. Necessary permission shall be sought from the Engineer, the location where the excavated materials will be used.

2.5.4 Over Excavation.

Except as may be directed by the Engineer, excess excavation for the convenience of the Contractor or over excavation performed by the Contractor for any purpose or reasons, shall be at the expense of the Contractor. If the excavation exceeds the depths specified, back filling with proper compaction shall be undertaken as fill works at the expense of the Contractor. If back filling is to be undertaken it shall be done by sand (FM 1.00 to 1.50) filled gunny bags as approved or directed by the Engineer.

2.5.5 Unsuitable Materials.

- i) When the specified levels or limits of excavation are reached, the Engineer will inspect the ground exposed. If the Engineer considers that any part of the ground is by its nature unsuitable, he may direct that the unsuitable material be further excavated to a depth from the lowest excavation level shown on the Drawings or as approved or directed by the Engineer and be replaced by a suitable backfill approved by the Engineer.
- ii) If the materials forming the bottom of any excavations become unacceptable to Engineer due to exposure to weather condition or due to flooding or have become puddle, soft or loose during the process of the works, the Contractor shall remove such damaged softened, or loosened material and excavate further. Such further excavation shall be held to be excess excavation and the cost of the excess excavation and subsequent replacement with a suitable backfill and compaction shall be at the expense of the Contractor.

2.5.6 Preparation of toe Foundation

The toe foundation shall be either excavated or built up to the lines and levels shown on the drawing.

2.5.7 Measurement

The quantity measured for payment shall be in cubic meters based on Pre-work and Post-work cross sections not exceeding 50 m apart of accepted bank length constructed and completed in accordance with the Specifications, to the lines, levels and grades required or as approved or directed by the Engineer

2.5.8 Payment

Payment of the item shall be made at the unit rate per **cubic meter** as included in the Bill of Quantities. The unit rate shall include all costs of alignment fixing, profiling, and excavation, fill work, placement of spoils at specified distance including all costs of labour, materials and construction equipment.

2.6 Fine Dressing and Close Turfing**2.6.1 Description**

This work shall consist of furnishing all topsoil, grass and fertilizers and placing and incorporating the same on embankment slopes and other locations shown on the Drawings or directed by the Engineer. Fine dressing and Close turfing including ramming, watering until the turf grows properly, maintaining etc. on the slopes and the crest of embankment should be done with 75mm thick good quality durba or charkanta sods of size 200mmx200mm. Other grass types (like vetiver) proven to grow well under the local conditions may also be used subject to the prior approval of the Engineer.

2.6.2 Material

Grass shall be harmless inoffensive to person and animals and not of a kind recognized as a nuisance to agriculture. It shall be free of disease and noxious weeds, deep rooted and sufficiently rapid growing and spreading to give complete cover over the planted area within the final construction inspection period.

2.6.3 Construction Procedure

- i) The crest and slope of the embankment shall be shaped to slopes and levels, fully compacted then fine dressed with approved top soil in a layer of not less than 50 mm thick before being covered by good quality Durba grass turf or a similar approved turf from a source approved by the Engineer. The turf should be approximately 200 mm x 200 mm x 75 mm thick and be placed close

together in a staggered pattern with 100% coverage. The turfs shall be set firmly into the top soil dressing and watered immediately after planting, then daily until the grass is well established and new growth is clearly visible.

- ii) Sodding or turfing shall be planted with their root system substantially undamaged, well buried in firm material, and packed around the moist earth in which they have grown.
- iii) Grass planting shall be started well in advance of the monsoon season to ensure establishment of growth before the rain sets in and shall not be performed when ground is muddy or when the soil or weather condition would otherwise prevent proper soil preparation and subsequent operations.
- iv) The contractor shall be responsible for satisfactory growth and shall water, fertilize, and mow the grass to ensure 100% ground coverage of live grass all through the defect liability period.
- v) Fertilizer shall be approved lime or mixture of plant nutrients or both. Fertilizer shall consist of standard commercial material such as Nitrozen – Phosphate- Pottasium shared in ratio 16:5:12 or in other suitable ratio. The application rate shall be determined through soil analysis of soil sample taken from the area to be grassed.
- vi) All sodded areas shall be watered until the grass grows fully. Areas that do not grow or wash out shall be repaired and returned with fresh sods at the Contractor's expense.

2.6.4 Measurement

The quantity measured for payment shall be in **square meters** of finished and accepted well grown grass only.

2.6.5 Payment

Payment of the item shall be made at the unit rate per **square metre** as included in the Bill of Quantities. The unit rate shall include all cost of furnishing labour, material, incidentals for carrying out the work including preparation of grass-bed, and planting of grass as specified, fertilizing, watering, maintenance and all other procedures specified herein.

2.7 Foundation Excavation

2.7.1 Description

The work consists excavation in any type of soil/material for foundation of structures, construction of Cofferdam/Ring Bundh with excavated earth and its removal, disposal of excavated unsuitable earth, sheeting and other temporary work in protecting the stability and safety of excavated foundations. The Contractor shall construct and maintain accurate bench marks so that levels can be easily checked by the Engineer

2.7.2 Excavation plan

Excavation shall mean the removal of materials so that structures can be constructed to the lines, grades and dimensions shown on the Drawings. Excavation area shall be such adequate so that it provides necessary working space for placing forms, installation of any other Temporary Works etc. required during construction. The Contractor shall prepare, submit and obtain approval from the Engineer for excavation plans including details of any surface and/or sub-surface dewatering prior to the start of any excavation.

2.7.3 Clearing of Site

The site shall be cleared as required to remove all stumps, roots, vegetable and other objectionable materials specifically within areas for structure excavation, structures, appurtenance and any other facilities indicated on the Drawings or designated by the Engineer. The cleared material shall be

deposited in approved areas off site or burnt as directed by the Engineer. Cleaning of site includes cutting jungles, uprooting stumps and demolition of existing minor structures.

2.7.4 Excavated Spoil Earth

Excavated earth if found suitable shall be used for construction of Cofferdam/Ring Bundh as per specification specified in Article No.2.2.1. Unsuitable/surplus earth shall be removed from the site by hauling to any distance at approved locations.

2.7.5 Over Excavation

Except as may be directed by the Engineer, excess excavation for the convenience of the Contractor or over excavation performed by the Contractor for any purpose or reasons, shall be at the expense of the Contractor. If the excavation for foundations exceeds the depths specified, back filling shall be undertaken as fill works at the expense of the Contractor. If back filling is to be undertaken it shall be done by sand and shall have a fineness modulus (FM) between 1.0 and 1.50 or as approved or directed by the Engineer.

2.7.6 Final Finishing of Excavation

When excavating to specified foundation levels, the Contractor shall not excavate the last 150 mm until immediately before commencing the construction work, except that the Engineer shall permit otherwise. Any damage to the work due to the Contractor's operations shall be repaired at the expense of the Contractor.

2.7.7 Removal of Unsuitable Materials

When the specified levels or limits of excavation are reached, the Engineer will inspect the ground exposed. If the Engineer considers that any part of the ground is by its nature unsuitable, he may direct that the unsuitable material be further excavated to a depth from the lowest excavation level shown on the Drawings or as approved or directed by the Engineer and be replaced by a suitable backfill approved by the Engineer.

If the materials forming the bottom of any excavations, which is acceptable to the Engineer at the time of his inspection, subsequently become unacceptable to him due to exposure to weather condition or due to flooding or have become puddle, soft or loose during the process of the works, the Contractor shall remove such damaged softened, or loosened material and excavate further manually. Such further excavation shall be held to be excess excavation and the cost of the excess excavation and subsequent replacement with a suitable backfill shall be at the expense of the Contractor.

2.7.8 Measurement

The quantity of foundation excavation of earth for structures to be measured in **Cubic Meter** for payment shall include excavation for all structures. The measured volume shall be the plan outline, bounded by the bottom plane of the blinding concrete under the reinforced concrete footing and on top by the surface of the existing ground and on the side by vertical planes of the foundation.

2.7.9 Payment

The work measured shall be paid as per unit prices per **Cubic Meter** as shown in the Bill of Quantities. The payment shall be the full compensation for all excavation and construction & removal of Cofferdam/Ring Bundh for structures including arranging land and borrowing earth from elsewhere (while excavated earth are not sufficient to construct the entire Cofferdam/Ring Bundh), supply of all materials, labour, equipment, tools and incidentals etc. necessary to the successful completion of the work. The payment shall also be the full compensation for providing working space around the

foundation structure for shoring and other protective supports and for disposal of unsuitable/surplus excavated materials by hauling to any distance at approved locations.

Should it be necessary, in the opinion of the Engineer, to lower the footing/foundation to an elevation below the level shown on the approved drawings, payment for the excavation and backfill for structures required below plan level up to 1.5m for any individual footing or whole foundation will be made at a unit price equal to 115% of Contract unit price and payment for the excavation from an elevation greater than 1.5m below plan level up to 3m below will be made at a unit price equal to 125% of the Contract unit price. In case, where additional depth required for any footing/foundation beyond 3m, a supplementary agreement shall be made covering the excavated quantities recovered from depths in excess of 3m below the plan grade.

2.8 Formwork

2.8.1 Description

The Formwork consists of furnishing all materials, labour, equipment, manufacturing, installation and removal of formwork. The materials required for manufacturing of formwork may be timber, plywood, bamboo, steel, paint etc. In all hydraulic structures, steel shutter shall only be used except minor joints and chamfer.

It shall be the responsibility of the Contractor to perform the work by engaging well trained and experienced staff or by the sub-contractor who shall have enough number of well trained and experienced staff to coordinate his activities with the other operations. However the Contractor shall be responsible for the quality of work performed by the sub-contractor as per the requirements of these specifications.

2.8.2 Concrete Formwork

- i) The Contractor shall submit for the approval of the Engineer details of the methods and materials proposed for formwork to each section of the work. Details of all proposed wrought formwork and formwork to produce special finishes are to be submitted, for approval in writing to the Engineer before any materials are brought on to the Site. If the Engineer so requires, samples of formwork shall be constructed and concrete placed so that the proposed methods and finish effect can be demonstrated.
- ii) Formwork shall be constructed from sound materials of sufficient strength, properly braced, strutted and shored as to ensure rigidity throughout the placing and compaction of the concrete without visible deflection. Formwork shall be so constructed that it can be removed without shock or vibration to the concrete.
- iii) All joints shall be close fitting to prevent leakage of grout and at construction joints the formwork shall be tightly secured against previously cast or hardened concrete to prevent stepping or ridges to exposed surfaces.
- iv) Where the Contractor proposes to make the formwork from standard sized manufactured formwork panels, the size of such panel shall be approved by the Engineer before they are used in the construction of the work. The finished appearance of the entire elevation of the structure and the adjoining structures shall be considered when planning the patterns of joint lines caused by formwork and by construction joints to ensure continuity of horizontal and vertical lines.
- v) Formwork shall be constructed to provide the correct shape, lines and dimensions of the concrete shown on the Drawings. Due allowance shall be made for any deflection which will occur during the placing of concrete within the formwork. Panels shall have true edges to permit accurate alignment and provide a neat line with adjacent panels and at all construction joints. All panels shall be fixed with their joints either vertical or horizontal, unless otherwise specified or approved.

- vi) Formwork shall be provided for the top surfaces of sloping work where the slope exceeds 15 with the horizontal and shall be anchored to enable the concrete to be properly compacted and prevent floatation; care shall be taken to prevent air being entrapped. Openings for inspection of the inside of the formwork and for the removal of water used for washing down shall be provided and so formed as to be easily closed before placing concrete.
- vii) Forms/Panels shall be supported by scaffolding pipe and steel joist sufficient enough to withstand all impact, weight of green concrete, moving loads etc.

2.8.3 Formwork for Exposed Concrete Surfaces

- i) Unless otherwise stated on the Drawings, wrought formwork shall be used for all permanently visible concrete surfaces. Wrought formwork shall be such as to produce a smooth and even surface free from perceptible irregularities. Tongued and grooved planed boards, plywood or steel forms shall have their joints flush with the surface. The formwork shall be formed from approved standard sized panels. The panels shall be arranged in a uniform approved pattern, free from defects likely to be detected in the resulting concrete surface.
- ii) Formwork for structural concrete permanently exposed to public inspection shall be faced with plain 28/26 gauge steel sheet fitted over 38 mm thick wooden plank panels suitably braced or steel framing faced with minimum 12/14 BWG mild steel sheet.
- iii) The finished surface shall be within the tolerances specified and full cover to reinforcement steel shall be maintained.
- iv) The panels / forms shall be supported by scaffolding pipe and steel joist sufficient enough to withstand all impact, weight of green concrete, moving loads etc.

2.8.4 Formwork for Non-Exposed Concrete Surfaces

Unless otherwise stated on the Drawings, rough formwork may be used for all surfaces which are not permanently exposed. Rough formwork may be constructed of plain butt joined sawn timber but the Contractor shall ensure that all joints between boards shall be grout tight.

The finished surface shall be within the tolerances specified and full cover to reinforcement steel shall be maintained.

2.8.5 Preparation of Formwork

- i) Before concrete is placed, the surfaces of formwork shall be free from adhering foreign matter, projecting nails and the like, splits or other defects, and all formwork shall be clean and free from standing water, dirt, shavings, chippings or other foreign matter.
- ii) Before placing concrete all reinforcement bars, anchoring, steel, beams, cables, fixing truss, bolts, pipes or conduits or any other fixtures which are to be built in shall be fixed in their correct positions, and cores and other devices for forming holes shall be held fast by fixing to the formwork or otherwise. Holes shall not be cut in any concrete without the approval of the Engineer.
- iii) All exterior and interior angles on the finished concrete shall be given 20 mm by 20 mm chamfers unless otherwise shown in Drawings or ordered by the Engineer. When chamfers are to be formed, the fillets shall be accurately cut to size to provide a smooth and continuous chamfer.
- iv) No ties or bolts or other device shall be built into the concrete for the purpose of supporting formwork without the prior approval of the Engineer. The whole or part of any such supports embedded in reinforced concrete shall be capable of removal so that no part remaining embedded in the concrete shall be nearer than 50mm from the surface. Holes left after removal of such supports shall be neatly filled with well rammed dry-pack mortar.
- v) After cleaning, the formwork in contact with the concrete shall be treated with suitable non-staining mould oil or approved form oil to prevent adherence of the concrete. Care shall be taken to prevent the oil from coming in contact with reinforcement or mixing with the concrete. At construction joints, surface retarding agents shall be used only where ordered by the Engineer.
- vi) The use of spacer blocks for the reinforcement shall be prohibited whenever the same effect can

be achieved by properly dimensional spacer rings mounted directly on the reinforcement. All spacer blocks and rings shall be of the same strength as the concrete in which they are embedded and shall be adequately cured before use.

Prior to placing concrete, all forms shall be inspected and all debris and extraneous matter removed. The form oil or release agent shall not react with concrete to affect the strength nor shall it give any color. It shall be applied in such a manner as not to contaminate the reinforcement and other fixtures to be embedded in concrete.

2.8.6 Removal of Formwork

- i) Formwork shall be removed in such a manner as will not damage the concrete. No formwork shall be removed until the concrete has gained sufficient strength to support itself. Centers and props may be removed when the member being supported has gained sufficient strength to carry itself and the load to be supported on it with a reasonable factor of safety.
- ii) The following table is a guide to the minimum periods which must elapse between the completion of the concreting operations and the removal of formwork. No formwork shall be removed without the permission of the Engineer and such permission shall not relieve the Contractor of his responsibilities for the safety of the structure.

Table : 2.8.6 Minimum period of curing before removal of formwork

Type and Position of Formwork	Approximate Period (days)
Side of beams, walls and columns (unloaded)	3
Slab soffits (props supporting)	14
Removal of props to slabs	21
Beam soffits (props supporting)	21
Removal of props to beams	28

Notwithstanding the foregoing the Contractor shall be held responsible for any damage arising from removal of formwork before the structure is capable of carrying its own weight and any incidental loading.

2.8.7 Openings

Temporary and permanent opening in concrete shall be framed neatly with provisions for keys or reinforcing steel as shown on the drawing or approved or directed by the Engineer.

2.8.8 Defects in Formed Surfaces

Workmanship in formwork and concreting shall be such that concrete shall normally require no repair to surfaces being perfectly compacted and smooth.

If any blemish is revealed after removal of formwork, the Engineer's decision concerning remedial measures to be undertaken shall be obtained immediately. These measures may include, but shall not be limited to, the following:

- i) Fins, pinholes, bubbles, surface discoloration and mirror defects may be rubbed down with sacking immediately the formwork are removed;
- ii) Abrupt and gradual irregularities may be rubbed down with carborundum stone and water after the concrete has been fully cured;
- iii) Deep honey combed concrete shall be repaired within 24 hours of stripping the formwork by cutting back to sound concrete. The concrete shall be cut back at least 50mm behind face reinforcement. Cut edges shall be regular and not feathered. Recasting shall be with the same concrete as the original casting; the Contractor's formwork and method of placing shall be approved by the Engineer.
- iv) Under some circumstances, abrupt and gradual irregularities of shallow honey combed concrete may be repaired by cutting back and reforming with an approved epoxy resin or mortar in accordance with the Manufacturer's instructions.

2.8.9 Holes to be filled

- i) Holes formed in concrete surfaces by formwork supports or the like shall be filled with dry pack mortar made from one part by weight of Ordinary Portland Cement/Portland Composite Cement and three parts of specified fine aggregate approved by the Engineer. The mortar shall be mixed with only sufficient water to make the materials stick together when being molded in the hands.
- ii) The Contractor shall thoroughly clean any hole that is to be filled and break out any loose, broken or cracked concrete or aggregate, removing any dry cement in the hole. The surrounding concrete shall be soaked until the whole surface that will come into contact with the dry pack mortar has been covered and darkened by absorption of the free water by the cement. The surface shall then be dried so as to leave a small amount of free water on the surface.
- iii) The dry pack material shall then be placed and packed in layers having a compacted thickness not greater than 10mm in thickness. The compaction shall be carried out by use of a hardwood stick and a hammer and shall extend over the full area of the layer, particular care being taken to compact the dry pack against the sides of the hole;
- iv) After compaction the surface of each layer shall be scratched before further loose material is added. The hole shall be slightly over filled and the surface shall be finished by laying a hardwood block against the dry pack fill and striking the block.

2.8.10 Design Joints

- i) Design joints shall be formed in the positions and manner shown on the Drawings and shall be shuttered square to the work to provide a smooth surface to the concrete. The joints shall be made by forming the concrete on one side of the joint and allowing it to set before concrete is placed on the other side of the joint. The face of the joint first formed shall be smooth, dense and free from irregularities and honeycombing. The plane of the joint shall extend completely through the structure unless shown otherwise on the Drawings.
- ii) Caulking grooves shall be provided as shown on the Drawings or in accordance with the joint sealant manufacturer's recommendations. At all joints where a caulking groove is formed, immediately prior to caulking, the groove shall be wire brushed and loose material removed and blown out by compressed air. After the groove has dried it shall be primed and caulked with approved sealant compound applied in accordance with the manufacturer's instructions.
- iii) Filters, as specified on the Drawings, shall be placed between the joints and adjacent earth surface.

2.8.11 Contraction Joints

Contraction joints are defined as joints placed in structures or slabs to provide for volumetric shrinkage of monolithic unit or movement between monolithic units. The joints shall be constructed so that there will be no bond between the concrete surface forming the joints.

2.8.12 Expansion Joints

Expansion joints are intended to accommodate relative movement between adjoining parts of a structure. The size of expansion joints shall up to 40mm depth and 20-25mm wide.

Compressible filler shall be placed between the joint faces to provide freedom for the two adjacent concrete masses to expand. Care shall be taken to ensure that the material fills the joint completely and that no concrete or hard material is left in the joint after the second face of the joint has been cast.

2.8.13 Measurement

The item Formwork shall be measured in Square Meter of the exposed concrete surface including all designed joints

2.8.14 Payment

Payment shall be made at the unit rate per Square Meter as included in the Bill of Quantities.

2.9 Dewatering of Sub- Surface and Surface Water

2.9.1 Type of Dewatering Systems

The Contractor may adopt one or both of the following dewatering systems considering the actual field conditions and requirements for proper execution of work (hydraulic structure).

- i) Dewatering by Sub-surface Water Control System.
- ii) Dewatering by Surface Water Control System;

2.9.2 Contractor's Responsibilities

The Contractor shall be solely responsible, and include in his rate, for the following tasks:

- i) Carry out subsoil investigations, collection of the requisite data, preparation of plans and drawings necessary for dewatering system(s).
- ii) Providing all equipment and accessories required for dewatering by the Surface Water Control System and Sub-surface Water Control System for satisfactory execution of the work.
- iii) Transportation, furnishing, installation, safe operation and maintaining of dewatering system including operators, mechanics, supply of power, fuel, lubricants, spares, repairing etc. throughout and removal of the equipment at the end of the construction period under this Contract.
- iv) The Contractor shall provide continuous supervision of the system by persons competent to recognize adverse conditions as they develop and take immediate corrective measures. The supervisor engaged by the Contractor shall have thorough knowledge of the system, including the ability to suggest/make minor emergency repairs.
- v) The foundation shall be kept free from water at all the time during construction period. Pumping and bailing from any foundation shall be done so as to preclude the possibility of the movement of water through or alongside any concrete being placed. No pumping or bailing will be permitted during placing of concrete and for at least 24 hours thereafter, unless it is done from a suitable sump separated from the concrete work by a water tight wall or from well point.

- vi) The control of water throughout the time of this Contract shall be sole responsibility of the Contractor. The ground water table shall be maintained at minimum of 1.00 m below the lowest designed excavation level.
- vi) The control methods adopted by the Contractor shall be subject to the approval of the Engineer, including equipment, plan, methods, installation, operation, monitoring, maintenance procedures and precautions against the failure of any part of the system. The precautions shall include sufficient standby pumping plant and essential spare parts. The standby pumping plant shall comprise of at least one pump having minimum capacity of 10% of the total withdrawal requirement.

2.9.3 Site Information

Any sub-soil investigation conducted by the BWDB will be made available for the Contractor's review. The BWDB assumes no responsibility regarding the correctness of these data. It is the responsibility of the Bidder to verify all surfaces and sub-surface conditions prior to submitting a Bid.

2.9.4 Dewatering by Sub-surface Water Control System

Dewatering by Sub-surface Water Control System is defined as controlling water accumulated from any source requiring the use of well point or tube well system. The Contractor shall prepare and submit a dewatering plan based on field requirement to the Engineer for approval, prior to installation of the system.

Works to be performed under this clause include furnishing, installing, maintaining, operation and removing the sub-surface water control system, including observation wells, so that the required excavation can be safely and properly performed and the structure built and backfilled to the elevation as shown on the Drawings.

2.9.4.1 Precautionary Measures

- i) The drawdown level (as per observation well) shall always be remained at 1.00 m below the excavation level. If the excavation level is less than 1.00 m from ground water table and the ground water is likely to endanger either the open excavation or the structure, backfill may be ordered by the Engineer as a precautionary, measure against failure at the cost of the contractor.
- ii) If for any reason, ground water control is lost and ground water appears in any portion of the excavation, the Contractor shall take immediate action to control and confine the flow. Any portion of the final grade which, in the opinion of the Engineer, has been damaged by the action of the ground water shall be excavated as approved or directed by the Engineer and backfilled in accordance with the specifications at no extra cost to the Contract.
- iii) If it becomes necessary for any reason to stop the sub-surface de-watering operations before the construction of sub-structure is complete, the Engineer may order the site to be flooded up to the surrounding ground water level as de-watering is discontinued. Under no circumstances shall the site be flooded by allowing the ground water to rise through the soil. If it becomes necessary to flood the site as described above, all equipment that can be damaged shall be removed to safety.
- iv) The cost of all such backfilling, flooding and subsequent draining and re-excavation shall be included in the lump sum price for dewatering and no extra payment will be allowed.

2.9.4.2 Operation

The sub-surface dewatering system shall be operated 24 hours per day, seven days per week during the period that dewatering is required. The Contractor shall take advance precautions against failure of any part of the system.

2.9.4.3 Monitoring Wells

Observation wells of 40 mm diameter GI pipes with 1.8 m strainer and full filters shall be installed by the Contractor to suitably monitor the ground water levels maintained by the Contractor's dewatering system. The depth of wells shall be a minimum of 3.0 m below the lowest level of the foundation excavation. The Contractor shall provide a means for locking the access to the observation wells, and shall maintain a log book with daily reading of sub-soil water levels recorded every three hours, available at all times for inspection. The log book shall be periodically checked and authentication by Engineer's Representative.

2.9.4.4 Removal of System

The dewatering system shall be removed when the construction has progressed to a stage that site dewatering is no longer required, but only after receiving the written permission of the Engineer. Certain portions of the Contractor's dewatering system may be left in the ground when construction procedures so require and when written permission of the Engineer is obtained. Any such portion of the dewatering system shall be plugged, capped and/or otherwise rendered harmless to the work and the public.

2.9.5 Dewatering by Surface Water Control System

- i) Evacuation of surface water is defined as controlling surface water levels within the Cofferdam/Ring Bundh by use of pumps, sump pump, gravel drain or other mechanical devices, but without requiring the use of a well point or tube well system. Such water may be accumulated from percolation, rain or pumping flood water into the ring dyke, or any other source or combination of sources. The water levels inside the Cofferdam/Ring Bundh shall not exceed the levels as approved or directed by the Engineer.
- ii) Work to be performed under this clause include furnishing, installing, maintaining, operating and removal of the surface water control system for dewatering the accumulated water from the area within the Cofferdam/Ring Bundh so that the desired construction can be safely and properly performed. The discharge line/drainage system for the disposal of the evacuated water shall be constructed by the Contractor at his own cost as per approved drawing including the arrangement of the land and permission when necessary.

2.9.5.1 Operation of Dewatering System

The Contractor shall make all arrangement for pumps, fuel, lubricants, maintenance and operation of the equipment and the whole Surface Dewatering System and shall take precautions in advance, against failure of any part of the system.

2.9.5.2 Removal of System

The Surface Dewatering System shall be removed, upon written permission of the Engineer, when the construction has progressed to a stage that site dewatering is no longer required.

2.9.6 Clustering of Different Vent of Drainage & Inlet Flushing Sluice

2.9.6.1 Drainage Sluice

The Contract comprises different vent numbers of Drainage Sluice as shown below:

Table: 2.9.6.1 showing size and Number of Vent of Drainage Sluice for dewatering

Polder No	32	33	35/1	35/3
Total No of Structure for dewatering	8	12	15	4
Vent size	1.5mx1.8m	1.5mx1.8m	1.5mx1.8m	1.5mx1.8m
Vent No.	3 Vent = 1 1 Vent =7	4 Vent = 1 2 Vent =1 1 Vent =10	4 V=1 3 Vent = 1 2 Vent =3 1 Vent =10	6-V= 1 2 Vent =1 1 Vent =2

In the BoQ Item No.4.06, 3(three) Clusters of Drainage Structure have been provided for dewatering purposes as shown below:

- i) 1 Vent & 2 Vent = 34 No
- ii) 3 Vent & 4 Vent= 4 No
- iii) 6 Vent = 1 No

2.9.6.2 Flushing Sluice

Table: 2.9.6.2 showing size and Number of Vent of Flushing Inlet for Dewatering

Polder No	32	33	35/1	35/3
Vent size	0.9mx1.2m	0.9mx1.2m	0.9mx1.2m	0.9mx1.2m
Nos of Structure for Dewatering	1	1	1	1

In the BoQ Item No 6.06 following Cluster of Flushing Inlet has been provided for dewatering purposes as shown below:

- (i) Vent of size 0.9mx1.2m=4 Nos.

2.9.7 Measurement

Measurement of item Dewatering shall be made in Unit Number of structure only on successful completion of the work as provided in BoQ

2.9.8 Payment

Payment shall be made only after successful completion of the work in Unit Number at the Price against the respective Items as included in the Bill of Quantities

2.10 Steel Sheet Piling Works

2.10.1 Description

This work consists of supplying and driving steel sheet piles of the grade, type and size shown in accordance with these specifications and in conformity with the requirements shown on the Drawings

2.10.2 Specification

- i) Steel sheet piles shall not show harmful defects under use. It shall be straight and out end surfaces shall be flat, for all practical purposes. It shall be adequately engaged with adjacent piles during driving provided that they can be disengages for extracting.
- ii) Joints of steel sheet pile shall be watertight provided their structure does not obstruct driving and extraction.
- iii) Steel sheet piles shall be hot rolled from structural carbon steel and shall have the following Mechanical properties:
- iv) Mechanical Properties

Tensile strength	:	490 N/mm ²
Yield strength	:	296 N/mm ²
Elongation	:	15% (min)
- v) Steel sheet piles shall be roughly of U-shape with joints of piles when driven located on the neutral axis of the piling work.
- vi) Length of steel sheet piles shall be in terms of whole numbers of meters for standard lengths and shall be measured in divisions of 500 mm. There shall be one handling hole of diameter 25 mm to 60 mm, the centre of which is to be located 100 mm to 300 mm from one end.
- vii) The size and weight of the steel sheet pile shall be as follows or equivalent to British Standard Specification.

Table 2.10.2 U-Type Steel Sheet Pile

Width	:	Minimum 400 mm
Depth	:	Minimum Depth 85 mm
Thickness	:	Minimum 8.00 mm
Weight Per m ² of Pile	:	88.00 kg/ m ²
Section Modulus	:	529 cm ³ /m

2.10.3 Cutting of Steel Sheet Piles

Cutting of steel sheet piles to be done to design length and shape as per requirement in design and drawing and as per direction of Engineer in charge..

2.10.4 Driving Steel Sheet Piles**2.10.4.1 Equipment and Workmanship**

- i) Not less than 14 days before any piling work is commenced the Contractor shall submit to the Engineer for approval full details of his proposed piling plant and detailed method statements for carrying out the work. Where applicable, such details shall include a full description of the piling frame, hammer, helmet and packing, methods of handling, pitching and supporting the piles before and during driving, the proposed driving procedure and such further information as the Engineer may require.



- ii) The piling frame shall be of sturdy construction supported on an adjustable base, securely guyed and with ample toggle connections to leaders so that the pile is firmly held at all times. The type and weight of hammer shall be to the approval of the Engineer and the weight of the hammer shall be at least half that of the pile; in general, a heavy hammer with a short drop should be used in preference to a light hammer with a longer drop.
- iv) The Contractor shall not commence any piling until the plant and methods which he proposes to use have been approved by the Engineer but such approval shall not relieve the Contractor from any of his obligations and responsibilities under the Contract. If for any reason the Contractor wishes to make any change in the plant and methods of working which have been approved by the Engineer, he shall not make any such change without having first obtained the Engineer's approval thereof.

2.10.4.2 Records

The Contractor shall keep complete records of all data as required by the Engineer covering the fabrication, driving and installation of each pile and shall submit two signed copies of these records to the Engineer not later than noon of the next working day after installation of the piles.

2.10.4.3 Programme and Progress Report

The Contractor shall inform the Engineer each day of the programme of piling for the following day and shall give adequate notice of his intention to work outside normal hours and at weekends, where approved.

The Contractor shall submit to the Engineer on the first day of each week, or on such other date as the Engineer may decide, a progress report showing the rate of progress to that date and progress during the previous week or period of all main items of piling works, as required by the Engineer.

2.10.4.4 Setting Out

The Contractor shall establish and maintain permanent datum level points, base lines and grid lines to the satisfaction of the Engineer and shall set out with a suitable identifiable pin or marker the position of pile line. The main setting out for piles is to be completed prior to commencement of piling. Secondary or individual pile setting out is to be completed and agreed not less than 8 hours prior to commencing work on the piles concerned and adequate notice for checking shall be given by the Contractor.

Notwithstanding such checking and agreement, the Contractor shall be responsible for the correct and proper setting out of the piles and for the correctness of the positions, levels, dimensions, and alignment of the piles.

2.10.4.5 Driving of Sheet Pile

- i) All sheet piles shall be driven in presence of the Engineers' authorized representative and no pile driving will be allowed at night without prior permission from the Engineer.
- ii) Piles shall be accurately pitched and driven in the position and to the lines shown on the Drawings within the specified tolerances. The lengths of piles shall be as shown on the Drawings or such other lengths as the Engineer may direct. Piles shall be driven in a sequence approved by the Engineer.
- iii) The steel sheet piling shall be assembled against the guides so that each pile is rigidly supported and plumb at both edges and side. All temporary guide structures shall be removed by the Contractor. At all stages during driving, piles shall be adequately supported and restrained without damage to the piles or any coatings or preservative treatment, by means of leaders, trestles, temporary supports or other guide arrangements to maintain position and alignment. Handling, slinging and pitching of piles shall be by methods approved by the Engineer.

- iv) Piles deflected from the proper lines shall, where ordered by the Engineer, be withdrawn and re-pitched until the proper line is obtained. No forcible method of correction of the position or line of any pile will be permitted. Any holes from which piles are withdrawn shall be packed with approved non-plastic material before re-driving. The cost of withdrawing, re-pitching, re-driving to the previous level and filling with non-plastic materials shall be borne by the Contractor.
- v) Piles ruptured in the interlock or otherwise damaged in driving shall be pulled and new pile should be driven. If at any time the forward edge of the piling wall is found to be out of plumb, the piling already assembled shall be driven to the forward edge plumb before additional piling is assembled or driven.
- vi) The maximum permissible taper in a single pile shall be 20 mm per meter of length. Splicing of piles during driving will not be allowed except where specifically approved by the Engineer. Where welding of piles is approved by the Engineer for field conditions, welding shall be done in accordance with the direction of the Engineer.
- vii) No pile (or pair of piles) shall be driven to less than one half or more than two thirds of the specified depth before the next pile (or pair of piles) has been driven to one half of the specified depth.

Corner joints and special piles shall be fabricated in accordance with the Drawings.

2.10.4.6 Tolerances

Piles shall be driven accurately vertical and the permitted deviation of the pile centre from the centre line shown on the Drawings or setting out plan shall not exceed 50 mm measured at the working level of the piling rig, or other level agreed by the Engineer.

The maximum permitted deviation of the finished pile shall be 1 in 75 from the vertical.

2.10.4.7 Disturbance and Noise

The Contractor shall carry out the piling work in such a manner and at such times as to minimize noise and disturbance. No pile driving will be allowed at night without prior permission from the Engineer.

The Contractor shall take precautions to avoid damage to existing services and adjacent structures. Any such damage shall be repaired to the satisfaction of the Engineer.

The Contractor shall ensure that damage does not occur to complete piling works and shall submit to the Engineer for approval his proposed sequence and timing for driving.

2.10.4.8 Obstructions encountered during Driving

If during the execution of the Works the Contractor encounters obstructions in the ground, he shall forthwith notify the Engineer and submit to him details of the proposed method(s) for overcoming the obstruction. The Contractor shall proceed in accordance with the approved method.

2.10.5 Treatment of Steel Sheet Pile Tops

The top 300 mm length of steel sheet piles, to be embedded in concrete as shown on the Drawings, shall be given two coats of bituminous paint to form a non-bonding contact with the concrete. A 20 mm gap, filled with impregnated hessian cloth or approved filler, shall be maintained above the piles. The filler, used in accordance with the manufactures instructions, shall be kept in position with clips etc., or as approved by the Engineer.

The main length of the steel sheet piles shall not be painted.

2.10.6 Measurement

The quantity of steel sheet piles to be measured under this Section shall be computed weight in metric ton of piles supplied and accepted as shown on the Drawings. This measurement also includes the cost supply of all materials according drawings and BOQ, and included all taxes, freights, incidental charges, etc. complete as per direction of Engineer- in- charge. In computing the weight to be measured, the theoretical weights of piles of the cross section shown on the Drawings or authorized shall be used.

The driving of steel sheet piles will be area measured in square meter on driven piles as per drawing and direction of Engineer in charge.

2.10.7 Payment

Payment item shall be made at the unit prices included in the BoQ as follows :

Sheet Piles in Metric ton (BoQ: Bill No.04; Item No.4.08 i)

Driving of sheet pile in Sqm (BoQ: Bill No.04; Item No.4.08 ii)

2.11 Structural Concrete

2.11.1 Description

Concrete is a composite construction material made primarily with aggregate, cement, and water. There are many formulations of concrete, which provide varied properties, and concrete is the most used man-made product in the world.

All concreting shall be carried out in accordance with the current British Standard BS 8500-2 and as specified by the Engineer.

All sampling and testing of constituent materials shall be carried out in accordance with the provisions of the appropriate British or American Standard and all sampling and testing of fresh and hardened concrete shall be carried out in accordance with the provisions of BS 1881 "Method of Testing Concrete" or similar.

2.11.2 Materials

2.11.2.1 Cement

The cement used in the Works shall be obtained from manufacturers approved in writing by the Engineer and shall be Ordinary Portland Cement/Portland Composite Cement complying with the requirements of ASTM C150 Type 1 or BS 12 or equivalent standard. Special cements shall conform to the requirements laid down by the Engineer.

The Engineer may make any tests, which he considers advisable or necessary to ascertain if the cement has deteriorated in any manner during transit or storage. Any cement which, in the opinion of the Engineer, is of doubtful quality shall not be used in the Works until it has been re-tested and test result sheets, showing that it complies in all respects with the relevant standard, have been delivered to and accepted by the Engineer.

Cement containing lumps, which cannot be broken to original fineness by finger pressure, will be rejected irrespective of age and shall be removed from the Site.

The Engineer shall ask to carry out the sampling, inspection and testing of all cement as he may consider necessary. Samples shall be taken as instructed from the site store, or from elsewhere on the works or from any places where cement is used for incorporation in the works. Cement may be rejected, at the discretion of the Engineer, if it fails to meet any of the requirements of the specifications. The compressive strength and tensile strength of standard cubes and briquettes respectively shall be not less than as follows:

Table: 2.11.2.1 Minimum strength of cement

Days	Compressive strength (N/mm ²)	Tensile strength (N/mm ²)
3	13	1.00
7	20	2.00
28	28	2.50

The initial setting time shall be not less than 45 minutes and the final setting time shall be not more than 8 hours. The cement when tested for fineness shall have a specific surface of not less than 160 m²/kg. The cement when tested for soundness shall not have an expansion of more than 10 mm. The unit weight of cement shall be 14.16 KN/m³.

Cement shall be delivered to the work site in sound and properly sealed jute/paper bags, each plainly marked with manufacture's name or registered mark. The cement shall be protected from the weather by tarpaulins or other approved covering during transit. The weight of individual bag containing cement shall be 50 kg and weight of all bags shall be uniform. The weight of cement shall be legibly marked on each bag. Bags in broken or damaged condition shall be rejected.

Each consignment of cement delivered to the site must be accompanied by a certificate showing the place of manufacture and the results of standard tests carried out on the bulk supply from which the cement was extracted.

The Contractor shall provide waterproof and well ventilated pucca godowns at the specified or approved location at the site, having a floor of wood or concrete raised at least 450 mm above the ground. The sheds shall be large enough to allow a minimum 300mm gap between the stacked cement and the godown walls, to store sufficient cement stored to ensure continuity of work and to permit each consignment to be stacked separately therein to permit easy access for inspection. All storage facilities shall be subject to approval by the Engineer.

Immediately upon arrival at the site, cement shall be stored in the godowns with adequate provision to prevent absorption of moisture. The Contractor shall use the consignments in the order in which they are received. Cement delivered to the site in drums or bags provided by the supplier or manufacturer shall be stored in the drums or bags until used in the Works. Any cement in drums or bags which have been opened shall be used immediately after opening. The cement shall not be stored in a godown for more than four months or a lesser period as approved or directed by the Engineer. After this period has expired, any unused cement shall be removed from the site.

2.11.2.2 Fine Aggregates

Fine aggregates shall be non-saline clean natural sand and have a fineness modulus between 1.5 and 2.5 and conform to the following ASTM standard grading. The amount of silt, clay and fines shall not exceed 5%. Fine aggregate shall not be used in work until it has been tested and test result sheet, showing that it complies with the relevant standard.

Following shall be deleterious substance tolerance:

- i Friable particle <0.5% by mass
- ii Coal and lignite < 0.5% by mass
- iii Passing 0.075 mm <3% by mass

Table 2.11.2.2 Grading of fine aggregates for structural concrete

Sieve No	Sieve size (mm)	Percentage by weight passing
4	4.76	95 – 100
16	1.18	45 - 80
50	0.30	10 - 30
100	0.15	2 - 10
Pan	-	2 - 7

2.11.2.3 Coarse Aggregates

- i) Coarse aggregates shall consist of crushed stone (25 mm downgraded) for producing Concrete class A, B. The pieces of aggregates shall be angular in shape and have granular or crystalline or smooth, but not glossy non-powdery, surfaces.
- ii) The amount of clay, fine silt, and fine dust occurring in a free state or as a loose adherent shall not exceed 1 percent. The sum of the percentages of all deleterious substances in any size shall not exceed 3 percent, by weight. After a minimum period of 6 hours immersion in water, the previously dried sample shall not have gained in weight more than 5 percent for use in reinforced concrete not more than 10 percent for use in plain concrete. The specific gravity shall not be less than 2.60.
- v) Coarse aggregates shall be tested according to ASTM Designation **C330** or equivalent. Gradations for 50mm, 40mm, 25mm and 20mm size aggregates, unless otherwise specified shall conform to the following requirements.

Table: 2.11.2.3 grading of coarse aggregate for structural concrete

25 mm downgraded size	
Sieve Size (mm)	% Passing by Weight
38.10 mm (1.5 inch)	100
25.4 mm (1.0 inch)	95-100
12.70 mm (0.5 inch)	25 - 60
4.76 mm (3/16 inch)	0 - 10
3.17 mm (1/8 inch)	0-5

Stone chips shall satisfy the following criteria:

- (i) Water absorption as determined by STP 7.5 or AASHTO T-85 or BS-812 shall not be more than 2% and soft fragments < 2% by mass.
- (ii) Materials passing through 0.075 mm sieve < 0.50 % if Clay, < 1.5% if fractured dust by mass.
- (iii) The Aggregate Impact Value (AIV) shall not exceed 30% as per BS 812.
- (iv) The percentage of wear according to Loss Angeles Test shall not exceed 35 as per ASTM C-535, The Flakiness Index <30% and TPFV>150 KN.

2.11.3 Water

The water used for concrete mixing and curing shall be drinkable water, clean and free from any substances injurious to the finished product. It shall be taken from an approved source and free from objectionable quantities of silt, organic matter, alkali, salt and other impurities. Whenever required to do so by the Engineer, the Contractor shall take samples of the water being used or which is proposed to be used for mixing concrete and test them in accordance with BS EN BS EN 1008:2002. No concrete shall be made with unapproved water. **Special attention in this connection is drawn to the fact that underground water at the project sites is salty and no way suitable for concreting work. So, the Contractor has to make arrangement to store sweet water by digging sufficient numbers of pond at the construction site.**

2.11.4 Admixtures

Admixtures shall mean materials added to the concrete materials during mixing for the purpose of altering the properties of the concrete mix.

The Contractor shall obtain the Engineer's written permission before using admixtures. The methods of use and the quantities of admixture used shall be subject to the Engineer's approval, which approval or otherwise shall in no way limit the Contractor's obligations under the Contract to produce concrete with the specified strength and workability.

2.11.5 Type of Concrete

The structural concrete shall be of compressive strength as shown on the Drawings or as approved or directed by the Engineer. Each mix shall be designed to ensure optimum workability, prevent segregation and produce a dense, durable concrete by adjusting the fine and coarse aggregate proportions following the procedures set out in the specification. The required strength of the structural concrete is given in the following table.

Table 2.11.5 Specifications for structural concrete

Concrete Type	28 day Cylinder Strength (N/mm ²)
Structural Concrete	22.0

2.11.6 Concrete Mix Design

When designing the concrete mix, the contractor shall consider:

- i. Strength (As per 2.11.5)
- ii. Water/cement Ratio (<0.45)

- iii. Minimum cement content (As per 2.11.5)
- iv. Minimum Filler content $< 0.25\text{mm} + \text{cement}$ for 20 mm 435kg/m³
- v. Coarse Aggregate (as per 2.11.2.3)
- vi. Fine Aggregate (as per 2.11.2.2)
- vii. Workability (Slump $< 75\text{mm}$)
- viii. Temperature

2.11.6.1 Trial Mixes

After the Contractor has received approval for the cement and aggregate to be used, he shall prepare trial mixes with concrete of designed proportions to prove and establish workability, strength, water cement/ratio, surface criteria etc. Methods of transporting fresh concrete and the compaction equipment shall be provided to the Engineer for his approval. The trial mixes shall be made and compacted in the presence of the Engineer, using the same type of plant and equipment for each trial mix, cylinders or cubes shall be made and tested in accordance with and shall be used for the Works.

The margin of the trial mix should be taken as 1.5 times of the characteristics strength of the concrete. Twelve concrete cylinder samples shall be made from the trial mix in the presence of the Engineer. The concrete cylinders shall be made, cured, stored and tested in accordance with BS 1881. Six cylinders shall be tested at 7 days and six cylinders shall be tested at 28 days. If the strength of any of the cylinders tested at 28 days is below the characteristic strength, the Contractor shall redesign the mix, make further preliminary mixes for the Engineer's approval, then undertake additional trial mixes and test the resultant samples until a satisfactory mix is obtained and approved by the Engineer. The trial mix proportions should be approved if the required strength is obtained from tests carried out and the consistency and surface is to the satisfaction of the Engineer.

When a mix has been approved, no variations shall be made in the mix proportions, or in the type, size, grading zone or source, of any of the constituents without the consent of the Engineer, who may require further trial mixes to be made before any such variations are approved.

Until the results of trial mixes for a particular class have been approved by the Engineer, no concrete of the relevant class shall be placed in the Works.

2.11.7 Slump Test

- i. The Contractor shall undertake slump tests of the freshly made concrete in accordance with BS 1881 and the slump shall be within the range of 50 to 100 mm unless otherwise indicated in the drawings or approved by the Engineer.
- ii. Slump tests shall be carried out on each batch of concrete of 50m³ or less frequently if or as directed by the Engineer.
- iii. The records of slump tests shall be maintained in a register and be made available to inspection.

2.11.7.1 Water Content and Slump

- i. Water cement ratio shall not exceed 0.45, unless otherwise indicated in the Drawings or approved by the Engineer.
- ii. Throughout concrete production the actual water cement ratio shall be strictly monitored and the batch quantities of aggregates and water regularly adjusted to maintain the design water cement ratio.

- iii. Total water for each batch of concrete shall be the minimum amount necessary to produce a plastic mixture of the strength specified with adequate density, uniformity and workability.

2.11.8 Proportioning of Mix

The approved mix shall be proportioned by weight or, except cement, by volume, if volume batching is approved by the Engineer. Allowance shall be made for the moisture content of the aggregates.

Fine and coarse aggregate and water may only be measured by volume in boxes or containers approved by the Engineer. Cement shall be added to concrete mixers by whole number of bags only.

2.11.9 Mixing Concrete

All concrete shall be mixed in modern mechanically operated mixers capable of combining aggregate, cement and water into a uniform mixture and discharging without segregation. Mixers shall be to the approval of the Engineer.

Mixing time shall be at least one minute after the last ingredient has been added to the mixer or so much more time as may be recommended by the manufacturer of the mixer.

Hand mixing of concrete shall not be allowed without the written permission of the Engineer

2.11.10 Quality Control of Concrete

- 1) The Contractor shall be responsible for providing samples of concrete and its constituent materials either for testing by him or for testing at the Engineer's laboratory or laboratory designated by the Engineer. For this purpose concrete test cylinders, which shall be made in accordance with BS 1881, shall be deemed to be 'samples'. All sampling of constituent materials shall be carried out in accordance with the provisions of the appropriate British Standard, and all sampling of fresh and of hardened concrete shall be carried out in accordance with the provisions of BS 1881 unless such provision is at variance with the Specification.
- 2) The tests, which the Contractor is required to undertake himself on behalf of the Engineer, are those to be carried out on fresh concrete at the place of final deposit, or elsewhere on the Site as directed by the Engineer. These tests comprise:
 - i) The Contractor shall test aggregates for moisture content and so determine the water/cement ratio of the fresh concrete. Determinations of water/cement ratio shall be carried out as required by the Engineer and the results and calculations submitted to him.
 - ii) The Contractor shall undertake slump tests on each batch of the freshly made concrete or less frequently if approved or directed by the Engineer. The slump of concrete to be used in the Works shall not exceed the slump of the trial mix by more than 10% and shall in any case not be more than the maximum specified.
 - iii) The sampling of concrete for concrete cylinders shall, where possible, be undertaken at the place of deposition of the concrete. Each sampling shall provide sufficient concrete to make six cylinders and allow a slump test.
- 3) After stripping, each cylinder shall be indelibly marked with the date taken, location in the structure and prescribed number.
- 4) Samples shall be taken for each 50 m³ for structural concrete of concrete batched or at a frequency agreed by the Engineer. The cylinders shall be cured properly and tested in the Field Laboratory. If the Engineer for his satisfaction desires to test the Concrete Cylinders at any recognized Laboratory other than Field Laboratory, the Contractor shall make such arrangements. All cost of such tests shall be borne by the Contractor.

2.11.11 Unspecified Concrete

- i) If cylinders taken at site during the progress of the works fail to attain the specified strength no further concreting shall take place until the cause of the failure has been established and corrective measures taken to the satisfaction of the Engineer.
- ii) The Engineer may require that core samples be taken and tested in accordance with ASTM Designation C-42 or a similar standard or other test be performed on sections of the works made from the suspect concrete; the cost of all such testing being borne by the Contractor. If such testing fails to demonstrate the integrity of the sections of the works, then all sections made with the suspect concrete shall be removed from the site.

2.11.12 Transporting, Placing and Compacting Concrete

- i) Concreting shall not be commenced without the written approval of the Engineer or his Representative. This approval shall be in the form a standard check list approved by the Engineer prior to the commencement of the work. The check list shall be filled in and approved by the Engineer's representative during his inspection and acceptance of materials, plant and equipment, concreting arrangements, the positioning, fixing and condition of reinforcement and any other items to be embedded and the cleanliness, alignment and suitability of the containing surfaces or formwork.
- ii) Concrete shall be conveyed from the mixer/batching plant as rapidly as possible by methods, which will prevent segregation or drying out and ensure that the concrete is of the required workability at the point and time of placing. The re-mixing of concrete will not be permitted.
- iii) The concrete shall be placed in the position and sequences indicated on the Drawings and Specification or as approved or directed by the Engineer. The concrete shall be placed in clean, oiled formwork and compacted before initial set has occurred, and in any event, not later than thirty minutes from the time of mixing. The concrete shall be placed in layers not greater than 450 mm thick and each layer thoroughly compacted by power driven internal type vibrators supplemented by hand spading and tamping.
- iv) The concrete shall be deposited as far as possible in its final position without re-handling or segregation and in such a manner so as to avoid displacement of the reinforcement and other embedded items or formwork. Where chutes are used to convey the concrete, their slopes shall not be such as to cause segregation and suitable spouts or baffles shall be provided where necessary. Concrete shall not be dropped through a height greater than 1200 mm except with the approval of the Engineer who may order the use of bankers and the turning over of the deposited concrete by hand before being placed.
- v) The vibrators shall at all times be adequate in numbers, amplitude and power to compact the concrete properly and quickly throughout the whole of the volume being compacted to the satisfaction of the Engineer. Spare vibrators shall be readily on hand in case of breakdown. The duration of vibration shall be limited to that required to produce satisfactory compaction without causing segregation. Vibration shall on no account be continued after water or excess grout has appeared on the surface.
- vi) The concreting shall be carried out in such a way that the exposed faces of concrete shall be plain, smooth, sound and solid, free from honeycombing and excrescences. After compaction the exposed concrete surface shall be struck off smooth with hand held steel floats. No plastering of imperfect concrete faces will be allowed. Any concrete that is defective in any way shall, if so ordered by the Engineer, be cut out and replaced to such depth or be made good in such manner as the Engineer may direct.
- vii) Where concrete is required to be placed against undisturbed ground, the entire space between the finished concrete surface and the ground, including any overbreak, is to be completely filled with concrete of the specified class. The concrete shall be well rammed and compacted to ensure that all cavities are filled and the concrete is everywhere in contact with the ground. Where permitted by the Engineer, any extensive patches of over break may first be filled with concrete Class C as approved or directed by the Engineer.
- viii) Where concrete is required to be placed against a metal surface to which it is required to adhere, care shall be taken to work the concrete well into the re-entrant angles and to ensure contact by hammering the metal part on its free side provided that this is done without damaging the metal or its protective coating, if any.

- ix) The placing of concrete under water will be permitted only in exceptional circumstances and with the prior approval of the Engineer. Where concreting under water is allowed, 25 per cent additional cement must be added. Concrete shall be deposited continuously in each section by the use of tremie pipes or other approved means and no horizontal construction joints will be permitted to be made under water. Approved and adequate protection against possible damage or movement due to scour must be provided.
- x) The Contractor shall organize the casting of mass concrete to minimize thermal cracking. The Contractor's proposal and his casting sequence shall be submitted to the Engineer and concreting shall not commence until the Engineer's written approval is received.
- xi) Construction joints shall be formed in the work where indicated on the Drawings or as previously approved by the Engineer. Where necessary, the Contractor shall allow for working beyond ordinary working hours in order that each section of concrete may be completed in a continuous pour with the concreting carried up to each construction joint.

2.11.13 Concreting in Adverse Conditions

Concreting during periods of constant heavy rain shall not be permitted unless aggregate stockpiles, batching and mixing plants, transporting equipment and the precast yard are adequately covered. During showery weather, the Contractor shall ensure that work can be concluded at short notice. Adequate covering shall be provided to protect newly placed concrete from the rain.

In hot weather, the aggregate stockpiles shall be shielded or sprayed with water and the mixing water shall be adequately cooled or insulated to ensure that the temperature of the concrete when placed shall not exceed 30°C.

2.11.14 Curing Concrete and Protection

Concrete shall be protected from the effects of sunshine, dry wind, rain, running water or mechanical damage for a continuous period, until the concrete has reached at least three quarters of its 28 day strength, but for not less than 10 days. The Contractor shall submit his proposals to achieve this protection for the Engineers approval.

The protection and curing of concrete, which has achieved its final set, shall be by one or more of the following methods:

- i by water spray in continuous operation or a layer of water;
- ii by covering with hessian or similar absorbent material, or sand, kept constantly wet;
- iii after thorough wetting, by covering with a layer of water proof fabric kept in contact with the concrete surface.
- iv the use of saline water for curing purposes will not be permitted.

2.11.15 Concrete Surface Finishing

- i) Finishing of concrete surfaces shall be performed by skilled workmen to the satisfaction of the Engineer. Exposed flat concrete surfaces shall be screened to produce an even and uniform surface then they shall be given a trowel finish unless otherwise specified on the Drawings. All exposed and unprotected edges shall be given 20 mm x 20 mm chamfers. Concrete stairs and bridge decks shall have a broom finish.
- ii) The Concrete surface finish on upward facing horizontal or sloping faces shall be, except for blinding concrete or otherwise stated on the Drawings, a "fair" surface. A "fair" surface shall be obtained by screeding and trowelling with a wood float.
- iii) Screeding shall be carried out, following compaction of the concrete, by the slicing and tamping action of a screed board running on the top edges of the formwork or screeding guides to give a dense concrete skin true to line and level.
- iv) Wood float trowelling shall be carried out after the concrete has stiffened and the film moisture has disappeared. Working should be kept to the minimum compatible with a good finish and the

surface shall be true to the required profile to fine tolerance. Whenever necessary the Contractor shall provide and erect overhead covers to prevent the finished surface from being marred by raindrops or dripping water.

- v) Where a "fine" surface is indicated upon the Drawings this shall be obtained in a similar manner to "fair" surface save that a steel float shall be used in lieu of the wood float.
- vi) Formed surface for painting, exposed to view and waterway surfaces shall be smooth and free from projections, and shall be rubbed smooth immediately after the forms are removed. Formed surfaces shall be classified as follows:
- vii) Unexposed concrete surfaces upon or against which backfill or concrete is to be placed require no treatment except the removal and repair of defective concrete.
- viii) Exposed and hydraulic surfaces of water ways shall have a very smooth, sound surface by control of form work, concrete placement and repair of abrupt surface irregularities by grinding or rubbing of high spots and filling of voids.

2.11.16 Embedded Items

All embedded items shall be firmly and securely fastened in the place as indicated on the Drawings or as required by the Engineer.

2.11.17 Construction Joints

- i) Concrete surfaces upon or against which concrete is to be placed and to which new concrete is to be placed, that have become so rigid that the new concrete cannot be incorporated integrally with that previously placed, are defined as construction joints. Formed vertical or inclined construction joints as well as unformed joints which are due to interruption of concrete placement will only be permitted where shown on the Drawings or approved or directed by the Engineer. All exposed faces of construction joints shall be made absolutely straight, level or plumb and normal to finished surface.
- ii) Surfaces of construction joints shall be prepared as early as possible after casting. The preparation shall consist of the removal of all laitance, loose or defective concrete coatings, sand and other deleterious materials. Preparation shall be carried out preferably when the concrete has set but not hardened by jetting with a fine spray of water or brushing with a stiff brush, just sufficient to remove the outer mortar skin and to expose the larger aggregate without its being disturbed. Where this treatment is impracticable and work is resumed on a surface which has set, the whole surface shall be thoroughly roughened or scraped with suitable tools so that no smooth skin of concrete that may be left from the previous work is visible.
- vi) The prepared joint face shall be thoroughly cleaned by compressed air and water jets or other approved means and brushed and watered immediately before depositing concrete. If so, ordered the roughened surface shall be covered with cement mortar prior to placing the new concrete.

1.11.18 Schedule of Test

Following Test shall be carried out at the frequencies shown in the Table to check the properties of construction materials (Cement, Sand and Stone Chips), Water and Concrete Strengths as per specifications;

Sl No.	Name of Test	Frequency of Test	Test Method
1	<u>Cement:</u> i. Fineness ii Initial Setting Time and Final Setting Time iii Compressive Strength iv Tensile Strength v Unit Weight	1 For each fresh Consignment arriving at Site 2 One Sample for each 200 M. Ton 3 As approved or directed by the Engineer	ASTM C786, ASTM C 403, ISO 679:2009 or Equivalent
2	<u>Fine Aggregate (Sand)</u> i Fineness Modulus ii Chemical Test	1. 1(one) Sample for each 350 Cum or part thereof 2. At least 1 Sample in a week 3. As approved or directed by the Engineer	ASTM C 33 or Equivalent
3	<u>Coarse Aggregate (Stone Chips)</u> i Gradation Test ii Water Absorption iii Aggregate Impact Value (AIV) iv Loss Angeles Test	1. 1(one) Sample for each 700 Cum or part thereof 2. At least 1 Sample in a week 3. As approved or directed by the Engineer	ASTM C330 , AASHTO T-85 , BS-812, ASTM C-535 or equivalent
4	<u>Water</u> Suitability of Water for Concrete Mixing	1. For each source of Water 2. As approved or directed by the Engineer	BS EN 1008:2002
5	<u>Concrete</u> i Slump ii Water Cement ratio iii Cylinder Test (Compressive Strength) v Non-destructive Test (Rebound Hammer) iv Concrete Core Test	1 One set of Cylinder (One set comprises 6 Nos. Test Cylinder) for each 50 cum or part thereof of fresh concrete produced with correspondence Slump and Water Cement Ratio 2 Rebound Hammer Test will be carried out as frequent as the Engineer considered 3 Concrete Core Test will be carried out if any Test Cylinder fails to pass the specified strength 4 As approved or directed by the Engineer	BS 1881 ASTM C-42 or Equivalent

1.11.19 Nondestructive Testing

The Contractor shall provide onsite a 'rebound' (Schmidt or similar) testing hammer for use by the Engineer for checking the in-situ strength of the concrete. Testing shall be carried out at the frequency and in the locations approved or directed by the Engineer. Any concrete structures found to be of strength less than specified will be removed from the Works site and replaced by the Contractor.

1.11.20 Measurement

The concrete of the specified type completed in place in accordance with the specifications stated herein and/ or as per provisions of the BOQ or as shown on the Drawings or as directed by the Engineer shall be measured in Cubic Meter. In computing quantities, the dimensions used shall be those shown on the Drawings. No deduction from the measured quantity shall be made for drainage, pipes less than 200mm diameter, conduit, chamfers, reinforcement bars, expansion joints and water stops.

Reinforcing steel bars shall be measured for payment as described in the specifications Clause **2.12**.

Construction joints, expansion joints, dowel bars, polythene, hessian cloths, cork sheets etc. shall not be measured separately but shall be deemed to be an integral part of the structural concrete item and to be constructed as per design and drawing

2.11.20 Payment

Payment for Concrete will be made on **Cubic Meter** (as Specified in the Bill of Quantities).

1.12 M.S. Work for Reinforcement

2.12.1 General

The steel reinforcement shall be prepared and fixed in accordance with the Working Drawings furnished by the Engineer. This work shall consist of furnishing and placing bars of the grade, type and size shown in accordance with these specifications and in conformity with the requirements shown on the Drawings

The Contractor shall provide the Engineer with bar bending schedules detailing the reinforcement required for the Permanent Works. Such schedules are to be approved by the Engineer prior to the commencement of work. Approval shall not relieve the Contractor from his responsibilities under the Contract for providing the materials called for on the Drawings. All further working drawings and lists of reinforcement necessary to carry out the Works shall be provided by the Contractor at his own cost.

All reinforcement delivered to the site shall be stacked prior to use off the ground and kept free from dirt, oil, grease and avoidable rust.

2.12.2 Steel Reinforcement

Reinforcement bars shall be mild steel made from billet structural grade of 60 and shall conform to following specifications.

(1) Code or standard	Standard of equivalent code: ASTM A575, A615-Grade 60.
(2) Physical Properties	Yield Stress - 414 N/mm ² minimum Tensile Stress - 483 N/mm ² minimum Percentage elongation - 20% minimum. (min. gauge length-5 dia).
(3) Standard Dimensions and Weight	According to table 2.13.1

(4) Dimensional tolerance	Below 28mm bar +/-0.5mm Above 28mm bar +/-0.6mm
(5) Weight tolerance	The difference between calculated Weight and actual shall be within +/-3.5%.

Reinforcing Steel shall be deformed bar. All reinforcement bars shall be Mild Steel made from **Billet Structural Grade of 60** and shall conform to following specifications. Test will be carried out for each fresh consignment and at the frequencies as per directions of the Engineer.

Table 2.12.2 Dimension & Weight:

Bar Diameter		Cross Sectional Area		Perimeter		Unit Weight	
in	Mm	in ²	mm ²	in	Mm	lb/ft	kg/m
1/4	6.35 6	0.05	28.27	0.79	18.85	0.167	0.249 0.22
5/16	7.94 8	0.07	50.26	0.98	25.13	0.261	0.370 0.395
3/8	9.525 10	0.11	78.54	1.18	31.42	0.376	0.56 0.62
1/2	12.70 12	0.20	113.10	1.57	37.70	0.668	0.99 0.89
5/8	15.875 16	0.31	201.06	1.96	50.27	1.043	1.56 1.58
3/4	19.05 20	0.44	283.53	2.36	59.69	1.502	2.24 2.23
7/8	22.23 22	0.60	380.13	2.75	69.12	2.044	3.05 2.98
1	25.40 25	0.79	490.87	3.14	78.54	2.670	3.98 3.85
1-1/8	28.65 28	1.00	615.75	3.54	87.96	3.400	5.06 4.83
1-1/4	31.75 32	1.27	804.25	3.99	100.53	4.303	6.42 6.31

2.12.3 Cutting and Bending

All cutting and bending shall be in accordance with standard approved practice. Straightening of bends and re-bending of incorrectly bent bars shall not be permitted. Bars shall be bent cold by use of an approved bending machine.

Bending radii shall be as specified on the drawings with bends made round a former having a diameter of at least three times the diameter of the bar. If the radii are not shown on the Drawings, ACI standards shall be followed.

Where splices or overlapping in reinforcement are required the bars shall, unless otherwise shown on the Drawings, have an overlap of not less than thirty times the diameter where a U-hook is employed on each of the overlapping bars and forty-five times the diameter for bars without hooks.

2.12.4 Placing and Fixing Reinforcing Steel

All reinforcement shall be securely and accurately fixed in position shown on the drawings using approved spacer blocks and chairs. Tolerance allowance for placing reinforcement shall not exceed 12mm. No splices of reinforcement shall be made other than as shown on the Drawings or approved by the Engineer.

All intersections of bars shall be secured with No 22 to 18 gauge galvanized iron wire, the ends being turned into the body of the concrete. The reinforcement shall be held securely in place to the lines and grades shown on the Drawings by approved concrete supports, spacers or ties with particular care being taken during placing of the concrete.

The specified concrete cover as shown in the drawing to reinforcement shall be maintained with the aid of approved supports and spacer pieces. Top reinforcement in slabs shall be maintained in position by means of chairs made out of mild steel, the diameter and quantity being sufficient to ensure security of the reinforcement shall be used to support access ways, working platforms, or the placing equipment or for the conducting of an electric current. Reinforcement supports and spacers shall be sufficient to maintain reinforcement in place throughout the concreting operation and shall not be exposed on the concrete face or discolour the finished concrete.

Before any steel reinforcement is embedded in the concrete any loose mill scale, loose rust and any oil, grease or other deleterious matter shall be removed. Partially set concrete which may adhere to the exposed bars during concreting operations shall be removed.

2.12.5 Concrete Cover to Reinforcement

Unless specified on the Drawings, the clear concrete cover to reinforcement shall be as tabulated below:

Table 2.12.5 Clear concrete cover to reinforcement

Description of Concrete Element	Clear Cover (mm)	
	Normal Exposure	Saline Water
Wall and floor slab: - Contact with earth	60	75
- Exposed to weather and water	50	60
Regulator Pier	50	60
Regulator Deck Slab	40	40
Railing	25	25

Cover shall be maintained by the use of the minimum practical number of purpose made concrete blocks, approved spacers and reinforcement chairs. Concrete spacer blocks shall be made from cement, sand and small aggregate to match the mix proportions of the surrounding concrete as far as practical to ensure comparable strength, durability and appearance.

2.12.6 Splicing

Reinforcing shall be furnished in the lengths indicated on the Drawings. When the Contractor wishes to use more splices than are indicated and / or necessary, the Contractors shall furnish Working Drawings to the Engineers for approval in accordance with the guidelines provided on the Contract Drawings. If such additional splices are approved, the extra weight occasions by such splices shall be included in the measurement of reinforcement for payment.

All splices for high yield deformed steel bars and mild steel plain steel bars shall have lap lengths as shown on the Drawings. Lap splices shall generally be located at points of minimum tension in bars. Except where otherwise shown on the Drawings lap splices shall be made with the bars placed in control and security wired together.

2.12.7 Welding of Reinforcement

Reinforcement which is specified to be welded shall be welded by any process the Contractor can demonstrate by bend and tensile tests which will ensure that the strength of the parent metal is not reduced and that the weld possesses strength no less than that of the parent metal. The welding procedure established by the successful test weld shall be maintained and no departure from this procedure shall be permitted. Following the establishment of satisfactory welding procedures, each welder to be employed on the work shall carry out welder performance qualification tests on reinforcing bars of the same metal and size as those on the works.

2.12.8 Dowel Bar and Cap

Where shown on the Drawings, dowel bars shall be incorporated in movement joints and bridge bearings. The dowel bars shall be a round mild steel bar of the diameter and length indicated on the Drawings and the top of the bar shall be covered with an approved dowel cap. The capped end of the dowel bar shall be sawn square; bar cropping will not be permitted.

Where dowel bars are to be provided through movement joints the part of the bar to be free to move shall be coated with an approved bond breaking bitumen paint and fitted with a compressible cap. The cap shall be of such a diameter to provide a sliding fit on the bar and of length indicated on the Drawings. The cap shall be partially filled with approved compressible filler.

2.12.9 Measurement

The quantity of reinforcement to be measured under this Section shall be computed as weight in kilograms and accepted as shown on the Drawings provided that the quantity shall not include the reinforcement in any item of work for which the basis of payment include the reinforcement. In computing the weight to be measured, the theoretical weights of bars of the cross section shown in the Drawings shall be used. The weight shall be calculated based on a constant mass of 0.00785 kg/mm² per metre run.

The computed weight shall not include the extra material incurred when bars larger than those specified are used, or the extra material necessary for splices when bars shorter than those specified are used with permission of the Engineer, or the weight of any devices used to support or fasten the reinforcement in the correct position including any necessary chairs

2.12.10 Payment

Payment shall be made in Kg as per unit rate included in BoQ Item. The rate shall include all cost of material including cutting, binding, welding, providing Dowel bar etc.

2.13 M.S. Work in Plate, Angle

2.13.1 MS work in Plates

Angles, channels, flat bars, Tees etc. includes fabricating, machining, cutting, bending, welding, forging, drilling, riveting, embedding anchor bars, staging and fitting fixing, local handling etc. complete as per design, specification and direction of Engineer in charge.

Standards of steel and other metalwork shall comply with the following standards. This list is given for the Contractor's guidance and shall not be taken as exhaustive.

Structural Steel Sections (Part 1: Hot rolled sections)	BS 4
Steel Wire Ropes	BS 302
Covered Electrodes for the Manual Metal-Arcs Welding of Mild Steel	BS 639
Black Hexagon Bolts, Screws and Nuts	BS 4190
Steel Tubes and Tubular suitable for Screwing to BS 21 Pipe Threads	BS 1387
Phosphor Bronze Ingots and Castings	BS 1400
Carbon Steel Plate, Sheet and Strip	BS 1449
Grey Iron Castings	BS 1452
Steel Tubes for Structures	BS 1775
Arc Welding of Carbon Manganese Steels	BS 2642
Cast Steel for General Engineering Purposes	BS 3100
Weldable Structural Steels	BS 4360
Weldable Structural Steel Sections	BS 4848
Metal-arc Welding of Carbon and Carbon Manganese Steels	BS 5135

2.13.2 Nuts and Bolts

Bolts, rag bolts, nuts and washers shall conform to BS 4190 as regards dimensions. Each bolt shall be provided with two washers and shall be long enough to show a full thread through the nut after fixing. External bolts and fixing rag bolts, nuts and washers shall be sherardized steel. Assemble nuts, bolts and washers or galvanized fittings or equipment shall be either galvanized or sherardized.

2.13.3 Steel Plate

Steel Plates, shapes and bars shall conform to ASTM Designation A 36 or approved equal standard.

2.13.4 Embedded Metal work

Metalwork component to be cast into the structures shall be fabricated as per the Drawing. Unless indicated on the Drawings, the components shall not be painted but prepared in accordance with direction of Engineer and then firmly secured in position prior to concreting.

The contractor shall plan his concreting work so as to avoid risk of knocking or damaging the components. Second stage concreting shall be undertaken in accordance with design

Exposed surface second stage casting work shall be painted according to direction of Engineer.

Welding during positioning of parts shall be carefully, so that, vertical and horizontal levels of the exposed surfaces may not be disturbed due to heat, generated at the time of welding.

Rubbing surfaces shall be cleaned before installation gates or stop logs.

2.13.5 Welding

Welding shall be metal-arc welding complying with the requirements of BS 5135 as appropriate. All welds shall be continuous. The Contractor shall supply samples to the Engineer when required by him for examination or test. All weldable structural steel shall comply with the requirements of BS 4360 and shall be the grade of steel as specified hereinafter, or on the Drawings.

2.13.6 Measurement

Measurement of item *M.S. Work in Plate, Angle* shall be on Kg

2.13.7 Payment

Payment shall be made at the unit rate as included in the Bill of Quantities.

2.14 PVC Water Stops

2.14.1 General

Where shown on the Drawings, Construction (as required and approved by the Engineer), Contraction and Expansion Joints shall be made watertight by the provision of a continuous water stop strip of polyvinyl-chloride (PVC) as manufactured by a Manufacturer approved by the Engineer, fixed across the joint. Unless otherwise specified or ordered, a three bulb section PVC water stop shall be used in expansion joints.

2.14.2 Specification

- i) Water stops shall be of high grade PVC containing no filler or reclaimed or scrap material. PVC shall comply with the requirements of BS 2571 for PVC type A, class 1. The quality of water stops shall comply with the following major requirements:

Specific gravity	:	1.30 (max)
Hardness	:	80 (min)
Tensile strength	:	13.80 N/mm ² (min)
Elongation	:	225% (min)

- ii) The water stops shall be obtained from a manufacturer approved by the Engineer, and shall be fixed and jointed according to the manufacturer's instructions. All strips shall be stored in a place as cool as practicable and shall in no case be exposed to the direct sun light. Splicing of polyvinyl chloride water stop shall be performed in accordance with the manufacturer's recommendations. A thermostatically controlled electric source of heat shall be used to make all splices. The heat shall be sufficient to melt but not char the plastic. Splices shall develop at least 90 percent of the tensile strength of unsliced materials and shall withstand bending 180 degree around a 50 mm diameter pin without cracking or separating.
- iii) The Contractor shall submit to the Engineer for his approval, as soon as practicable after acceptance of his tender and not less than a month before the commencement of concreting, details of his proposals for the installation of water stops. These shall show where joints in the water stops are to be located and details of the intersections and changes of direction to a scale that shows the position of any joint or shape of any moulded section.

2.14.3 Installation

- i) Water stops shall be installed with approximately half of the width of the material embedded in the concrete on either side of the joint. It shall be firmly supported by split stop-end shuttering and in no case shall be water stop be pierced to assist in fixing. Special care shall be taken to ensure that the concrete is well worked against the embedded parts of the strips and is free from honeycombing. Precautions are to be taken to protect any projecting portions of the strips from damage during the progress of the works and from sunlight and heat.
- ii) If, after placing concrete, water stops are moved out of position or shape, the surrounding concrete shall be removed, the water stop reset, and the concrete replaced at the Contractor's own expense. Two 10 mm reinforcing bars shall be provided to support the water stops and shall be securely held in position by the use of spacers, supporting wires, or other approved devices.
- iii) Flexible water stops shall be fully supported in the formwork, free of nails and clear of reinforcement and other fixtures. Damaged water stops shall be replaced and during concreting care shall be taken to place the concrete so that water stops do not bend or distort.

2.14.4 Joint

As far as possible, jointing of PVC water stops on site shall be confined to the making butt joints in straight runs of water stops. Where it is agreed with the Engineer that it is necessary to make an intersection or change of direction of any joint, other than a butt joint in a straight run, on site a preliminary joint, intersection or change of direction piece shall be made and submitted to such tests as the Engineer may require.

2.14.5 Compressible Filler

The Contractor shall supply and fix pre-moulded joint fillers in all expansion joints and where shown on the Drawings. Unless otherwise specified, the joint filler shall be of resin or bituminous bonded cork such as "Hydrocor" as manufactured by Expandite. The filler shall be obtained from a manufacturer approved by the Engineer and shall be stored and fixed in accordance with the manufacturer's instructions. The joint filler of the thickness specified shall be cut to shape and fixed to fill the whole space between the concrete faces of the joint sealer. Abutting pieces shall be in close contact and the joints covered on each side to prevent the passage of cement grout.

2.14.6 Bitumen Coated Joints

Where the Drawings show bituminous paint between concrete faces, the Contractor shall clean and dry the face to which the paint is to be applied and shall then paint the bitumen on in two separate applications. The bitumen shall be straight run bitumen, grade 80/100 penetration, or other approved by the Engineer

2.14.7 Filter Materials

The expansion joint have to be provided with filter consisting of sand of FM ≥ 2.0 and Bricks Khoa / Chips as per gradation shown in the drawing. Sand Filter of thickness 150 mm of base width 1200 mm and side slope 1:2 at bottom over which brick khoa/ Chips in 2(two) layers(50 mm to 20 mm at top & 20 mm to 5 mm at bottom) as shown in the drawing are to be placed at the expansion joint.

2.14.8 Measurement

Measurement of item PVC Water Stop shall be made on Meter

2.14.9 Payment

Payment shall be made at the unit rate per Meter as included in the Bill of quantities. The unit rate shall include all cost of materials, compressive filler, bitumen, sand & khoa filter including fixing, placing, tools and plants etc

2.15 Compaction Sand Pile

2.15.1 General

Sand compaction pile shall generally be used for improvement of sandy as well as clayey soil in alluvial plain, mostly plains, reclaimed land and marshy land. It is carried out to densify the loose deposit and thereby to increase factor of safety against liquefaction. Densification of loose foundation soil is achieved when sand through injected pipe are force to go down with the effect of compaction by drop hammer and together with the lateral and vertical displacement of surrounding layers.

2.15.2 Equipment

The equipment used for sand compaction piles are;

- i) Derrick/Winch
- ii) Casing pipe
- iii) Drop Hammer

Drop hammer weighing 1.0 ton and above shall be of solid cylinder and sectional area shall be such that it can play within the casing pipe. Diameter of hammer section shall be about 6.0 to 8.0 mm lower than the opening of the casing pipe. The casing pipe shall be of Mild Steel.

2.15.3 Construction

- i) A small hole of about 50 cm depth shall be made on the ground with the hammer.
- ii) Casing pipe shall be installed at that point and kept vertical. The casing pipe shall be held in position with the wire rope connected to the winch i.e. downward movement of the casing pipe shall be restrained.
- iii) Coarse sand of FM between 1.5 and 2.5 or sand gravel mix as provided in the design shall be placed within the casing pipe (250mm to 300mm dia) upto a depth of about 1.0 to 1.5 meter.
- iv) The coarse sand or sand gravel mix placed at the tip of casing pipe shall then be compacted to form a solid mass by the hammer, holding the casing pipe in position.
- v) Casing pipe shall then be allowed to go downward with application of hammer blows on the shoe formed at the tip and shall be penetrated to the desired depth.

- vi) As the casing pipe reaches the desired depth, the pipe shall be pulled back by about 30 cm. from the lowest position and then held firmly from the winch. Artificial shoe shall then be detached from the casing pipe with the hammer blows.
- vii) The casing shall be drawn to a desired height, sand discharged into the casing pipe to depth of about 1.5 to 2 times the drawn up height of the casing pipe.
- viii) The discharged sand shall be compacted by the hammer and the process of compaction shall continue until the casing pipe reaches the ground surface.
- ix) The removed volume of sand or sand gravel mix. measured on the ground shall be between 120% to 130% of the designed volume.
- x) Effect of improvement of the foundation soil shall be confirmed by SPT, CPT or any other method as approved by the Engineer, between and at the centre of piles so as to satisfy the desired bearing capacity.
- xi) In case of not attaining the required bearing capacity, the Contractor shall establish the cause of the failure and undertake such remedies as are necessary through driving additional sand pile at his own cost.

2.15.4 Measurement

Measurement of item Sand Pile shall be made on Meter accomplished as per design recorded by the Engineer in a certified register.

2.15.5 Payment

Payment shall be made at the unit rate per Meter as included in the Bill of quantities.

2.16 Supplying & Dumping of Geo-textile Bags by Floating Barge

2.16.1 Objective

The aim is to provide a continuous geo-bag revetment / mattress in under water river bank slope including at least 15m falling apron so that no scour could be occurred. Geo-textile bags shall also be used in river closing activities

2.16.2 Geo-textile Specification

The geo-textiles shall be manufactured from polypropylene or polyester fabric and shall be non-woven and needle punched and not solely thermally bonded. The thermal bond shall not influence the flexibility of the sand bags including their launching behavior. The Geo-textile shall comply the following properties:

SI	Test Parameter	Standard Value
1	Mass per unit area	=>400 gm/ m ²
2	Thickness under a pressure of 2 kPa	=>3 mm
3	Apparent / Effective Opening size	=>0.08 mm

4	Horizontal Permeability	=> 3×10^{-3} m/sec
5	Vertical Permeability	=> 4.5×10^{-3} m/sec
6	Grab Tensile Strength	=>1500 N
7	Strip Tensile Strength	=>23 KN / m
8	CBR Puncture Resistance	=> 3800 N
9	Elongation at maximum force (machine direction MD)	=>60% and <=100%
10	Elongation at maximum force (CMD)	=>40% and <=100%
11	Permeability (Velocity Index for a head loss of 50 mm- V_{H50})	=> 2×10^{-3} m/sec
12	UV resistance	=>70% of original tensile strength before exposure

2.16.3 Testing Geo-textiles

Geo-textile delivered at site should be certified by ISO with brand name.

- i) The properties of geo-textile to be delivered at site shall be tested at BRTC, BUET according to relevant test standard given in the specification.
- ii) Tests shall be carried out from each quantity of 10,000 nos. of geo-textile bag supplied. Seams shall be tested for tensile strength every 10,000 m of seam.
- iii) The sample size for the fabric shall be 2 m² and shall be marked to indicate its upper side, longitudinal and transverse directions, type of geo-textile and the date that the sample was taken. Seam samples shall be at least one meter in length and the ends of the threads are to be firmly tied off by the Contractor or Supplier at the time the samples are taken. Each test shall be carried out on at least three samples.
- iv) The Contractor shall bear the expenses of all routine tests. Notwithstanding the submission of reports to the effect that the geo-textile conforms to the Specification, the Engineer shall at all times be entitled to have additional samples of geo-textile tested if he is of the opinion that the geo-textile does not conform to the Specification. The Engineer shall only select samples from any lot of bags procured at site by the contractor.

2.16.4 Required Properties of Geo-textile Bags

All geo-textiles bags shall be manufactured and supplied from a single source and grade of geo-textile and shall comply in full with the following specification;

Bag size (Empty)	Weight (kg) (When filled with dry sand)	Filled Volume (m ³)	Min seam strength EN ISO 10321
1200 mm x 950mm	250	0.1664	18 n/m
1050 mm x 800 mm	175	0.1164	18 n/m

2.16.5 Preparation and Sewing of Geo-textile bags

- (i) The geo-bags shall be prepared by sewing on two longitudinal sides as per drawing. The transverse (top) side shall be kept open for subsequent closing.
- ii) Sewing should be done by machine at machine or cross-machine direction.
- iii) The number of stitch in every 25 mm should not be less than 6 nos. The stitch shall be double thread chain stitch type (type 401 under ISO 4915/DIN 61400) or two thread type with lock stitch (type 301 under ISO 4915/DIN 61400).
- iv) At the bottom end of each seam (at the folded side) the stitch shall be locked either by stitching one time back and forth for a length of minimum 25mm from the end of the bag, or by joining the ends of the two threads e.g. by gluing, knotting or other appropriate methods, acceptable to the Engineer.
- v) The two lines of stitches shall be within 5 mm distance with a margin of 25 mm from the edge of the geo-textile to the centerline between the two seams. The tolerance is 3 mm in each direction.
- vi) Thread used for stitching should be of the same material as the geo-textile or of materials more durable than the material of geo-textile (e.g. polypropylene or polyester thread if the geo-textile is made of polypropylene).
- vii) The thread used must be of high quality and equivalent stability to UV exposure as the geo-textile material.

Geo-bags shall comply with the following specifications. Maximum filled capacity in volume and weight shall be in respect of filling with dry sand ($FM \geq 1.0$). Each individual bag shall in no case be smaller than specified.

2.16.6 Storing Geo-textile Bags

The Contractor must build secured temporary storing facilities of geo-bags at site in order to protect the Geo-bag from UV ray.

2.16.7 Filling, Sewing and Stacking of Geo-bags

The filling sand shall be non-saline clean natural sand and have a fineness modulus ≥ 1.00 . The amount of silt, clay and fines shall not exceed 5%. The geo-textile bag shall be filled up with dry specified sand. The fill volume and weight of each bag shall not be less than 0.1664 m³ and 275 kg respectively. After filling the bag shall be checked by weighing scale and close the mouth by specified seam (04 lines) using double needle sewing machine.

2.16.8 Dumping Plan

The contractor shall have to conduct bathymetric survey, prepare dumping plan mentioning global positional coordinate based on the bathymetric survey using applicable software and submitting to the Engineer for approval prior to commencement of dumping work.

2.16.9 Dumping of Bags

- i) The bag dumping shall be performed using flat top barge, anchored and positioned by double drum mooring winch. Bags for use in launching apron shall be stockpiled to the satisfaction of the Engineer. Prior to the commencement of dumping, the contractor proposal to ensure that the quality & quantity have been approved by the Engineer.
- ii) The dumping shall be started at the far end in the river and proceeds towards the river bank. The contractor shall maintain dumping register duly signed by the quality control personnel. The quantity of bag to be dumped shall be recorded in the register with date and shall make the register available at site for inspection.
- iii) Dumping of bags below low water level must start early December or at such time while river attains its LWL and must be accomplished no later 30 April or as specified in the design.
- iv) The entire revetment / protective work length shall be divided into suitable panels or batches and dumping area shall be delineated by GPS coordinate using total station. Dumping shall be done in suitable batches / panel simultaneously in continuous reach with the aid of barge or floating pontoon. The material of each batch / panel shall be stored in several stacks. After full development of launching apron of each batch / panel as per design, then dumping of new batch / panel can be started.
- v) The dumping volume will be checked by taking Pre-work and Post-work cross sections. The dumping area shall be verified by engaging divers who identify the uncovered area through installation of buoy. The contractor shall take immediate action to cover the identified bare area through dumping geo-bags.

2.16.10 Measurement

Measurement of item Dumping of Geo-textile Bag shall be made on Each Number of bags dumped.

2.16.11 Payment

Payment shall be made at the unit rate per bag. The unit rate includes all cost of bags, sand, sewing thread, buoy, labour, all equipment, filling, sewing, stacking, transportation and dumping bag etc. including survey. However, while this item is used in construction of Closure Dam (under Clause No.2.9 as per approved design), no separate payment will be made for supplying and dumping of geo-bags which are deemed to have been covered in the Lump Sum rate under Bill No.11: Closure Dam, of the BoQ.

2.17 Manufacturing and Supplying Cement Concrete (CC) Blocks for Revetment/ Structure loose Apron and Slope

2.17.1 General

Pre-cast concrete blocks shall be made to the dimensions shown on the Drawings or as specified in the Bill of Quantities. The materials and workmanship shall comply with the specifications in all respect and to the satisfaction of the Engineer. Except otherwise shown on the Drawings, precast concrete blocks (cc blocks) shall be **made from concrete having minimum cylinder strength at 28**

days of 15.0 N / mm² for Hydraulic Structure and of 10.50 N / mm² for Protective Work and cast in moulds formed from steel sheet. The moulds shall be sufficiently tight fitting to prevent grout losses and sufficiently rigid to withstand the effects of placing and vibratory the concrete without distorting and capable of releasing the hardened concrete blocks without causing damages to the blocks.

2.17.2 Cement

- i) The cement used in the Works shall be Ordinary Portland Cement/Portland Composite Cement complying with BS BN 197-1:2011. The cement shall be delivered to the site of the Works in sound and properly sealed bags. The Contractor shall provide from each consignment of cement, delivered to the site, such samples as the Engineer may require for testing.
- ii) In addition to the tests required in BS BN 197-1:2011, the Engineer may also make any further tests, which he may consider advisable or necessary to ascertain if the cement has deteriorated in any manner during transit or storage. Cement showing lumps which cannot be broken to the original fineness by finger pressure will be rejected irrespective of age and shall be removed from the site.
- iii) Any cement which in the opinion of the Engineer is of doubtful quality shall not be used in the Works until it has been re-tested and test result sheets, showing that it complies in all respects with the relevant standard, have been delivered to the Engineer.

Table 2.17.2 Minimum strength of cement

Days	Compressive strength (N/mm ²)	Tensile strength (N/mm ²)
3	13	1.00
7	20	2.00
28	28	2.50

- iv) The initial setting time shall be not less than 45 minutes and the final setting time shall be not more than 8 hours. The cement when tested for fineness shall have a specific surface of not less than 160 m²/kg. The cement when tested for soundness shall not have an expansion of more than 10 mm. The unit weight of cement shall be 14.16 KN/m³.
- v) Cement shall be delivered to the work site in sound and properly sealed jute/paper bags, each plainly marked with manufacture's name or registered mark. The cement shall be protected from the weather by tarpaulins or other approved covering during transit. The weight of individual bag containing cement shall be 50 kg and weight of all bags shall be uniform. The weight of cement shall be legibly marked on each bag. Bags in broken or damaged condition shall be rejected.
- vi) Each consignment of cement delivered to the site must be accompanied by a certificate showing the place of manufacture and the results of standard tests carried out on the bulk supply from which the cement was extracted.
- vii) The Contractor shall provide waterproof and well ventilated pucca godowns at the specified or approved location at the site, having a floor of wood or concrete raised at least 450 mm above the ground. The sheds shall be large enough to allow a minimum 300mm gap between the stacked cement and the godown walls, to store sufficient cement stored to ensure continuity of work and to permit each consignment to be stacked separately therein to permit easy access for inspection. All storage facilities shall be subject to approval by the Engineer.
- viii) Immediately upon arrival at the site, cement shall be stored in the godowns with adequate provision to prevent absorption of moisture. The Contractor shall use the consignments in the order in which they are received. Cement delivered to the site in drums or bags provided by the supplier or manufacturer shall be stored in the drums or bags until used in the Works. Any

cement in drums or bags which have been opened shall be used immediately after opening. The cement shall not be stored in a godown for more than three months or a lesser period as approved or directed by the Engineer. After this period has expired, any unused cement shall be removed from the site.

- ix) The cement shall be placed in the sheds immediately upon delivery to the site and shall be used in the order in which it has been delivered. Any cement in bags which have been opened shall be used immediately after opening.

2.17.3 Coarse Aggregate

- i) The coarse aggregates shall be crushed stone chips (40 mm downgraded or as specified in the design) and well shaped. The amount of clay, fine silt and fine dust occurring in a free state or as a loose adherent shall not exceed one percent by weight. Crushed stone chips aggregates shall comply with B.S 882 - Part 2 and shall be hard, strong, durable, dense and free from injurious amounts of adherent coatings, clay, lumps, dust, soft or flaky particles, shell, mica, alkali, organic matter and other deleterious substances. The various sizes of particles of which an aggregate is composed shall be uniformly distributed throughout the mass. The aggregates shall be stored on hard and dry ground with adequate partitions to ensure the separation of different types and grading. Care shall be taken in storage to avoid inclusion of any foreign material in the aggregates. The aggregates shall be handled carefully so as to avoid segregation of various sizes within each grade. Testing of aggregates shall be in accordance with B.S 812. The Engineer reserves the right to approve or reject the sources of aggregates. No materials shall be used in the work until it has been tested and test result sheets showing that it complies with the relevant standard, have been delivered to the Engineer.
- ii) Coarse aggregates shall be well graded within the grading given in the table below: Percentage by Weight Passing Standard Sieves

Cable 2.17.3 Grading of Coarse aggregate 40 mm maximum size

US Standard Square Mesh	40 mm
50.80 mm	100
38.10 mm	95 – 100
25.40 mm	-
19.05 mm	35 – 70
12.70 mm	-
9.52 mm	10 – 30
No. 4	0 – 5
No. 8	-

Stone Chips shall satisfy the following criteria:

Water absorption as determined by STP 7.5 (or AASHTO T-85) or BS-812 shall not be more than 2 %.

The Aggregate Impact Value (AIV) shall not exceed 30% limit as per BS 812: Part 3, Chapter 6.

The percentage of wear according to Los Angeles Test shall not be more than 35 as per ASTM C535.

2.17.4 Fine Aggregates

Fine aggregates shall be non-saline and consist of hard, dense, durable materials and shall be free from injurious amounts of clay lumps, lightweight materials or other deleterious substances. No materials shall be used in the work until it has been tested and test result sheets showing that it complies with the relevant standard, have been delivered to the Engineer.

Fine aggregates shall have a fineness modulus (FM) equal to or greater than 1.5 and shall conform to the following requirements:

Table 2.17.4 Grading of fine aggregate

Sieve No.	Sieve Size (mm)	Percentage by weight passing
4	4.76	95-100
16	1.18	45-80
50	0.30	10-30
100	0.15	2 – 10
Pan	-	3 – 7

2.17.5 Water

The water used for concrete mixing and curing shall be drinkable water, clean and free from any substances injurious to the finished product. It shall be taken from an approved source and free from objectionable quantities of silt, organic matter, alkali, salt and other impurities. Whenever required to do so by the Engineer, the Contractor shall take samples of the water being used or which is proposed to be used for mixing concrete and test them in accordance with BS EN BS EN 1008:2002. No concrete shall be made with unapproved water. **Special attention in this connection is drawn to the fact that underground water at the project sites is salty and no way suitable for concreting work. So, the Contractor has to make arrangement to store sweet water by digging sufficient numbers of pond at the construction site.**

2.17.6 Formwork

Formwork and moulds shall be constructed to ensure designed uniform shapes and block sizes. They shall be of steel sheet of minimum 18 gauges with arrangement of nuts and bolts or other mechanism so that they can be easily removed in two parts without any impairment to the cast C.C. Block. Wherever any defect is noticed in a formwork should immediately be replaced as per direction of Engineer or Engineer's Representative.

2.17.7 Concrete Type

Concrete shall be of compressive strengths as shown on the Drawings or as approved or directed by the Engineer. Each mix shall be designed to ensure optimum workability, prevent segregation and produce a dense, durable concrete by adjusting the fine and coarse aggregate proportions following the procedures set out in the specification. Two types of C.C Blocks shall have to be manufactured under the contract as shown below:

2.17.7.1 CC Block for Hydraulic Structure

The Blocks will be used in the loose apron and slope of hydraulic structure shall have 28 days Cylinder Strength of minimum **15 N/mm²**

2.17.7.2

The Blocks will be used in Slope/Bank Protection Work shall have 28 days Cylinder Strength of minimum **10.5 N/mm²**

2.17.8 Mix Design

The Contractor shall prepare trial mixes having workability, strength and surface finish as criteria, to satisfy the Engineer regarding these qualities. The trial mixes shall be made and compacted in the presence of the Engineer, using the same type of equipment as will be used for the Works. Not later than 7 days before commencement of concreting operations, the Contractor shall inform the Engineer in writing about mix designs he proposes to use, and his target slumps for the various Items. These trials shall not cease until the Contractor has demonstrated that the requirements of these Specifications have been met.

The margin of the trial mix should be taken as 1.5 times of the characteristics strength of the concrete. Twelve concrete cylinder samples shall be made from the trial mix in the presence of the Engineer. The concrete cylinders shall be made, cured, stored and tested in accordance with BS 1881. Six cylinders shall be tested at 7 days and six cylinders shall be tested at 28 days. If the strength of any of the cylinders tested at 28 days is below the characteristic strength, the Contractor shall redesign the mix, make further preliminary mixes for the Engineer's approval, then undertake additional trial mixes and test the resultant samples until a satisfactory mix is obtained and approved by the Engineer. The trial mix proportions should be approved if the required strength is obtained from tests carried out and the consistency and surface is to the satisfaction of the Engineer.

When a mix has been approved, no variations shall be made in the mix proportions, or in the type, size, grading zone or source, of any of the constituents without the consent of the Engineer, who may require further trial mixes to be made before any such variations are approved.

2.17.9 Mixing of Concrete

All concrete shall be mixed in modern mechanically operated mixers capable of combining aggregate, cement and water into a uniform mixture and discharging without segregation. The mixer machine without hopper shall not be allowed for mixing and wooden box shall have to use to discharge coarse and fine aggregate into the hopper. Unless otherwise permitted by the Engineer, hand mixing of concrete is prohibited. Mixing should be done thoroughly to ensure that concrete of uniform color and consistency is obtained. Mixing time shall be at least one minute after the last ingredient has been added to the mixer or so much more time as may be recommended by the Engineer. Specified vibrator shall be used in casting of the blocks. The forms of CC blocks shall not be opened before 24 hours or as approved or directed by the Engineer. Honey combed or damaged blocks shall not be acceptable.

2.17.10 Water Cement Ratio

The maximum water cement ratios specified shall be the ratios by weight of free water to cement in the mix based on the aggregates being in a saturated surface dry condition. The Contractor shall test aggregates for moisture content and so determine the water/cement ratio of the fresh concrete. Water cement ratio shall not exceed 0.45, unless otherwise indicated in the Drawings or approved by the Engineer. Throughout concrete production the actual water cement ratio shall be strictly monitored and the batch quantities of aggregates and water regularly adjusted to maintain the design water cement ratio. Determinations of water/cement ratio shall be carried out as required by the Engineer and the calculations submitted to him.

2.17.11 Slump

The Contractor shall make available required number slump cone at site. The Contractor shall undertake slump tests of the freshly made concrete in accordance with BS 1881 and the slump shall be within the range of 50 to 100 mm unless otherwise indicated in the drawings or approved by the Engineer. If the range does not comply with the mix, it should not be used. Slump tests shall be carried out on each batch of concrete of 25 m³ or as approved or directed by the Engineer. The records of slump tests result shall be maintained in a register and be made available to inspection.

2.17.12 Concrete Test Cylinders

The sampling of concrete for preparing Concrete Test Cylinders shall, where possible, be undertaken at the place of concrete mix. Each sampling shall provide sufficient concrete to make 6 (six) cylinders and allow a slump test. Samples shall be taken for each 50 m³ for blocks of concrete batched or at a frequency agreed by the Engineer.

The cylinders shall be cured properly and tested in the Site Laboratory. If the Engineer for his satisfaction desires to test the Concrete Cylinders at any recognized Laboratory other than Site Laboratory, the Contractor shall make such arrangements. All cost of such tests shall be borne by the Contractor.

2.17.13 Non-destructive Testing

The Contractor shall provide on site a 'rebound' (Schmidt or similar) hammer duly calibrated from reputed designated laboratory for checking the in-situ strength of the concrete for use by the Engineer. Testing shall be carried out frequently or at the frequency and in the locations approved or directed by the Engineer. The field test may be taken by rebound hammer on blocks; the strength should be **>15.0 N/mm² and >10.50 N/mm² at 28 days** for Structural Blocks and Protective Works Blocks respectively. Any concrete blocks found to be of strength less than specified will be removed from the Works site and have to be replaced by the Contractor.

2.17.14 Casting of C.C Block

CC Blocks Casting/Concreting yards should be leveled well compacted ground with neat sand-cement mortar finished brick soling/lean concrete finish over it. Casting Moulds/Forms are to be placed over thick polythene sheeting to prevent leakage through bottom of the shutter. Inner sides of the Moulds/Forms are to be cleaned and oiled before each batch of casting operation takes place.

Mixing of concrete shall be done by modern automated mixing plant/machine. Unless otherwise permitted by the Engineer, hand mixing of concrete is prohibited. Mixing should be done thoroughly to ensure that concrete is of uniform color and consistency.. The concrete shall be placed in the Moulds/Forms in full and be thoroughly compacted by vibrators supplemented by hand spading and tamping. In no way the vibrator should touch the Mould/Form during vibration operation. The vibrators shall at all times be adequate in numbers to compact the concrete properly and quickly throughout the whole operation of Block casting in each batch. The duration of vibration shall be limited to that required to produce satisfactory compaction without causing segregation. Care should be taken that no leakage of cement mortar takes place. After compaction the exposed concrete at top surface shall be struck off smooth with hand held steel floats.

The Moulds/Forms shall not be opened until the concrete is firmly set. Honey combed or partly damaged blocks shall not be acceptable

The contractor shall arrange all land required for the CC Blocks Casting/Concreting yards, preparation of yard with brick soling, polythene sheeting, oiling of Moulds / Forms etc for which no extra cost will be paid. All compensations in this regards are deemed to have covered by the BoQ item "Cement Concrete Blocks (CC Blocks)"

2.17.15 Curing Concrete Blocks

Concrete Blocks shall be protected from the effects of sunshine, dry wind, rain, running water or mechanical damage for a continuous period, until the concrete has reached at least three quarters of its 28 day strength, but for not less than 10 days. The Contractor shall submit his proposals to achieve this protection for Engineer's approval. The water used for concrete curing shall be fresh water, clean and free from any substances injurious to the concrete. The use of saline water for curing purposes will not be permitted. Curing and protection of concrete may be done following the methods:

- (i) By water spray in continuous operation or a layer of water;
- (ii) By covering with Hessian or similar absorbent material, or sand, kept continuously wet;
- (iii) After thorough wetting, by covering with a layer of water proof fabric kept in contact with concrete surface;
- (iv) All materials spray equipment and an ample supply of water for curing shall be ready on site before manufacturing of Precast C.C Block starts. C.C Blocks that is, in the opinion of the Engineer, not cured according to the approved curing procedure will be regarded as inferior and shall be dealt with as damaged blocks.

2.17.16 Numbering of Blocks

Each block shall be marked with a consecutive number and the date of casting. The Contractor shall maintain a manufacturing register with signature of quality control personnel. The number, date of casting, date and location of placing of each block shall be recorded in the register and shall make the register available at all times for inspection by the Engineer.

2.17.17 Stockpiles of Blocks

Blocks shall not be stockpiled until they have been cured for at least 21 days. They should be stockpiled with consecutive numbers and in measurable stack. The stacks shall not contain more than 4 layers and shall not be stacks very closed to the riverbank.

2.17.18 Damaged Blocks & Rejected Blocks

Blocks which are found unspecified through visual inspection by the Engineer or his representative shall be rejected. If laboratory test result are found not conforming to the desired strengths, all the Blocks manufactured on the day representing the date of sample of collection shall be rejected (all the Blocks manufactured on the date representing the Test). All Those Blocks shall be stacked separately. Blocks which are damaged during stockpiling, transport or handling and shall be rejected and stacked separately. The Contractor shall remove those rejected and damaged Blocks from the site within 24 hrs. ordered by the Engineer. The contractor has to supplement the damaged or rejected number of blocks at his/their own cost.

2.17.19 Schedule of Test

Following Test shall be carried out at the frequencies shown in the Table to check the properties of construction materials (Cement, Sand, Gravels, Admixture), Concrete Blocks as per specifications;

Sl No.	Name of Test	Frequency of Test	Test Method
1	<u>Cement:</u> i. Fineness ii Soundness iii Initial Setting Time and Final Setting Time iv Compressive Strength v Tensile Strength vi Unit Weight	1 For each fresh Consignment arriving at Site 2 For each 100 M. Ton 3 As approved or directed by the Engineer	ASTM C786, ASTM C 403, ISO 679:2009 or Equivalent
2	<u>Fine Aggregate(Sand)</u> i Fineness Modulus ii Chemical Test	1. 1(one) Sample for each 350 Cum or part thereof 2. At least 1 Sample in a week 3. As approved or directed by the Engineer	ASTM C 33 or Equivalent

3	<u>Coarse Aggregate (Stone Chips)</u> i Gradation Test ii Water Absorption iii Aggregate Impact Value (AIV) iv Loss Angeles Test	1. 1(one) Sample for each 700 Cum or part thereof 2. At least 1 Sample in a week 3. As approved or directed by the Engineer	ASTM C330 , AASHTO T-85 , BS-812, ASTM C-535 or equivalent
4	<u>Water</u> Suitability of Water for Concrete Mixing	1. For each source of Water 2. As approved or directed by the Engineer	BS EN BS EN 1008:2002
5	<u>Concrete</u> i Slump ii Water Cement ratio iii Cylinder Test (Compressive Strength) v Non-destructive Test (Rebound Hammer) iv Concrete Core Test	1 One set of Cylinder (One set comprises 6 Nos. Test Cylinder) for each 50 cum or part thereof of fresh concrete produced with correspondence Slump and Water Cement Ratio 2 Rebound Hammer Test will be carried out as frequent as the Engineer considered 3 Concrete Core Test will be carried out if any Test Cylinder fails to pass the specified strength 4 As approved or directed by the Engineer	BS 1881 , ASTM C-42 Or similar standard

2.17.20 Measurement

Measurement of concrete blocks shall be made on blocks in numbers (size-wise) casted, cured and stockpiled and accepted. Separate Items for manufacturing of C.C Blocks for the two types of C.C Blocks have been provided in the BoQ.

2.17.21 Payment

Payment shall be made in number at the unit rate of block (size-wise) against the Items for two types of CC Blocks as included in the Bill of quantities.

2.18 Supplying of Hard Rocks

2.18.1 General

Hard rock shall conform to the sizes/weights and grading shown on the Drawings. The material shall not be polluted, and shall be free from objectionable quantities of dirt, sand, dust and elongated or flaky stones. The ratio between the smallest and largest dimension of single stone shall generally be not less than 0.4.

The hard rock shall be free from cracks and veins, which could lead to breakage during loading, unloading and dumping. The bulk specific gravity of the boulder shall have a minimum value of 2700 kg/m³ as per BS 812; part 2, chapter 6.

The weighted average loss of materials in the sodium sulphate soundness test shall not be more than 10% by weight in accordance with ASTM C88. The percentage of wear as determined by the Los Angeles Test shall not be more than 40 as per ASTM C535. The Aggregate Impact Value (AIV) on average shall not exceed the 30% limit included in BS 812; Part 3, Chapter 6.

The Contractor shall procure the hard rock, conforming to the specifications, from any source(s) inside Bangladesh (Including Maddhyapara Hard Rock Mining Project, Dinajpur) or outside Bangladesh. The Contractor shall, for the Engineer's prior approval, submit test report of the Hard Rock from the proposed quarry furnishing full details thereof. Whatever the source be, the Contractor shall be fully responsible for supplying the hard rock as per specifications under any situation. All import taxes and other incidental expenditure, where applicable, are deemed to have been covered by the Item "Supplying and measureable stacking of hard rock of specified size, ranges at work site" included in the BOQ, Item No.9.05 of Bill No.9. The Employer for imported hard rock will make **no** separate payment for CDST and other taxes levied.

2.18.2 Size and Void

The following size of rock shall be used in development of launching apron of river bank revetment work shall be considered to have void as shown below;

Rock size: 30 cm to 40 cm. (Void = 20%)

2.18.3 Procurement Schedule

The Contractor shall have to furnish the procurement schedule mentioning quantity of materials to be procured in each consignment with definite period. The contractual quantity of hard rock shall have to be procured by maximum three consignments. No measurement shall be taken unless one third materials is procured and stockpiled at site.

2.18.4 Measurement

Measurement of Hard Rock shall be made on Cubic Meter procured and stockpiled at site. The respective percentage of void shall be deducted from the measured volume for payment. The stack-wise measurement shall be recorded in a register duly signed by Contractor and the Engineer or his representative. The measured stack shall be fully coloured using power spray and permanent colour for clear distinguishing between measured and unmeasured stack of Hard Rock at site.

2.18.5 Payment

Payment shall be made at the unit rate per Cubic Meter as included in the Bill of quantities, Item No.9.05 of Bill No.9. The unit rate shall include all cost of hard rocks (including custom duties, all other taxes, if any, and other incidental cost), transportation to site, stacking, testing etc. and all other compensations.

2.19 Supplying & Laying Geo-textile Filter

2.19.1 Geo-textile Fabric

All geo-textile fabric shall meet in full the requirements of Physical, Mechanical and Hydraulic properties. The geo-textile manufacturer must be ISO 9001 certified by an accredited register. Geo-textile in standard rolls shall be clearly marked at regular intervals (every square meter or continuous marking at 1 m distance) with the product name and grade. Marking in every 100 sqm. is required to identify the supplier. Each roll of geo-textile shall be protected in a plastic foil wrapper, clearly labeled with the roll number, production of lot number and description of the product, product name, grade and manufacturers details. Geo-textile filter shall be extended up to 1000 mm below LWL. Geo-textile filter shall be protected from ultra violet ray and any sort of damage during handling and placing.

The geo-textiles shall be manufactured from polypropylene or polyester fabric and shall be non-woven needle-punched and not solely thermally bonded. The thermal bond shall not influence the flexibility under water. The required porosity of geo-textile shall be minimum 80%. Porosity is a calculated value out of tested material characteristics and the specific weight of the fibers.

2.19.2 Specification

The geo-textiles shall be manufactured from polypropylene or polyester fabric and shall be non-woven and needle punched and not solely thermally bonded. The thermal bond shall not influence the flexibility of the sand bags including their launching behavior. The Geo-textile shall comply the following properties:

SI	Test Parameter	Standard Value
1	Mass per unit area	=>400 gm/ m ²
2	Thickness under a pressure of 2 kPa	=>3 mm
3	Apparent / Effective Opening size	=>0.08 mm
4	Horizontal Permeability	=> 3 x 10E ⁻³ m/sec
5	Vertical Permeability	=> 4.5 x 10E ⁻³ m/sec
6	Grab Tensile Strength	=>1500 N
7	Strip Tensile Strength	=>23 KN / m
8	CBR Puncture Resistance	=> 3800 N
9	Elongation at maximum force (machine direction MD)	=>60% and <=100%
10	Elongation at maximum force (CMD)	=>40% and <=100%
11	Permeability (Velocity Index for a head loss of 50 mm- V _{H50})	=> 2 x 10 ⁻³ m/sec
12	Ultra-Violet (UV) Resistance	=>70% of original tensile strength before exposure

2.19.3 Testing Geo-textiles

- i) Geo-textile delivered at site should be certified by ISO with brand name.
- ii) The properties of geo-textile to be delivered at site shall be tested at BRTC, BUET according to relevant test standard given in the specification.
- iii) Tests shall be carried out from each quantity of 10,000 square meter of geo-textile fabric supplied. Seams shall be tested for tensile strength every 10,000 m of seam.
- iv) The sample size for the fabric shall be 2 m² and shall be marked to indicate its upper side, longitudinal and transverse directions, type of geo-textile and the date that the sample was taken. Seam samples shall be at least one meter in length and the ends of the threads are to be firmly tied off by the Contractor or Supplier at the time the samples are taken. Each test shall be carried out on at least three samples.
- v) The Contractor shall bear the expenses of all routine tests. Notwithstanding the submission of reports to the effect that the geo-textile conforms to the Specification, the Engineer shall at all times be entitled to have additional samples of geo-textile tested if he is of the opinion that the geo-textile does not conform to the Specification. The Engineer shall only select samples from any lot procured at site by the contractor.

2.19.4 Construction

The Geo-textile fabrics shall be placed above the inverted filter on the surface of slope of embankment / river bank as per design and drawing. The fabric shall be placed in position, providing machine seamed joints (with 100% polypropylene or nylon thread) or minimum 35 cm lap in dry condition and minimum 100 cm lap under water including protecting the geo-textile materials from UV sun ray and from any other damages.

2.19.5 Measurement

Measurement of item geo-textile filter shall be made based on the area in square meters measured parallel to the face on the slopes as shown on the drawings or as approved or directed by the Engineer. No additional payment will be made for fabric used to provide specified laps.

2.19.6 Payment

Payment of item of Geo-textile Filter Fabric shall be at the unit rate per Square Meter as included in the Bill of Quantities.

2.20 Supplying & Laying Sand Filter

2.20.1 General

The fine filter shall consist of natural sand of FM 1.0 to 1.5 or as specified in the drawing. The material shall not contain any flint, chip or lime. The quantity of silt, clay and dust, determined in accordance with the decantation method given in BS 812, shall not exceed 3% by weight of the sample. The content of mica shall not exceed 3% by weight of the sample. The material shall not contain any deleterious material in such form or in sufficient quantity as to affect adversely on the geo-textile filter above.

2.20.2 Construction**2.20.2.1 For Structure Loose Apron & Slope**

The foundation for the sand filter shall be thoroughly compacted and graded to the elevations shown on the Drawings prior to the placement. The filter material shall be placed in a uniform layer of the thickness shown on the drawing or approved or directed by the Engineer. Minimum 150 mm thickness of sand or as specified in the drawing having FM **1.0 to 1.5** shall be placed on prepared, well dressed and compacted bed and slope/surface.

2.20.2.2 For Protective Work

The foundation for the sand filter shall be thoroughly compacted and graded to the elevations shown on the Drawings prior to the placement. The filter material shall be placed in a uniform layer of the thickness shown on the drawing or approved or directed by the Engineer. Minimum 100 mm thickness sand or as specified in the drawing having FM **1.0 to 1.5** shall be placed on prepared, well dressed and compacted slope/surface above LWL.

2.20.3 Measurement

Measurement of item sand filter shall be made in cubic meter. Separate Items for supplying and laying of sand filter for structure and protective works have been included in the BoQ

2.20.4 Payment

Payment of item Sand Filter for structure and protective works shall be made at the unit rate per Cubic Meter against separate items as included in the Bill of Quantities.

2.21 Supplying & Laying 1st Class/Pick Jhama Chips as Filter**2.21.1 General**

Coarse (aggregate) filter materials shall be made from first class /picked jhama bricks. The bricks shall be sound, hard and well burnt, uniform in size, shape and color, homogeneous in texture and free from flaws & cracks. A fractured surface shall show a uniform compact structure, free from holes, lumps or grits. The unit weight shall not be less than 1100 kg/m³; minimum crushing strength 14 N/m² and above; increase in weight after one hour absorption in water shall not more than 15% of dry weight. Any dust or fine materials below 5mm size are to be removed by screening and be thoroughly washed by an approved method.

2.21.2 Construction**2.21.2.1 Hydraulic Structure Loose Apron and Slope**

The aggregate filter materials shall be laid on two layers of equal thickness or as shown in the drawings. The filter material in the bottom layer of thickness 100 mm shall be well graded between 5 to 20 mm and the filter material at the top of thickness 100 mm shall be well graded between 20 to 40 mm in accordance with the grading shown on the drawings.

2.21.2.2 Protective Work

The aggregate filter materials shall be laid on two layers of equal thickness or as shown in the drawings. The filter material of thickness **100 mm /150 mm** (40mm to 20 mm well graded at top & 20mm to 5mm at bottom) shall laid in accordance with the grading shown on the drawings.

2.21.3 Measurement

Measurement of item Khoa filter shall be made in cubic meter. Separate Items for supplying and laying of khoa filter for structure and protective works have been included in have been included in the BoQ

2.21.4 Payment

Payment of item Coarse Filter or Khoa filter shall be at the unit rate per Cubic Meter as included in the Bill of Quantities.

2.22 Placing/Laying of Cement Concrete(CC) Blocks

2.22.1 General

The CC blocks shall be placed on the loose apron of structure and on slopes for both structure and protective works to cover the surface over a geo-textile fabric filter and granular filter underneath in the profile shown on the drawing. For the **revetment works**, placing shall commence from the most upstream part of the eroded bank, based on a chainage to be furnished by the Engineer. The toe foundation shall be either excavated or built up to the lines and levels shown on the drawing. The placing of blocks shall start from the toe and progress up the slope at the segment where launching apron of protective work/loose apron of hydraulic structure has been fully developed as per design.

The blocks shall be laid in manner so as not to damage or displace the underlying filter. Any damage caused to the filter during placing of the blocks shall be repaired by the Contractor at his own cost and to the satisfaction of the Engineer. The entire outer face of the slope of structure revetment shall have a smooth and even appearance. For bank protective work the outer face above LWL shall have a smooth and even appearance.

During the placement of the blocks, the underlying filter shall not be disturbed by removing or denting a portion thereof by any manner harmful to the filter. Any damage to the filter during overlaying shall be repaired by the Contractor at his own cost.

The outer surface of the completed revetment shall have a smooth appearance with minimal unevenness.

The inverted filter layers and CC blocks placement shall start from the toe and progress up the slope of the embankment/dyke.

The fine filter layers shall be placed and lightly tamped into place, followed by the coarse filter layer which shall be sufficiently compacted to support the overlaying material.

The inverted filter shall not advance more than 1 m up the slope before being covered by the specified overlaying material to assist placement and prevent damage to the filter layer.

The CC block shall be laid on the filter in rows parallel to the direction of the current. The blocks in each row shall be staggered half a block width from those in the row below. Adjacent blocks in the same row shall be laid with a gap between them of the minimum dimensions given below:

Block Size	Gap (mm)
0.60 m and less	10
larger than 0.6 m	15

2.22.2 Measurement

Measurement of item Placing Concrete Blocks shall be made in cubic meter based on the numbers of Blocks used to cover the area as shown in the drawing.

2.22.3 Payment

Payment of item Placing Concrete Blocks shall be at the unit rate per Cubic Meter as included in the Bill of Quantities.

2.23 Dumping of Hard Rocks/ Boulders/CC Blocks

2.23.1 General

The revetment works shall commence from the most upstream part of the eroded bank, based on a chainage to be furnished by the Engineer. The toe foundation shall be either excavated or built up to the lines and levels shown on the drawing.

2.23.2 Stockpile of Rocks/Boulder/CC Blocks

Hard Rocks/Boulders/C.C Blocks for use in launching aprons shall be stockpiled in different sizes and in the percentages shown on the Drawings to the satisfaction of the Engineer. Prior to the commencement of placing / dumping the Hard Rocks/Boulders/C.C Blocks, the Contractor's proposal to ensure that the different Hard Rocks/Boulders/C.C Blocks sizes are well distributed shall have been approved by the Engineer. If required, the effectiveness of the Contractor's proposal shall be demonstrated to the Engineer.

2.23.3 Dumping Plan

The contractor shall have to prepare a Dumping Plan, conduct bathymetric survey, mentioning global positional coordinate based on the bathymetric survey using applicable software and submit to the Engineer for approval prior to commencement of dumping work. The dumping plan shall be prepared following the length of dumping pontoon. Each dumping plan consists of at least one fourth of the contractual revetment length. Once dumping started in a segment, it must be completed prior to start dumping in another segment.

2.23.4 Methodology of Dumping of Hard Rocks/Boulders/C.C Blocks

The rock/boulders/CC Blocks dumping shall be performed using flat top barge, anchored and positioned by double drum mooring winch. Rock/Boulder/C.C Blocks for use in launching apron shall be stockpiled to the satisfaction of the Engineer. Prior to the commencement of dumping, the contractor proposal to ensure the quality & quantity shall have to be approved by the Engineer. Dumping of rocks below low water level must start early December or at such time while river attains its LWL and must be accomplished no later 30 April or as specified in the design. The entire revetment / protective work length shall be divided into suitable panels or batches and dumping area shall be delineated by GPS coordinate using total station. Dumping shall be done in suitable batches / panel simultaneously in continuous reach with the aid of barge or floating pontoon. The material of each batch / panel shall be stored in several stacks. After full development of launching apron of each batch / panel as per design, then dumping of new batch / panel can be started.

2.23.5 Dumping Records

The contractor shall maintain dumping register duly signed by the Engineer or his representative. The quantity of rocks/boulder/CC Block to be dumped shall be recorded in the register with date and shall make the register available at site for inspection. The dumping volume will be checked by taking Pre-work and Post-work cross sections. The dumping area shall be verified by engaging divers who identify the uncovered area through installation of buoy. The contractor shall take immediate action to cover the identified bare area through dumping Hard Rocks/Boulders/C.C Blocks.

2.23.6 Measurement

Measurement of Dumping of Hard Rocks/Boulders/C.C Blocks shall be the same quantity (stack-wise) in cubic Meter as measured, coloured, recorded in the certified register. A cross checking will be made between the quantity actually supplied/manufactured and the quantity dumped taking accounts of the existing quantity (if any).

2.23.6 Payment

Payment shall be made at the unit rate per cubic meter as included in the Bill of quantities.

2.24 Backfill to Hydraulic Structure

2.24.1 Specification

Structural backfill consists of furnishing, placing and compacting fill material around structures and other appurtenance to the lines and grades shown on the Drawings or approved or directed by the Engineer. Prior to placing backfill, all trash, metal, debris, lumber, bricks, soft materials and similar objectionable foreign materials shall be removed from the area to be backfilled.

No backfill shall be placed in standing water, on surfaces that are excessively soft, wet or against concrete structures that have not cured for at least fourteen days or such other period as may be approved or directed by the Engineer.

Structural backfill shall be compacted by mechanical means to attain 30% relative density. Fill shall be placed in horizontal uniform layers of the following thickness:

- ☐ Mechanical compaction - 230 mm of loose material.

Before compaction, each layer shall be moistened or aerated to provide suitable conditions for compaction. Mechanical compaction shall only be undertaken by equipment approved by the Engineer.

Unless shown otherwise on the Drawings, backfilling behind abutments, wing walls and retaining walls shall be with sand of Fineness Modulus (FM) not less than 0.80 approved by the Engineer.

2.24.2 Measurement

Measurement of item Backfill of Hydraulic Structure shall be made on Cubic Meter on the basis of pre work and post work measurement

2.24.3 Payment

Payment shall be made on measured volume at the unit rate as included in the Bill of Quantities.

2.25 Sand Filling in Foundation of Hydraulic Structure

2.25.1 Description

This work consist of filling in foundation trenches or any other places by furnishing, placing, compacting and shaping suitable sand of acceptable quality and **F.M $\geq$ 1.00** to make up levels to the lines, levels, grades, dimensions and cross sections in accordance with these specifications and as shown on the Drawings or BOQ and/ or as instructed by the Engineer.

2.25.2 Materials

Materials shall be of natural sand free from vegetable matters, soft particles and clay having **F.M $\geq$ 1.00** or as shown in the Drawings. All fill materials shall be stockpiled outside the working areas. Materials shall be tested and approved by the Engineer.

2.25.3 Construction

The original ground surface should be prepared by scarifying, watering / drying if necessary and compacted. Sand fill shall be placed on the desired place in horizontal layers and each layer shall not exceed a loose thickness that will be required to obtain a compacted thickness of 150mm. All fill materials shall generally be compacted mechanically.

Sand fill shall be compacted by mechanical means to attain minimum 50% relative density. Fill shall be placed in horizontal uniform layers of the following thickness:

- Mechanical compaction - 230 mm of loose material.

Before compaction, each layer shall be moistened or aerated to provide suitable conditions for compaction. Mechanical compaction shall only be undertaken by equipment approved by the Engineer.

2.25.4 Measurement

Measurement shall be taken on compacted volume of completed and accepted work in cubic meters. The cross section to be used will be the areas bound by the original ground shaped or leveled, the sides and the bottom of the foundation.

2.25.5 Payment

Payment shall be made on measured volume in Cubic Meter at the unit rate as included in the Bill of Quantity.

2.26 Manufacturing & Installation of Vertical Lift Gate, Hoist & Shutter

2.26.1 MS work in plates

Angles, channels, flat bars, Tees etc. includes fabricating, machining, cutting, bending, welding, forging, drilling, riveting, embedding anchor bars, staging and fitting fixing, local handling etc. complete as per design, specification and direction of Engineer.

Standards of steel and other metalwork shall comply with the following standards. This list is given for the Contractor's guidance and shall not be taken as exhaustive.

Structural Steel Sections (Part 1: Hot rolled sections)	BS 4
Steel Wire Ropes	BS 302
Covered Electrodes for the Manual Metal-Arcs Welding of Mild Steel	BS 639
Black Hexagon Bolts, Screws and Nuts	BS 4190
Steel Tubes and Tubular suitable for Screwing to BS 21 Pipe Threads	BS 1387
Phosphor Bronze Ingots and Castings	BS 1400
Carbon Steel Plate, Sheet and Strip	BS 1449
Grey Iron Castings	BS 1452
Steel Tubes for Structures	BS 1775
Arc Welding of Carbon Manganese Steels	BS 2642
Cast Steel for General Engineering Purposes	BS 3100

Weldable Structural Steels	BS 4360
Weldable Structural Steel Sections	BS 4848
Metal-arc Welding of Carbon and Carbon Manganese Steels	BS 5135

2.26.2 Nuts and Bolts

Bolts, rag bolts, nuts and washers shall conform to BS 4190 as regards dimensions. Each bolt shall be provided with two washers and shall be long enough to show a full thread through the nut after fixing. External bolts and fixing rag bolts, nuts and washers shall be sheradised steel. Assemble nuts, bolts and washers or galvanized fittings or equipment shall be either galvanized or sheradised.

2.26.3 Steel Plate

Steel Plates, shapes and bars shall conform to ASTM Designation A 36 or approved equal.

2.26.4 Water Level Gauges

Water Level Gauges shall be made from mild steel and be coated with vitreous enamel. All cutting, drilling and punching of the plates shall be completed before the vitreous enamel is applied.

The steel shall be machined smooth and be thoroughly cleaned to remove all rust, scale dirt and grease before enameling. The vitreous enamel shall have a minimum thickness of 0.5 mm on the numerical side and 0.25 mm on the reverse side and where the steel has been cut, punched or drilled.

The face of the gauge shall be white and numeral and graduations shall be dark blue. Graduations shall be sharp and accurate to the dimensions shown on the Drawings or as approved or directed by the Engineer.

The Water Level gauges shall be extended from design bed level to about 2 meters above design full supply level and the zero level on each gauge shall be the design bed level. The reduced level for the zero gauge shall be shown on each gauge.

2.26.5 Welding

Welding shall be metal-arc welding complying with the requirements of BS 5135 as appropriate. All welds shall be continuous. The Contractor shall supply samples to the Engineer when required by him for examination or test. All weldable structural steel shall comply with the requirements of BS 4360 and shall be the grade of steel as specified hereinafter, or on the Drawings.

2.26.6 Gates and Hoists

This work consists of manufacturing and supplying of M.S. vertical lift Gate shutter, manufacturing and supplying and installation of pedestal type lifting device for slide gates, fitting & fixing of gate shutter and lifting device using the steel of the grade, type and size shown in accordance with these specifications and in conformity with the requirements shown on the Drawings.

Each gate shall be designed to withstand and operate against the seating head of water specified on the relevant Drawings with no water downstream and of being raised clear of the orifice soffit.

Each gate shall consist of framing incorporating guide grooves, sealing faces and a spindle guide bracket supporting members specified on the Drawings, movable gate leaf with sealing faces and operating gear.

A list of standards is given below as guidance for the materials to be used in manufacturing of Gates/Stop logs and hoists. A Contractor is permitted to use any standard equivalent to the specified one only after taking approval from the Engineer.

Hot Rolled Steel (Flats, Structural shapes, Plates)	ASTM, A 36 or BS 4848
Cold Rolled Steel (Shafting)	AISI, 1035 or BS 2994
Carbon Steel (Bots, Nuts, Fasteners)	AISI, 1015
Stainless Steel (Stem, Stem Coupling)	AISI, 303
Cast Iron (Housing, Gear, Shield)	ASTM, A48
Cast Steel (Wheel/Roller)	ASTM, A148
Phosphor Bronze (Bush, Bearing)	ASTM, B139C

2.26.7 Vertical lift Gate:

Manufacturing and supplying of M.S. vertical lift Gate of shutter should be of 10 mm thick M.S. skin plate, , horizontal main beam , top and bottom beam , end vertical beam, Vertical stiffener etc as per design and specification and as approved by the Engineer..

2.26.8 Wheel Type Lifting Device:

Manufacturing and supplying and installation of Wheel Type Lifting devise of 750 mm dia , SS SQ Thread Lift Screw, 30 mm Ø, Bronze Lift Nut 20/100Ø, H=183 etc, as per approved design including supply of all components, labors with approved paint where necessary etc. complete including the cost of all materials as per specification and direction of the Engineer.

2.26.9 Fitting/Fixing Gates:

Cost includes the charge for fitting & fixing gates of different size (1.95mx1.65m or 1.65mx1.35 m or as specified in the design or approved or directed by the Engineer) including making holes in concrete for hooking arrangements with supply of necessary materials, tools and other accessories required for fitting the same to regulator/ sluice and mending the damages with CC (in same proportion of parent concrete), removing the spoils etc. complete including the cost of all materials as per direction of Engineer

2.26.10 Bushing:

Wheel bearing of fixed wheel gates shall be provided with self lubricating bearings in accordance to the Drawings. All other bearings and bushes shall be provided with grease ways and proper grease fitting for preventive maintenance.

2.26.11 Wheel assemble and Rail

Wheel assemblies, wheel pin and hinges shall have self lubricating bearing. Wheels Bearings (bronze), wheel pins, etc, shall be assembled before being installed in the gates. The wheel pin shall be a cantilever type with the eccentric portion of it being properly aligned with the wheel tread faces (the) eccentricity of pin has not been shown in the drawing). If the contractor wants to use self-aligning roller bearings for this cantilever pin, he will have to make other necessary corrections in the wheel assembly and shall have to submit detailed drawings in detail for approval by the Engineer.

Standard rails. On which the wheels roll, shall be in accordance with the Drawings.

2.26.12 Neoprene Rubber Seals

Neoprene Rubber Seals shall be molded solid sections of the musical note type to the dimensions shown in the Drawings. The material shall be a compound of natural rubber or a copolymer of reinforcing carbon black, zinc oxide, accelerators, antioxidants, vulcanizing agents and plasticizer. The physical Characteristics shall meet, the following specification:

Tensile strength	20 N/mm ²
Elongation at break	45%
300% modules	6 N/mm ²
Durameter hardness (shore type A)	60-70
Water absorption (max)	5% by weight
Compression set	30%
Tensile strength after oxygen bomb	
Against ASTM D572	80% of tensile strength
Tensile strength of vulcanized joints	10 N/mm ²

The seals shall be molded in one piece for each straight length, without the inclusion

2.26.13 Fabrication

Components supplied shall be in good condition and marked as per fabrication drawings for easy checking

Before being assembled, all the components shall be in good condition. If twisted or bent or damaged in any way they must be repaired/replaced, according to the Drawings and as instruction of Engineer, before assembly.

All tolerance and allowances for metal fits shall conform to the approved standard Journals and sliding surfaces shall be polished and finished with sufficient smoothness and accuracy to ensure proper operation when assembled.

Cutting shall be by machine, by sawing or by oxy-acetylene torch. Oxygen cut edges must have all gouges removed by grinding. All outside corners shall be clean and with a radius of the right dimension.

Pin holes shall be bored to gauge, smooth and straight, and at right angles to the axis of the member. Boring shall be done after the member is securely fastened in position.

2.26.14 Embedded Metal work

Metalwork component to be cast into the structures shall be fabricated as per the Drawing. Unless indicated on the Drawings, the components shall not be painted but prepared in accordance with direction of Engineer and then firmly secured in position prior to concreting.

The contractor shall plan his concreting work so as to avoid risk of knocking or damaging the components. Second stage concreting shall be undertaken in accordance with design

Exposed surface second stage casting work shall be painted according to direction of Engineer. Welding during positioning of parts shall be carefully, so that, vertical and horizontal levels of the exposed surfaces may not be disturbed due to heat, generated at the time of welding.

Rubbing surfaces shall be cleaned before installation gates or stop logs.

2.26.15 Tolerances

Tolerances for sealing surfaces, guides etc shall be selected to prevent over stressing of the gate parts and to effect watertight seal. Tolerances for machined and fitted parts shall comply with the requirements of the specifications or standards. All tolerances and means of adjustment shall be defined on the contractor's drawings and be subject to the Engineer's approval.

2.26.16 Tests

Tests will include the assemble of components in the manufacturing shop as well as on site.

All tests performed at shop or at site shall be witnessed by the Engineer or his representative and results recorded. If any defects are discovered, they shall be remedied and the tests repeated until satisfactory results are obtained.

2.26.17 Gates/Stoplogs

The gates and stoplogs complete with seals, guides and fixed wheels wherever applicable, shall be assembled so as to attain a tight and water proof sealing at the base, at the top and at sides. The lifting and lowering of gates and stoplogs should be achieved from the deck without under resistance. Except where water sealing is required, all metal to metal contact surfaces must be lubricated by the contractor during test operations. Any defects observed shall be corrected promptly and the test repeated. Any damage to the gate or components during test shall have no extra cost.

2.26.18 Slide Gates

Care shall be exercised during the installation of embedded metalwork and gate guide to obtain proper alignment and insure that the appropriate components are plumbed. The frames and wedges shall be adjusted as required to assure that the gates will slide freely and seat uniformly. Care shall also be exercised to prevent warping, racking, bending or other damage to the gate or components. Following installation and placement of second stage concrete, the gates shall be operate manually to demonstrate satisfactory installation and operation.

2.26.19 Stoplogs

The contractor shall handle and store the stoplogs safely and securely from the time they are delivered to site until the time they are accepted by the Engineer. The installation of the stoplogs shall be performed in a workmanlike manner, and care shall be exercised to insure that the stoplogs seat in the stoplog grooves uniformly to the satisfaction of the Engineer.

2.26.20 Hoists

Before assemble and installation, all bearing surfaces, grease and oil grooves shall be carefully cleaned and lubricated with approved oil and grease.

2.26.21 Slide Gate Hoist, Stems and Guides

The contractor shall install hoists on each slides gate as well as seams and stem guides as shown on the Drawings. Approved manufacturer's installation shall be strictly observed. Prior to acceptance, the hoist shall be lubricated and operated through a complete cycle of opening and closing of the slide gate to demonstrate satisfactory installation and operation under design load.

2.26.22 Painting

All exposed metal surface of the items described in the preceding paragraph shall be painted. All the paints shall be obtained from the same manufacturer and shall be compatible with the other paints in

the same protective scheme. They shall be suitable for the climatic conditions in Bangladesh especially in coastal belt. The manufacturer and the formulation of the paints shall be subject to the approval of the Engineer. The Contractor shall supply to the Engineer samples of the paints at least a month before the paints are to be used in the works.

The primer used beneath the coal tar/epoxy paint shall be specially formulated for the purpose. In selecting or formulating the zinc rich priming paint the Contractor shall give due regard to the period of storage and to the requirement that it shall give protection outdoors in Bangladesh for periods of possibly up to six months.

Coal tar/epoxy paint shall be such that the coating will not run or craze when exposed to direct sunlight on the site for prolonged periods after immersion in water.

The paint shall be delivered in the paint manufacturer's drums with seals unbroken. Each drum shall be clearly and indelibly marked with a description of its contents, date of manufacture, and the date before which it should be used. Each drum shall have a different serial number.

The Contractor shall prepare and paint the surfaces of steelwork before dispatch from the manufacturer's works as specified in this Clause.

Steelwork surfaces to be painted shall be shot or grit blasted, and the maximum surface roughness of blasted steel shall not exceed amplitude of 0.1 mm. A second quality surface finish is required in accordance with BS 4232.

Contact surfaces in welded construction that will be completely sealed shall be left unpainted. Surfaces which will be in contact with concrete when erected on Site shall receive no treatment or painting.

Contact surfaces or sub-assemblies which are put together at the manufacturer's works and which will be in permanent contact or concealment after shop assembly, other than those surfaces mentioned above, shall be cleaned and painted with one coat of priming paint before assembly and brought finally together while the paint is still wet.

All rags, brushes and tools used for the surface preparations shall be clean.

Surfaces contaminated with oil or grease shall be cleaned with white spirit.

Surfaces to be painted shall be properly prepared and ample time shall be allowed for drying and hardening before the application of successive coats of paint, and no exterior painting is to be done in wet or foggy weather.

Immediately before paint is applied the whole of the surface to be painted shall be thoroughly cleaned of all dust, loose paint or dirt, if necessary by washing down with fresh clean water and by brushing with a bristle brush. Steelwork shall be thoroughly dry before application of paint.

The first coat of priming paint shall be applied by brush.

The ideal temperature for painting lies within the range 15°C to 32°C with the ambient relative humidity below 90%. So far as is practicable all painting should be done when the ambient conditions are favorable and are like to continue so throughout the drying time of the paint.

Before dispatch from the manufacturer's works, surfaces of steelwork which have been previously primed shall be properly cleaned surfaces shall be cleaned and treated with one coat of a mixture of white lead and tallow or with approved varnish or plastic paints.

2.26.23 Installation

Care shall be exercised in setting and adjusting pivots and sealing surfaces to assure that the gates hang properly, swing freely and seal uniformly around the entire perimeter. The gate frames shall be adjusted simultaneously with the gate pivot adjustments. The gates and components shall be handled carefully to prevent damage to sealing surfaces and racking, as required. Following installation and

placement of second stage concrete, the gates shall be operated manually to demonstrate satisfactory installation and operation.

2.26.24 Measurement

Measurement of item Manufacturing and Installation of Vertical Gate shall be made on each gate (size wise) installed and accepted as per design and drawing.

2.26.25 Payment

Payment shall be made for each gate (size wise) at the unit rate as included in the Bill of Quantities.

2.27 Manufacturing and Installation of M.S Flap Gate

2.27.1 MS work in plates

Angles, channels, flat bars, Tees etc. includes fabricating, machining, cutting, bending, welding, forging, drilling, riveting, embedding anchor bars, staging and fitting fixing, local handling etc. complete as per design, specification and direction of Engineer.

Standards of steel and other metalwork shall comply with the following standards. This list is given for the Contractor's guidance and shall not be taken as exhaustive.

Structural Steel Sections (Part 1: Hot rolled sections)	BS 4
Steel Wire Ropes	BS 302
Covered Electrodes for the Manual Metal-Arcs Welding of Mild Steel	BS 639
Black Hexagon Bolts, Screws and Nuts	BS 4190
Steel Tubes and Tubular suitable for Screwing to BS 21 Pipe Threads	BS 1387
Phosphor Bronze Ingots and Castings	BS 1400
Carbon Steel Plate, Sheet and Strip	BS 1449
Grey Iron Castings	BS 1452
Steel Tubes for Structures	BS 1775
Arc Welding of Carbon Manganese Steels	BS 2642
Cast Steel for General Engineering Purposes	BS 3100
Weldable Structural Steels	BS 4360
Weldable Structural Steel Sections	BS 4848
Metal-arc Welding of Carbon and Carbon Manganese Steels	BS 5135

2.27.2 Nuts and Bolts

Bolts, rag bolts, nuts and washers shall conform to BS 4190 as regards dimensions. Each bolt shall be provided with two washers and shall be long enough to show a full thread through the nut after fixing. External bolts and fixing rag bolts, nuts and washers shall be sheradised steel. Assemble nuts, bolts and washers or galvanized fittings or equipment shall be either galvanized or sheradised.

2.27.3 Steel Plate

Steel Plates, shapes and bars shall conform to ASTM Designation A 36 or approved equal.

2.27.4 Welding

Welding shall be metal-arc welding complying with the requirements of BS 5135 as appropriate. All welds shall be continuous. The Contractor shall supply samples to the Engineer when required by him for examination or test. All weldable structural steel shall comply with the requirements of BS 4360 and shall be the grade of steel as specified hereinafter, or on the Drawings.

2.27.5 Gates and Hoists

This work consists of manufacturing and supplying of M.S.Flap Gate shutter, Chain Pulley Operated Hoist, fitting & fixing of gate shutter using the steel of the grade, type and size shown in accordance with these specifications and in conformity with the requirements shown on the Drawings.

Each gate shall consist of framing incorporating guide grooves, sealing faces and a spindle guide bracket supporting members specified on the Drawings, movable gate leaf with sealing faces and operating gear.

A list of standards is given below as guidance for the materials to be used in manufacturing of Gates/Stop logs and hoists. The Contractor is permitted to use any standard equivalent to the specified one only after taking approval from the Engineer.

Hot Rolled Steel (Flats, Structural shapes, Plates)	ASTM, A 36 or BS 4848
Cold Rolled Steel (Shafting)	AISI, 1035 or BS 2994
Carbon Steel (Bots, Nuts, Fasteners)	AISI, 1015
Stainless Steel (Stem, Stem Coupling)	AISI, 303
Cast Iron (Housing, Gear, Shield)	ASTM, A48
Cast Steel (Wheel/Roller)	ASTM, A148
Phosphor Bronze (Bush, Bearing)	ASTM, B139C

2.27.6 Flap Gates Shutter:

Manufacturing and supplying of M.S flap gate shutter should be of 10 mm thick M.S skin plate, with top beam, horizontal main beam, vertical stiffener, Neoprene Rubber seal, hinge assay with gate and wall bracket link arm of SUS hinge pin with proper thread nut, cotter pin and washer as per approved design including the cost of all materials of proper grade as specification and direction of the Engineer. Flap Gates shall be fixed at an angle of minimum 3° with the vertical.

2.27.7 Fitting/Fixing Gates:

Cost includes the charge for fitting & fixing gates of different size (1.95mx1.65m or 1.65mx1.35 m or as shown in the drawing or approved or directed by the Engineer) including making holes in concrete for hooking arrangements with supply of necessary materials, tools and other accessories required for fitting the same to regulator/ sluice and mending the damages with Cement Concrete of specified proportion , removing the spoils etc. complete including the cost of all materials as per direction of Engineer.

2.27.8 Bushing:

Wheel bearing of fixed wheel gates shall be provided with self lubricating bearings in accordance to the Drawings. All other bearings and bushes shall be provided with grease ways and proper grease fitting for preventive maintenance.

2.27.9 Neoprene Rubber Seals

Neoprene Rubber Seals shall be molded solid sections of the dimensions shown in the Drawings. The material shall be a compound of natural rubber or a copolymer of reinforcing carbon black, zinc oxide, accelerators, antioxidants, vulcanizing agents and plasticizer. The physical Characteristics shall meet, the following specification:

Tensile strength	20 N/mm ²
Elongation at break	45%
300% modules	6 N/mm ²
Durameter hardness (shore type A)	60-70
Water absorption (max)	5% by weight
Compression set	30%
Tensile strength after oxygen bomb Against ASTM D572	80% of tensile strength
Tensile strength of vulcanized joints	10 N/mm ²

The seals shall be molded in one piece for each straight length, without the inclusion

2.27.10 Chain Pulley Operated Hoist

Chain Pulley Operated Hoist as shown in the drawing shall be manufactured and installed.

2.27.11.1 Fabrication

Components supplied shall be in good condition and marked as per fabrication drawings for easy checking.

Before being assembled, all the components shall be in good condition. If twisted or bent or damaged in any way they must be repaired, according to the Drawings and as instruction of Engineer, before assembly.

All tolerance and allowances for metal fits shall conform to the approved standard Journals.

Cutting shall be by machine, by sawing or by oxy-acetylene torch. Oxygen cut edges must have all gouges removed by grinding. All outside corners shall be clean and with a radius of the right dimension.

Pin holes shall be bored to gauge, smooth and straight, and at right angles to the axis of the member. Boring shall be done after the member is securely fastened in position.

2.27.12 Embedded Metal work

Metalwork component to be cast into the structures shall be fabricated as per the Drawing. Unless indicated on the Drawings, the components shall not be painted but prepared in accordance with direction of Engineer and then firmly secured in position prior to concreting.

The contractor shall plan his concreting work so as to avoid risk of knocking or damaging the components. Second stage concreting shall be undertaken in accordance with design

Exposed surface second stage casting work shall be painted according to direction of Engineer

Welding during positioning of parts shall be carefully, so that, vertical and horizontal levels of the exposed surfaces may not be disturbed due to heat, generated at the time of welding.

Rubbing surfaces shall be cleaned before installation gates or stoplogs.

2.27.13 Tolerances

Tolerances for sealing surfaces, guides etc shall be selected to prevent over stressing of the gate parts and to effect watertight seal. Tolerances for machined and fitted parts shall comply with the requirements of the specifications or standards. All tolerances and means of adjustment shall be defined on the contractor's drawings and be subject to the Engineer's approval.

2.27.14 Tests

Tests will include the assemble of components in the manufacturing shop as well as on site.

All tests performed at shop or at site shall be witnessed by the Engineer or his representative and results recorded. If any defects are discovered, they shall be remedied and the tests shall be repeated until satisfactory results are obtained.

2.27.15 Gates/Stoplogs

The gates and stoplogs complete with seals, guides and fixed wheels wherever applicable, shall be assembled so as to attain a tight and water proof sealing at the base, at the top and at sides. The lifting and lowering of gates and stoplogs should be achieved from the deck without under resistance. Except where water sealing is required, all metal to metal contact surfaces must be lubricated by the manufacturer during test operations. Any defects observed shall be corrected promptly and the test repeated. Any damage to the gate or components during no extra cost.

2.27.16 Flap Gate Hoist

The contractor shall install gate hoists as shown on the Drawings. Approved manufacture's installation instruction shall be strictly observed. Prior to acceptance the hoist shall be lubricated and operated through a complete cycle of opening and closing of the flap gate to demonstrate satisfactory installation and operation under design load.

2.27.17 Painting

All exposed metal surface of the items described in the preceding paragraph shall be painted. All the paints shall be obtained from the same manufacturer and shall be compatible with the other paints in the same protective scheme. They shall be suitable for the climatic conditions in Bangladesh especially in coastal belt. The manufacturer and the formulation of the paints shall be subject to the approval of the Engineer. The Contractor shall supply to the Engineer samples of the paints at least a month before the paints are to be used in the works.

The primer used beneath the coal tar/epoxy paint shall be specially formulated for the purpose. In selecting or formulating the zinc rich priming paint the Contractor shall give due regard to the period of storage and to the requirement that it shall give protection outdoors in Bangladesh for periods of possibly up to six months.

Coal tar/epoxy paint shall be such that the coating will not run or craze when exposed to direct sunlight on the site for prolonged periods after immersion in water.

The paint shall be delivered in the paint manufacturer's drums with seals unbroken. Each drum shall be clearly and indelibly marked with a description of its contents, date of manufacture, and the date before which it should be used. Each drum shall have a different serial number.

The Contractor shall prepare and paint the surfaces of steelwork before dispatch from the manufacturer's works as specified in this Clause.

Steelwork surfaces to be painted shall be shot or grit blasted, and the maximum surface roughness of blasted steel shall not exceed amplitude of 0.1 mm. A second quality surface finish is required in accordance with BS 4232.

Contact surfaces in welded construction that will be completely sealed shall be left unpainted. Surfaces which will be in contact with concrete when erected on Site shall receive no treatment or painting.

Contact surfaces or sub-assemblies which are put together at the manufacturer's works and which will be in permanent contact or concealment after shop assembly, other than those surfaces mentioned above, shall be cleaned and painted with one coat of priming paint before assembly and brought finally together while the paint is still wet.

All rags, brushes and tools used for the surface preparations shall be clean.

Surfaces contaminated with oil or grease shall be cleaned with white spirit.

Surfaces to be painted shall be properly prepared and ample time shall be allowed for drying and hardening before the application of successive coats of paint, and no exterior painting is to be done in wet or foggy weather.

Immediately before paint is applied the whole of the surface to be painted shall be thoroughly cleaned of all dust, loose paint or dirt, if necessary by washing down with fresh clean water and by brushing with a bristle brush. Steelwork shall be thoroughly dry before application of paint.

The first coat of priming paint shall be applied by brush.

The ideal temperature for painting lies within the range 15°C to 32°C with the ambient relative humidity below 90%. So far as is practicable all painting should be done when the ambient conditions are favourable and are like to continue so throughout the drying time of the paint.

Before dispatch from the manufacturer's works, surfaces of steelwork which have been previously primed shall be properly cleaned surfaces shall be cleaned and treated with one coat of a mixture of white lead and tallow or with approved varnish or plastic paints.

2.27.18 Installation

Care shall be exercised in setting and adjusting pivots and sealing surfaces to assure that the gates hang properly, swing freely and seal uniformly around the entire perimeter. The gate frames shall be adjusted simultaneously with the gate pivot adjustments. The gates and components shall be handled carefully to prevent damage to sealing surfaces and racking, as required. Following installation and placement of second stage concrete, the gates shall be operated manually to demonstrate satisfactory installation and operation.

2.27.19 Measurement and Payment

Measurement of item *Manufacturing and Installation of Flap Gate* shall be made on each gate (size wise) manufactured & installed as per drawing and specifications and accepted

2.27.20 Payment

Payment shall be made for each gate (size wise) at the unit rate as included in the Bill of Quantities as per respective size

2.28 Dismantling of CC, RCC & Brick Masonry Work**2.28.1 General**

The existing damaged or unworkable / inadequate structure shall be dismantled and removed where new structure shall be constructed. Prior to the commencement of the Works, the Engineer shall confirm in writing the structures abandoned that are to be dismantled. The Contractor shall dismantle the structure and salvage the debris in location approved by the Engineer. The salvaged materials shall be stockpiled and sorted in locations approved by the Engineer.

The work consists;

- i) Dismantling the existing structure.
- ii) Removal and stockpiling of debris in measureable stack in a location approved by the Engineer.
- iii) Cleaning the site.

2.28.2 Measurement

Measurement of item Dismantling of Concrete & Brick Masonry work shall be made on stockpiled volume of debris in Cubic Meter

2.28.3 Payment

Payment shall be made on measured volume at the unit rate as included in the Bill of Quantities.

2.29 Dismantling of HBB Work**2.29.1 General**

The existing damaged / unworkable / unnecessary HBB work shall be dismantled and removed from the site. Prior to the commencement of the Works, the Engineer shall confirm in writing the HBB work abandoned that are to be dismantled / removed. The Contractor dismantled the HBB work and salvages the bricks & debris in location approved by the Engineer. The salvaged materials shall be stockpiled and sorted in locations approved by the Engineer.

The work consists;

- i) Dismantling the existing HBB work.
- ii) Removal and stockpiling of bricks and debris in separate measureable stack in a location approved by the Engineer.
- iii) The stockpiled bricks shall be handed over to the Engineer.
- iv) Cleaning the site.

2.29.2 Measurement

Measurement of item dismantling of HBB work shall be made on the existing HBB prior to commencement of dismantling work in Square Meter.

2.29.3 Payment

Payment shall be made on pre commencement measured area at the unit rate as included in the Bill of Quantities.

2.30 Dismantling of Khoa Consolidation/ Macadam Road**2.30.1 General**

The existing damaged / unworkable / redundant Khoa Consolidation/ Macadam road shall be dismantled and removed from the site. Prior to the commencement of the Works, the Engineer shall confirm in writing the Khoa Consolidation/ Macadam road abandoned that are to be dismantled /

removed. The Contractor shall dismantle the Khoa Consolidation/ Macadam road and salvage the materials. The salvaged materials shall be stockpiled and sorted in locations approved by the Engineer.

The work consists;

- i) Dismantling the existing Khoa Consolidation/ Macadam road.
- ii) Removal and stockpiling of salvaged materials in measureable stack in a location approved by the Engineer.
- iii) The stockpiled materials shall be handed over to the Engineer.
- iv) Cleaning the site.

2.30.2 Measurement

Measurement of item dismantling of Khoa Consolidation/ Macadam road shall be made on stockpiled volume of salvaged materials in Cubic Meter

2.30.3 Payment

Payment shall be made on measured volume at the unit rate as included in the Bill of Quantities.

2.31 Dismantling of Bituminous Carpeting

2.31.1 General

The existing damaged / unworkable / redundant Bituminous Carpeting shall be dismantled and removed from the site. Prior to the commencement of dismantling works, the Engineer shall confirm in writing the Bituminous Carpet abandoned that are to be dismantled / removed. The Contractor shall dismantle the Bituminous Carpet road and salvage the materials. The salvaged materials shall be stockpiled and sorted in locations approved by the Engineer.

The work consists;

- i) Dismantling the existing Bituminous Carpet road.
- ii) Removal and stockpiling of salvaged materials in measureable stack in a location approved by the Engineer.
- iii) The stockpiled materials shall be handed over to the Engineer.
- iv) Cleaning the site.

2.31.2 Measurement and Payment

Measurement of item *Dismantling of Bituminous Carpeting* shall be made on existing Bituminous Carpeting road prior to commencement of dismantling work in Square Meter

2.31.3 Payment

Payment shall be made on measured area at the unit rate as included in the Bill of Quantities.

2.32 Salvaging of Concrete Blocks/Boulders

2.32.1 General

The existing revetment material shall be removed from the agreed reconstruction lengths of the embankment and bank protection work needs to be cleared of all debris. The concrete blocks and any boulders / hard rock shall be stockpiled and sorted in locations approved by the Engineer.

Prior to the commencement of the Works, the Engineer shall confirm in writing the actual lengths of revetment that are to be reconstructed. The Contractor salvage the blocks and other existing revetment materials from the damaged revetment work taking full account of the need to protect the existing works.

The work consists;

- i) Removal and stockpiling of concrete blocks in measureable stack in a location approved by the Engineer.
- ii) Removal and stockpiling of existing revetment materials in measureable stack in a location approved by the Engineer.

2.32.2 Measurement and Payment

Measurement of item of *Salvaging of Revetment Materials* shall be made on stockpiled volume in Cubic Meter.

2.32.3 Payment

Payment shall be made on measured volume at the unit rate as included in the Bill of Quantities.

2.33 Painting of Existing Steel Member and Gates & Hoist

2.33.1 General

The exposed metal surface of all existing steel members and gates & hoists of the structures are to be provided with best quality of paint. All the paints shall be obtained from the same manufacturer and shall be compatible with the other paints in the same protective scheme. They shall be suitable for the climatic conditions in Bangladesh especially in coastal belt. The manufacturer and the formulation of the paints shall be subject to the approval of the Engineer. The Contractor shall supply to the Engineer samples of the paints at least a month before the paints are to be used in the works.

2.33.2 Removal of Existing Paint and Surface Preparation

The existing paint for the steelwork surfaces shall be removed through shot or sand blasting, and the maximum surface roughness of blasted steel shall not exceed amplitude of 0.1 mm. A second and final quality surface finish is required in accordance with BS 4232.

All rags, brushes and tools to be used for the surface preparations shall be clean.

Immediately before paint is applied the whole of the surface to be painted shall be thoroughly cleaned of all dust, loose paint or dirt, if necessary by washing down with fresh clean water and by brushing with a bristle brush. Steel work shall be thoroughly dry before application of paint.

2.33.3 Prime Coating

The primer used beneath the epoxy paint shall be specially formulated for the purpose. In selecting or formulating the zinc rich priming paint, the Contractor shall give due attention to the period of storage and to the requirement that it shall give protection outdoors in Bangladesh for periods of possibly up to six months. The first coat of priming paint shall be applied by brush.

2.33.4 Epoxy Paint Coatings

Epoxy paint shall be such that the coating will not run or craze when exposed to direct sunlight on the site for prolonged periods after immersion in water.

The paint shall be delivered in the paint manufacturer's drums with seals unbroken. Each drum shall be clearly and indelibly marked with a description of its contents, date of manufacture, and the date before which it should be used. Each drum shall have a different serial number.

Surfaces contaminated with oil or grease shall be cleaned with white spirit. Surfaces to be painted shall be properly prepared and ample time shall be allowed for drying and hardening before the application of successive coats of paint, and no painting is to be done in wet or foggy weather. The ideal temperature for painting lies within the range 15°C to 32°C with the ambient relative humidity below 90%. So far as is practicable all painting should be done when the ambient conditions are favorable and are like to continue so throughout the drying time of the paint.

The contractor shall make all sort of necessary arrangements for scaffolding properly secured to carry out the painting activities.

2.33.5 Measurement

Measurement shall be in square metre of the area covered with painting.

2.33.6 Payment

Payment shall be made on measured area in square metre at the unit rate as included in the Bill of Quantities.

2.34 Dewatering of Surface Water

The Contractor shall arrange installation and operation of surface pumps for bailing out of accumulated water inside the Cofferdam/Ring Bundh to facilitate the construction/ repairing works of the structure. Controlling surface water levels within the Cofferdam/Ring Bundh shall be achieved by use of pumps, sump pump, gravel drain or other mechanical devices, but without requiring the use of a well point or tube well system. Such water may be accumulated from percolation, rain or pumping flood water into the ring dyke, or any other source or combination of sources.

Work to be performed under this clause include furnishing & installing required numbers of Surface Pumps (minimum capacity **55 l/sec**) including construction of sump well, gravel drain, maintaining, operating and removal of the surface water control system for dewatering the accumulated water from the area within the Cofferdam/Ring Bundh so that the desired construction/repairing works of the structures can be safely carried out. The discharge line/drainage system for the disposal of the evacuated water shall be constructed by the Contractor at his own cost including the arrangement of the land and permission when necessary. The Contractor shall submit his plan for the surface water dewatering system to Engineer for approval.

2.34.1 Measurement

Measurement shall be made in unit number of structures undergone surface dewatering and the construction of structure has been completed in full respects.

2.34.2 Payment

Payment shall be made at the unit number accomplished as included in the Bill of quantities

2.35 Manufacturing, Supplying and laying of RCC Pipe

Machine made RCC pipe of length and thickness as specified in design shall be manufactured at site for the use in repairing Inlets in leanest trial mix. of 1:1.5:3 with 12mm/20mm down graded stone chips, sand of FM $\geq$ 2.0 and admixture (water reducing plasticizer) @ 1.5 litre per cubic meter of concrete to attain a minimum 28 days cylinder strength of 25 N/mm².

The Contractor shall deliver Reinforced Concrete Pipe for installation in Flushing Inlet / Outlet structures. Reinforced Concrete Pipe shall be manufactured by the centrifugally spinning process. Pipe strengths shall conform to the requirements of BS 5911. Pipe tolerances are to comply with B.S. 5911.

The works include breaking, screening, grading and washing aggregates with clear water, mixing, laying in forms, consolidating, curing etc. with 6mm dia M.S. work for reinforcement and form works as per approved drawing and specification including tools, plants, testing, safe handling & laying the pipes in position etc. complete as per design and direction of the Engineer.

RCC Pipes should be of 900mm dia, wall thickness not less than 90mm with circular reinforcement for inner case 90mm c/c, outer case 100mm c/c and longitudinal reinforcement 150mm c/c.

2.35.5 Measurement

Measurement shall be done in unit of metre of the pipe laid properly in position to true line and grade as shown in the drawing

2.35.6 Payment

Payment will be made in metre as included in the BoQ.

2.36 Placing and Random Placing of C.C Block in Apron/Berm of Slope Protection Embankment

Works to be performed under this clause include carrying of C.C Blocks from Stack yard from any distance, placing them in bottom layer in true line and grade at apron/berm of slope protection works and random placing of Blocks at top layers as shown in the drawing.

Placing and Random placing of Blocks should start early December or at such time while river attains it's LWL and must be accomplished before rising of river water level or as specified in the design

Prior to the commencement of placing and random placing of C.C Blocks at apron of Slope Protection, the contractor proposal to ensure the quality & quantity shall have to be approved by the Engineer. Blocks are to be placed manually. The bottom layer shall be placed in true line and level. Then the top 2(two) layers as shown in the drawing are to randomly placed in such way that the blocks are not damaged/cracked due to smash on each others. The quantity of blocks placed shall be recorded in to a certified Register with date and duly verified by the Engineer. The register shall be made available at site for inspection.

2.36.1 Measurement

Measurement of C.C Blocks placing shall be the same quantity (stack-wise) in cubic Meter.

2.36.2 Payment

Payment shall be made at the unit rate per cubic meter as included in the Bill of Quantities

2.37 Construction of R.C.C Cast in Situ Bored Piles**2.37.1 General**

A Pile is a structural member which transmits the load (compression, tension or combination of both) to a good bearing Stratum at deep depth. This is in general, resembles to a column but is buried in the ground.

Cast in Situ RCC bored Piles under this Clause shall be constructed of specified diameter as per approved drawing by boring a hole into the soil, inserting a reinforcing steel cage as per design secured symmetrically about the axis of pile and filling it with Concrete of specified compressive strength.

All works are associated with installation of bored and cast in place Piles by any of the recognized techniques for boring the hole, placing the reinforcement and filling the hole with concrete. All works shall be carried out strictly in accordance with the approved drawings and these specifications.

2.37.2 Submittal

The Contractor shall be required to make the following submittals

2.37.2.1 Performance Statement

The Contractor shall submit to the Engineer before start of piling work a detailed description of the equipment, (i.e cranes, drills, augers, bailing buckets, final cleaning equipment, Slurry Pumps, Concrete pumps and Casings etc.) materials and procedures that will be used. The description shall

include equipment specifications, loading capacities, protective devices, test apparatus, detailed installation procedures, test procedures and other documents as instructed by the Engineer.

2.37.2.2 Concrete Placement Schedule

The Contractor shall submit a concrete placement schedule, for review of the Engineer, prior to start of concrete placement operations. Daily concrete pour schedules shall be submitted 24 hours in advance of planned pours.

2.37.2.3 Testing Program

The Contractor shall submit test program for all specified requirements along with the testing schedule.

2.37.2.4 Test Reports

The contractor shall submit test reports showing the results of required tests and compliance with specified standards and codes. Test reports shall be certified by the Contractor at the testing agency approved by the Engineer.

2.37.3 Material

The specifications and quality requirements the materials are shown below;

- Coarse Aggregate** : Stone Chips of 20 mm down graded conform to the requirement of AASHTO T-85 or BS-812 , ASTM C 535
- Fine Aggregate** : Shall be non-saline clean natural sand and have a fineness modulus FM=> 2.50 and conform to the ASTM standard grading
- Cement** : Ordinary Portland Cement /Portland Composite Cement complying with the requirements of ASTM C150 Type 1 or BS 12 or equivalent standard
- Steel Reinforcement:** Billet Structural Grade of 60 conforming to ASTM A575, A615-Grade-40 & 60.
- Water** : As good as drinking water satisfying BS 3148
- Bentonite** : Clay of Montmorillonite Group having exchangeable Sodium cations

Concrete shall be of minimum 22 N/mm² at 28 days Cylinder Strength

2.37.4 Execution

2.37.4.1 Cleaning and Leveling

Before starting the piling work, the contractor shall complete clearing, leveling and setting out of the site. . Any obstacles shall be removed, as approved or directed by the Engineer. If the Presence of existing underground utilities is known or suspected, the Contractor shall carry out such diversion or protection.

All excavations shall be carried out as nearly as possible to the exact dimensions of the pile foundations to minimize backfilling.

All surplus excavated material from excavations not required for back filling shall, be disposed off as approved or directed by the Engineer.

All installation procedures shall be subjected to the Engineer's approval. No pile boring shall take place within 48 hours of the concreting of any pile which is within radius of 3 metre.

2.37.4.2 Drilling Method

- Drilling of holes for piling shall be done by straight or reverse rotary rig or any other suitable method proposed by the Contractor, subjected to approval of the Engineer. Regardless of the

method used for drilling holes, the following specifications shall be adhered to by the Contractor.

- After completion of drilling operations, the bore hole length will be checked & recorded.
- Drilling operations shall be carried out in such a way as to avoid any disturbance of the soil especially at the bottom of the hole.

2.37.4.3 Stabilizing of Bore Holes

- ☐ The Contractor shall ensure at all times that the hole does not collapse during and after boring. Where necessary temporary casing shall have to be provided for the unstable strata. The bottom of the temporary casing pipe shall be kept at least 1 metre below the unstable strata to prevent inflow of soil and formation of cavities in the surrounding ground.
- The temporary casing shall have internal diameter not less than the specified pile diameter. The temporary casings shall be thin walled mild steel cylindrical casing spirally welded or other construction. They shall be free of significant distortion, of uniform cross-section throughout each continuous length and free from internal projection.
- The Contractor may use bentonite slurry or any other drilling method with written approval of the Engineer. The nominal diameter of pile is defined as the minimum cross-section of unlined portion of borehole.
- It may also be noted that no extra payment shall be made for using temporary casing / bentonite slurry or adopting alternative drilling method(s) for advancing the boreholes in satisfactory manner.

2.37.4.4 Inspection of Bore Holes

After the bore has reached its final penetration as given on the approved Drawings and as may be additionally ordered by the Engineer, on the basis of data obtained in the field, and after it has been completely cleaned of all earth and otherwise made ready to receive the reinforcement and thereafter the concrete, the Contractor shall so inform the Engineer. The contractor shall provide all apparatus necessary for inspection.

All disturbed soil & loose material shall be pumped out in such a manner that after cleanout operation, the bottom of borehole remains horizontal and in undisturbed condition. The clean out pumping arrangement shall be such that the lower end of the pump can be moved all over the cross-section by a routine operation. The suction of the pump shall be adjustable. At the end of clean-out operations, a break shall be made for a period of at least five minutes, then pumping shall be resumed and shall continue until the bottom of hole is cleaned. The Engineer shall inspect the soil samples and test results thereon, check the actual bore penetration achieved, the cleanliness of the boreholes and the amounts and directions, if any, by which the borehole is out of position and/or out of plumb and having satisfied himself on these and on any other points which he may consider relevant, shall sign pour slip for the borehole authorizing the Contractor to proceed with the placing of reinforcement.

2.37.4.5 Bentonite Slurry

a. Tests shall be carried out to ensure that the proposed constitution of the slurry is compatible with the ground water: Proposals for the constitution and physical properties of the slurry shall include average, minimum and maximum values. The specific gravity of the slurry shall not be less than one and one tenth (1.1) in any case at any time. The Contractor shall use additives where necessary to ensure the satisfactory functioning of the slurry.

b. The Contractor shall carry out tests at site during the course of the piling to check the physical properties of the bentonite slurry in the works. These tests shall include, inter-alia, density, viscosity, shear strength and pH tests.

c. The Contractor shall control the bentonite slurry so that it does not cause a nuisance either on the site or adjacent waterway or other area. After use it shall be disposed of in a manner approved by the Engineer.

d. The level of the slurry in the bentonite shall be maintained so that internal fluid pressure always exceeds the external water pressure.

2.37.4.6 Concrete Work

Process of Concrete work in piles will be carried out as follows:

2.37.4.6.1 Placing of Steel Reinforcement

The cage of reinforcement shall be assembled on the ground and securely tied by means of binding wire in such a manner so as to form a rigid cage. It shall be lowered in the bore hole carefully keeping the cage concentric with the bore hole. Adequate concrete spacer blocks specially pre-cast shall be securely attached to the reinforcement at a suitable spacing and each quarter point so as to ensure that the concrete cover stipulated on the drawings is maintained throughout and that the reinforcement cage is not displaced in the casing during the course of subsequent concreting operations. In addition concrete spacer blocks shall be located immediately below and immediately above the lap at 4 points spaced around the cage. Particular care shall be taken to ensure that none of the spacer blocks move out of position to the inside of the reinforcement cage due to spacer blocks or lapped reinforcement or any other reasons which might interfere with concrete placement. Depth of the hole shall be measured just before and after the lowering of cage. In case it is found that the soil has caved into the hole during the lowering of the cage, the contractor shall be required to adequately clean the hole to the satisfaction of the Engineer, before the start of concreting at his own cost.

2.37.4.6.2 Method of Concrete Placing:

Pouring of concrete shall be done by an efficient tremie technique. The method and equipment used shall be subjected to the prior approval of the Engineer. The tremie pipes shall have to be large enough with due regard to the size of the aggregate. The diameter of tremie pipe shall be of not less than two hundred and fifty (250) mm, made of water tight construction. The tremie pipe shall be fitted with travelling plug, which shall be placed at the top of the pipe before charging the tremie pipe with concrete as barrier between the concrete and bentonite slurry, so as to prevent water or bentonite slurry entering the tube and mixing with concrete. The tremie shall be carefully lowered into the borehole so that the end of the tube shall rest at about one hundred & fifty (150) mm above the bottom of borehole, with reinforcement in the borehole and hopper end of the tremie tube shall be filled with concrete. It shall be slightly raised so that when the concrete reaches the bottom it flows out of the lower end of the tub, and fills the bottom of the borehole. Thereafter, the rate of withdrawal of the tremie shall be gradual so as to ensure the end of the tremie pipe is always one and half (1.5) meter below the top of concrete in the borehole. The discharge end shall be kept submerged continuously in the concrete and the shaft kept full of concrete to a point well above the water surface. When the next batch is placed in the hopper the tremie shall be slightly raised but not out of concrete at the bottom, until the batch discharges to the bottom of the upper. This operation shall be controlled by calculating the volume of concrete required to fill one linear meter of pile and then measuring the rate of withdrawal of tube corresponding to the volume of the batch in the hopper. The tremie shall not be moved horizontally during a placing operation. The rate of placing concrete in the borehole shall be neither less than 9.15 meters (30 feet) per hour and nor more than 15.24 meters (50 feet) per hour.

The depth of the concrete in the borehole shall be measured at intervals to keep a constant check that the tremie pipe bottom is immersed in concrete.

All tremie tubes shall be scrupulously cleaned after use for subsequent concreting. The contractor shall also establish and record the actual co-ordinates of the centers of the broken-off pile tops with respect to theoretical centre line of each pile cap as shown on the Drawings and the tolerance in this respect shall not exceed 50mm in any direction. No separate payment will be made for manufacturing, placing and breaking of this part of concrete.

The contractor shall take precautions to ensure that the concrete is free of voids and shall prevent the entry of water/or collapse of soils into the concrete.

Concreting shall continue until the concrete has reached an elevation five hundred (500) mm higher than the designated pile cut off level shown on the drawings.

2.37.4.7 Protection & Curing

As each pile cap is completed, the projected length shall be immediately and carefully protected from any condition that will damage or adversely affect the hardening of concrete. Concrete shall be cured for 28 continuous days by an approved method.

2.37.4.8 Stripping and Finishing:

Any cracked or defective concrete in the head of the completed pile shall be cut away and made good with new concrete well bonded into the old. The reinforcement in the pile shall be exposed for a sufficient distance to permit it to be adequately bonded to the pile cap. This shall be done carefully to avoid shattering or otherwise damaging the rest of the piles. The reinforcement shall then be cleaned and bent to form an anchorage into the concrete of the super-structure as approved or directed by the Engineer. Where a temporary casing is used, the top of the pile shall be brought up sufficiently above the required finished level to allow for slumping on withdrawal of the casing and to remove weak concrete.

2.37.5 Tolerance

- The drilled shaft shall be within 50.8 mm (2 inches) of the plan position in the horizontal plane at the Plan elevation for the top of the shaft.
- The vertical alignment of the shaft excavations shall not vary from the plan alignment by more than 20mm per metre of the depth.
- The cross-sectional dimensions of the pile shall not be less than those specified and shall not exceed them by more than 6 mm. Each face of a pile shall not deviate by more than 6 mm from any straight line 3 m long joining two points on that face, nor shall the centre of area of the pile at any cross section along its length deviate by more than 1/500 of the pile length from a line joining the centers of area at the ends of the pile.
- When a pile is less than 3 m long, the permitted deviation from straightness shall be reduced below 6 mm in accordance with actual length.
- After all the shaft concrete is placed, the top of the reinforcing steel cage shall be no more than 152.4 mm (6 inches) above and no more than 76.2 mm (3 inches) below plan position.
- The top elevation of the shaft shall be within 25 mm of the plan top of shaft elevation.
- The bottom of the shaft excavation shall be normal to the axis of the shaft within 62 mm per metre of shaft diameter

2.37.6 Integrity Test of Pile

Piles shall be selected by the Engineer for testing and detection of major faults, necking, discontinuities, and cross-sectional areas of piles. Contractor shall arrange all equipment/ tools and experienced person for carrying out the integrity test.

If the results of tests show that pile or piles are defective, the pile or piles shall be treated as faulty and rejected until the Contractor can demonstrate to the approval of the Engineer effective remedial measures that will be carried out.

2.37.7 Defective Piles

Any piles that are damaged or imperfect and thus rejected by the Engineer shall be removed and discarded. When the rejected pile is withdrawn, the space shall be filled solid with gravel or broken stone without extra payment thereof.

Debris from pile cut-offs and damaged piles shall not be buried in required fill under slabs at grade or in required embankments but shall be disposed of by the Contractor off the site of the work.

Defective Piles are replaced by any one of the following methods

The Pile shall be withdrawn and replaced by a new and when necessary, by longer pile.

A second Pile shall be cast adjacent to the defective pile.

The contractor shall undertake such additional tests/works as the Engineer may specify to provide additional foundations to supplement the defective piles and so modify the structure to be supported as to ensure that load will be transferred safely to the additional foundations of existing pile. The contractor shall be responsible for the cost of such additional functions and tests and/or of the extra work carried out in such modification to the structure.

2.37.8 Measurement

Measurement for construction of R.C.C cast in situ bored piles of the specified diameters as per approved design will be made per linear meter of the pile cast below cut off level. The cost includes all compensation for boring, driving & extracting temporary steel casing up to required depth (where necessary) with circulation of bentonite slurry, placing reinforcing cage, casting concrete including all cost of materials, manpower, operations of equipment, integrity test etc. Additional quantities of concrete, reinforcement and form work caused by incorrect location of piles or additional piles necessary to replace defective piles shall be on the contractor's expense.

2.37.9 Payment

Payment for construction of R.C.C cast in situ bored piles will be made at the unit rate per linear meter at the as included the in the Bill of Quantities for construction of R.C.C piles.

2.38 Miscellaneous Item

2.38.1 Cement Concrete in Foundation floor/ Filling Gap between C.C Blocks

Cement concrete work in leanest mix. 1:3:6 with sand of $FM \geq 5$, in foundation floor /filling the gap formed between the slope and straight portion of C.C Block pitching including breaking, screening, grading and washing aggregates with clear water, mixing, laying in position, consolidation to levels, curing, including supply of all materials, etc. complete as per direction of Engineer. The coarse aggregates shall be 20 mm down graded 1st Class brick/picked Jhama khoa /chips as per standard gradation. The measurement will be made in unit cum and payment will be made as per unit rate included in the BoQ

2.38.2 Dumping of C.C Block in Loose Apron of Hydraulic Structure

The works comprise dumping of C.C Block in the loose apron/bed of the hydraulic structures in true line and grade. C.C Blocks for dumping in the loose apron shall be stockpiled to the satisfaction of the Engineer. Prior to the commencement of dumping, the Contractor proposal to ensure the quality & quantity shall have to be approved by the Engineer. Blocks are to be dumped manually or any other means in control way such that the blocks are not damaged/cracked due to smash on each others. The quantity of blocks dumped shall be recorded in the register with date and duly be verified by the Engineer which will form basis of the measurement. Measurement of C.C Blocks dumping shall be the same quantity (stack-wise) in cubic Meter. Payment shall be made at the unit rate per cubic meter as included in the Bill of quantities.

2.38.3 Sand-Cement Plastering to old Concrete Surface

The work under this Clause comprises providing Sand-Cement plaster (thickness minimum 10 mm and maximum 15 mm) to the old concrete surface to achieve a protective coating to concrete.

Material:

Cement	: Ordinary Portland Cement/Portland Composite Cement complying with the requirements of ASTM C150 Type 1 or BS 12 or equivalent standard
Fine Aggregate	: Shall be non-saline clean natural sand and have a fineness modulus $FM \Rightarrow 1.30$ and conform to the ASTM standard grading
Water	: As good as drinking water
Bonding Agent (Liquid)	: Epoxy Resin

The surface to be plastered should be accurately positioned overall and zones should not deviate excessively from a plane (or curved) surface. Concrete surface must be clean of dust, loose particles, oil, and other foreign matter which would affect a bond of cement plaster to concrete. Background surfaces should ideally be at least as rough as coarse sandpaper or rough-sawn timber. Surface roughness shall be achieved by hacking or sand blasting. Substrate surfaces shall be cleaned by water jetting, blowing with (oil-free) compressed air and brushing

The sand-cement mortar should be mixed at proportion minimum of 3:1 by hand or machine. Hand mixing should be done on a smooth concrete floor or steel sheet. Sand to be spread first spread of about 100 mm thick and then cement of required quantity to be spread uniformly over the sand. Mixing to be continued until the colour is uniform. Then gradually water to be added while mixing until right consistence is achieved. The workability of the mix (at plastering consistence) to be checked by forming a flattened heap about 100 mm high and 200 mm in diameter on a non-absorbent surface. Placing a plasterer's trowel face down on top of the heap and pushing the trowel down, a workable plaster will squeeze out from under the trowel and it will be possible to push the trowel to within a few millimeters of the underlying surface

While workable mix is achieved plastering can be started. A liquid bonding agent (epoxy resin) is to be applied to concrete surface as per manufacturer's standards. The cement-mortar are then to be placed on the concrete surface and using a rectangular plasterer's trowel and pushing plaster onto the surface with heavy pressure to compact the plaster and ensure full contact with the substrate. The plaster should be slightly proud of the intended surface. Using a wood float the ridges made by the striker board should be removed. At the same time any depressions are to be filled in flushing with the surrounding plaster.

The plaster (mortar) should be used up within two hours of being mixed and never be re-tempered by mixing in additional water.

Plastering should be protected from the direct sun and drying winds. Curing of the plastering shall be carried out at least for 7 days with covering the surface with hessian cloth or other suitable material as approved by the Engineer and wetting it by sprinkling water.

2.38.4 Supplying, Filling & Dumping of Gunny or Synthetic Bags

The gunny or synthetic bags used in the works shall be new. Two sizes of bags weighing 75 kg and 50 kg shall be under the contract as per approved drawing. The bags shall be used in slope of loose apron of drainage sluice (repairing works) / river closing activities for filling the river bed/ river bank protection works for filling the scour holes. While filling the river bed for river closing activities, the fill material shall be local earth/sand available at sites. For other works fill material shall be sand of Fineness Modulus (FM) ≥ 1.00 . The Contractor shall submit sample bags to the Engineer for his approval

Sand for filling bags shall have Fineness Modulus (FM) ≥ 1.00 with not more than 5% passing the No. 100 sieve (US size) of hard, dense, durable materials free from injurious amounts of clay lumps, light weight materials or other deleterious substances. The filling sand shall be non-saline clean natural sand.

The bag shall be filled up with dry specified sand. The fill volume and weight of each bag shall not be less than 0.040 m³ for & 75 kg and 0.029 m³ & 50 kg respectively. After filling with specified sand, the bag shall be checked by weighing scale and close the mouth by specified seam using double needle sewing machine. The sewn bags shall be stacked in countable manner. The bags shall be counted by the Engineer prior to commencement of dumping work and duly be entered in a certified Register and verified by the Engineer which shall form basis of measurement.

Dumping of the Gunny or Synthetic Bag shall be done manually at the back of the protruded bullah piles along the toe of loose apron of repaired sluices.

Measurement of item Dumping of Gunny or Synthetic Bag shall be made on Each Number of bag of each size dumped and Payment shall be made at the unit rate per bag of size as included in the Bill of quantities. The unit rate includes all cost of bag, sand, thread, bouy, labour, equipment, filling & sewing bag, conducting survey and dumping. . However, while this item is used in construction of

Closure Dam (under Clause No.2.9 as per approved design), no separate payment will be made for supplying and dumping of Gunny or Synthetic Bags whatever which are deemed to have been covered in the Lump Sum rate under Bill No.11: Closure Dam, of the BoQ

2.38.5 Construction of Cement Mortar Gauge

The Gauges are to be constructed on the RCC wall of structures with cement mortar of 1:2 (FM of sand ≥ 1.5) of size **150mm × 25 mm (width×thickness)** .

Before construction of the gauge, the concrete surface shall be thoroughly roughened or scraped with suitable tools so that no smooth skin of concrete is visible. The surface shall be thoroughly cleaned by compressed air and water jets or other approved means and brushed and watered immediately before depositing cement mortar.

Cement mortar of proportion 1:2 shall then be placed in a bit larger size of 150mm × 25 mm. When the mortar is still green, the excess mortar to be trimmed out to make proper size (150mm × 25 mm). Wood float trowelling shall be carried out after the mortar has stiffened and the film moisture has disappeared.

Working should be kept to the minimum compatible with a good finish and the surface shall be true to the required profile to fine tolerance. While the cement mortar starts setting, the Gauge is to be engraved in meter, decimetre and millimetre. The Gauge shall be cured for at least 10(ten) days. Whenever necessary the Contractor shall provide and erect overhead covers to prevent the finished surface from being marred by raindrops or dripping water. After the mortar set completely, painting and figuring shall be carried out with black and red water proofing paint.

The Contractor shall arrange scaffolding and all other arrangements as necessary for carrying out the work.

The measurement of Cement Mortar Gauge will be in unit of **metre** and payment shall be made in metre at the unit rate included in the BoQ.

Supplementary Information

The Coastal Embankment Improvement Project, Phase-I` (CEIP-I) is planned to rehabilitate the embankments, remove drainage congestion by construction of sluices and re-excavation of drainage channels. Four (4) Polders namely 32, 33, 35/1 and 35/3 have been taken on priority in the first instant. The locations of these Polders are mentioned below:

Polder 32:

The Polder is located in Upazilla Dacope under Khulna District. The Polder covers two Union Parishads (U/P), namely Sutakhali and Kamarkhola. The Polder is bounded by Sibsa and Dhaki River to the west and North, Chunkuri, Bhadra & Sutakhali Rivers to the East and South. The approximate distance of the Polder is 370.00 km from Dhaka by road. The Polder was conceived in the year of 1960 under the Coastal Embankment Project (CEP). Construction of the Polder was started in 1966-67 and completed in 1971-72. The original concept of construction of this Polder was only to protect the agricultural lands from salinity intrusion caused due to tidal inundation from the river. At present, the embankment of the Polder is under heavy threat of cyclone surge, wave attack, river erosion and increasing risks brought about by climate change. The embankment and hydraulic structures of the polder were seriously damaged by SIDR and AILA. Many segments of the embankment of the Polder are damaged, mainly by overtopping action due to Sidr and Aila. The river side slope and berm in many places are subject to severe river erosion and wave action. The length of the embankment is under sectioned than design section with drastically deteriorated condition. Many of the hydraulic structures are fully or partially damaged and some are non-functioning due to missing of gates and siltation of C/S & R/S diversion channels. The concrete surfaces of the structures are in a deteriorated condition. The loose apron both C/S & R/S are either damaged or washed away. Most of the structures have to be re-built as they are not repairable. The embankment needs to be rehabilitated and upgraded with present CEIP design section.

Polder 33:

The Polder is located in Upazilla Dacope under Khulna District. The Polder covers 5 (five) Union Parishad (U/P), namely (1) Banisanta, (2) Laudob, (3) Kalashganj (4) Dacope and (5) Bazua. The Polder is bounded by Bhadra and Chunkuri Rivers to the West, Chunkuri and Pussur River to the North and East and Dhangmari River to the South. The approximate distance of the Polder is 250.00 km from Dhaka by road. The Polder was conceived in the year of 1960 under the Coastal Embankment Project (CEP). The construction of the polder was started in the year of 1966-67 and completed in the year of 1971-72. The original concept of construction of this Polder was only to protect the agricultural lands from salinity intrusion caused due to tidal inundation from the sea and river. At present, the embankment of the Polder is under heavy threat of cyclone surge, wave attack, river erosion and increasing risks brought about by climate change. The polder was affected by SIDR and AILA in the year of 2007 and 2009 respectively. Many segments of the embankment of the Polder were damaged mainly by overtopping due to Sidr and Aila. The river side slope and berm in many places are subject to river erosion and damaged by wave action. Almost the entirety of the embankment is under-sectioned and needs to be re-sectioned and upgraded to meet the CEIP design. Many of the hydraulic structures are partially damaged and few are non-functioning due to missing gates and silted up diversion channels. The other structures which are

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being functioning are not in good condition. The gates are corroded by saline water and concrete surfaces of the structures are in very poor condition. The loose apron on both C/S & R/S are either badly damaged or washed away due to lack of periodic maintenance. There is a local demand to use these structures for flushing as well as drainage in even though there is no provision for flushing. Most of the structures that are not repairable need to be replaced. The internal drainage channels have become silted up and have to be re-excavated on the basis of CEIP design.

Polder 35/1:

The Polder is located in two Upazillas namely Sharankhola and Morelganj under Bagerhat District. The Polder covers 5 Union Parishads (U/P) under the two Upazillas. Four U/P under Sharankhola namely 1) Khantakata, 2) Dhansagar, 3) Southkhali and 4) Rayenda and 1 (one) U/P under Morelganj namely Khaulia. The Polder is bounded by the mighty Baleswar River to the East and South, Sannashir Khal to the North and Bhola River to the West. The approximate distance of the Polder is 425.00 km from Dhaka by road. This Polder was conceived in the year of 1960 under Coastal Embankment Project (CEP). Construction of the Polder was started in 1961 and completed in 1968 but different types of other additional structures such as drainage sluices, flushing inlets and flushing cum drainage sluices as well as re-excavation of canals, construction of closure dams etc. were carried out afterwards. Later on, the Polder was rehabilitated under Second Coastal Embankment Rehabilitation Project (CERP-11) during 1997-98. The original concept of construction of this polder was only to protect the agricultural lands from salinity intrusion caused due to tidal inundation from the sea and river and to drain out rainfall run off. In the present context, the polder embankment continues to be under threat of cyclone surge, wave attack and increasing risks brought about by climate change. Many segments of the embankment in different places were damaged during SIDR and to a lesser extent by AILA mostly by overtopping of embankment, severe wave action and river erosion. Based on storm surge and wave analysis, two types of embankment have been recommended by the consultant. Most of the existing drainage sluices are in a very bad condition and have become almost non-functional. Many of these structures were constructed in early 1970. The concrete surfaces are severely affected by salinity. The upstream and downstream aprons of the sluices have been damaged. The loose aprons have also either been damaged or washed away. The gates of many sluices are either damaged or missing or non-functional. It is better to replace them with long lasting structures with the required ventage as per revised CEIP design condition. The internal drainage channels have become silted up and which need to be re-excavated for smooth drainage.

Polder 35/3:

The Polder is located in two Upazillas namely 1) Rampal and 2) BagerhatSadar under Bagerhat District. The Polder covers three Union Parishad (U/P) namely MalikerBer under Rampal U/Z and 1) Dema and 2) Karapare under BagerhatSadar U/Z. The Polder is surrounded by a big river Daratana to the East, Katakali River to the South West, Bishnu River to the West and Putimari River to the North. The approximate distance of the Polder is 371.00 km from Dhaka by road. The polder was conceived in the early 1960s. Construction of the Polder was started on 1981 and completed on 1986. Cyclone is the main threat to cause damage of life and properties of the polder area. The original concept of construction of this Polder was to protect low lying coastal areas against tidal flooding and salinity intrusion, considering only the tidal effects but ignoring effects of wind, wave and cyclonic storm surges. At the present context, the polder is under moderate threat of cyclone surge and wave

attack which are being magnified by climate change. The polder is vulnerable to river erosion. Many segment of the embankment have been damaged and eroded in river side slope in different places mainly due to river erosion, wave action and overtopping during SIDR. Most of the length of the embankment is under sectioned. Some places the crest level is almost down to ground level. The total length of the embankment will be re-sectioned and upgraded as per recommended CEIP design crest level. The existing structures are in a dilapidated condition. The gates do not function properly and drainage and flushing of water is taking place without any good control. The concrete surfaces of the structures have deteriorated. The reinforcement is found to be exposed in places and badly corroded in the saline environment. The internal drainage channels have silted up due to lack of maintenance for a long time. These will be re-excavated for efficient drainage within the Polder. The peripheral river named Putimari to the north of the polder is silted up due to which no water remains in the river during low tide but it gets water during the high tide which will serve the purpose of the flushing sluices exists on the periphery of this river.

Background of the Project Area

Bangladesh is a riverine country. There are more than 300 rivers in Bangladesh of which 57 are trans-boundary. Out of 57 trans-boundary rivers, 54 enter from India and 3 from Myanmar. It has a total area of 144,000 sq km and is surrounded to the west, north and east by India and shares a south-western border with Myanmar for 283 Km. To the south is the Bay of Bengal. The life and livelihood have been revolving around water of those rivers over the ages. The Ganges, the Brahmaputra (Jamuna) and the Meghna river system drain of about 1350 billion cubic metre discharge for total catchments area of about 1.72 million sq km through Bangladesh into Bay of Bengal (Fig.1).

The topography of Bangladesh is mainly comprised of the fertile alluvial floodplains of three large rivers namely Ganges, Brahmaputra and Meghna with over 90% of their catchments situated outside the country. These three rivers combine within the country to form the World's third largest river, the Lower Meghna, which drains into the Bay of Bengal via a constantly changing network of estuaries, tidal creeks and active deltaic coastline of the Bay. More than fifty other local rivers also flow within Bangladesh and drain into the Bay of Bengal. This lower part of the country adjoining with the Bay of Bengal is commonly known as "**Coastal Zone**".

The climate is subtropical to tropical and temperatures range from an average daytime low of 21°C in the cooler months of the year to 35°C in the hottest months. Annual rainfall varies from 1000 mm to 5000 mm with three-quarters of the rainfall occurring in between May and September. A substantial area of the country remains flooded during a normal monsoon season.

The population is close to 160 million, making it one of the densely populated countries in the world. Bangla is the national language of Bangladesh. Being predominantly agricultural, the average per capita income is US\$ 690.00. The population is predominantly Muslim with some 10% Hindu along with minorities of Buddhism and Christianity.

The life and livelihood have been revolving around water of those rivers over the ages. The Ganges, the Brahmaputra (Jamuna) and the Meghna river system drain of about 1350 billion cubic metre discharge for total catchments area of about 1.72 million sq km through Bangladesh into Bay of Bengal (Fig.1).

Major Sea Port; Chittagong is the main busy seaport of Bangladesh. Mongla (near Khulna) is the other seaport.

Land Port: Benapole, Bhomra, Tamabil, Hilli and Burimari

Airports; Dhaka and Chittagong are the standard international airports whereas Sylhet is a smaller international airport with limited facilities. Other national airports are; Saidpur, Rajshahi, Jeshore, Cox'sbazar.

The Project Area lies in South and South Western part of Bangladesh and spread over in the districts of Khulna and Bagerhat. Project Area is accessible by road and waterway. It is also accessible by air and road. It is about 6-7 hours drive from capital city Dhaka.

Vulnerability of Coastal Areas:

To counter the problems of frequent inundation by high tides and salinity intrusion, 139 Polders have been constructed in the coastal region of Bangladesh over the last 50 years period to protect 1.2 million hectares of land for permanent agriculture and the peoples residing in the coastal areas.

The Polders' embankments continue to be under threat of cyclone surges, wave attack and increasing risk brought about by climate changes. Most of the drainage sluices were built in early sixties & are in a very bad condition and have become almost non-functional. Concrete surfaces are severely affected by salinity. Upstream and downstream aprons of the sluices have also been damaged. Gates of many sluices are either damaged or missing or non-functional. Internal drainage channels have been silted up requiring re-excavation for smooth drainage.

Natural Hazards

Bangladesh experiences frequent natural disasters, loss of life, damage to infrastructure and other economic assets, which adversely impacts lives and livelihoods, especially of the poor people. Different regions of the country are affected differently by the various natural hazards. Climate change is expected to exacerbate many of the current problems and natural hazards that Bangladesh faces. This is due to its unique combination of physiographic, morphological and other natural features which have lead to the direct loss of life and physical property on a massive scale. The natural calamities are floods, cyclones and storm surges, and earthquakes are outlined below;

i) Cyclonic Storm Surge

Coastal flooding associated with storm surges is one of the world's foremost natural hazards in terms of loss of life and property damage. Storm surges are rapid sea level variations induced by cyclone wind fields. Cyclonic storms affecting the coastal region of Bangladesh cause heavy loss of life and property. The coastal regions bordering the Bay of Bengal suffer the worst because most of the tropical cyclones have genesis over the Bay of Bengal and strike the coast of Bangladesh. About one-tenth of the global total cyclones forming in different regions of the tropics occur in the Bay of Bengal. About one-sixth of tropical storms generated in the Bay of Bengal usually hit the Bangladesh coast. In many cases the

observed maximum water level was 4-12m and the death toll was 4000 to 3000,000. The main factors contributing to disastrous surges in the Bay of Bengal, especially Bangladesh are (a) Shallow coastal water (b) Convergence of the Bay, (c) High astronomical tides (d) Thickly populated low lying island and (f) Complex coastline and a number of tidal inlets including one of the World's largest river system Ganga-Brahmaputra-Meghna. Bangladesh Meteorological Department (BMD) forecasts the propagation of cyclone track, timing and location of landfall quite accurately. Historical records (Table-4.6) show that the Noakhali-Chittagong coast and Barisal-Noakhali coast are much more vulnerable for storm surges having maximum storm surge height of 13.64 m. The Khulna-Sundarban coastal region experiences storm surges with height ranging from 0.61 to 4.55 m.

TABLE-8: HISTORICAL RECORDS OF STORM SURGE

Coast	Range of Storm height (m)
Khulna Sundarban	0.61-4.55
Barisal Pataukhali-Noakhali	0.6-13.03
Noakhali-Chittagong	0.90-13.64
Chittagong-Cox's Bazar	0.90-5.15

ii) Increasing Frequency and Intensity of Tropical Cyclones:

As the most vulnerable country in the world to tropical cyclones, 60% of the worldwide deaths caused by cyclones in the last 20 years were in Bangladesh. A severe tropical cyclone hits Bangladesh on average every 3 years. These storms generally form in the Bay of Bengal in the months just before and after the monsoon and are accompanied by high winds of over 150 km per hr which can result in storm surges up to seven meters high. These storms can, therefore, result in losses of lives and livelihoods and extensive damages to houses and infrastructure in the coastal areas. The storm surges tend to be higher in Bangladesh than in neighboring countries because the Bay of Bengal narrows towards the north, where Bangladesh is located. Two recent tropical cyclones 'Sidr' and 'Aila' caused extensive damages. 'Sidr' struck the south-west coast of Bangladesh on 15 November 2007, affecting 2.3 million households and causing damage and losses estimated around US\$1.7 billion. 'Aila' struck the southern coast of Bangladesh on 25 May 2009 affecting nearly 5 million people and causing infrastructure damage of over US\$60 million. Climate change is expected to increase the frequency and intensity of tropical cyclones. With higher wind speeds and storm surges, these storms are expected to cause even more damages in the coastal regions.

iii) Flooding

Flood is a common phenomenon in Bangladesh. The major cause of flood is monsoon rainfall runoff from upstream catchments. More than 93 percent of runoff is from outside Bangladesh. Bangladesh is the sixth most vulnerable country to floods in the world. Most of Bangladesh lies in the delta of 3 of the largest rivers in the world, the Ganges-Brahmaputra-Meghna basin – with globally the second highest water flow during the flood season. In most years between 30-50% of the country is affected by floods. These cause losses in

agriculture, damages to households and livelihoods. However, every 4 to 5 years, there is a major flood that inundates 60% of the country and cause losses of life, substantial damage to infrastructure, housing, agriculture and livelihoods. In the last 25 years, Bangladesh has experienced six severe floods. In 2007, two successive floods inundated over 70% of the country, destroyed over 85,000 houses, affected almost 1 million households and destroyed 1.2 million acres of crops. Total estimated damage from these floods was over US\$1 billion.

It has been observed that land development works need to be conducted to a certain height for avoiding flood. The equipment of intake pump, treatment plant pump and machineries, distribution reservoir pumping station must keep 1m above the highest flood level.

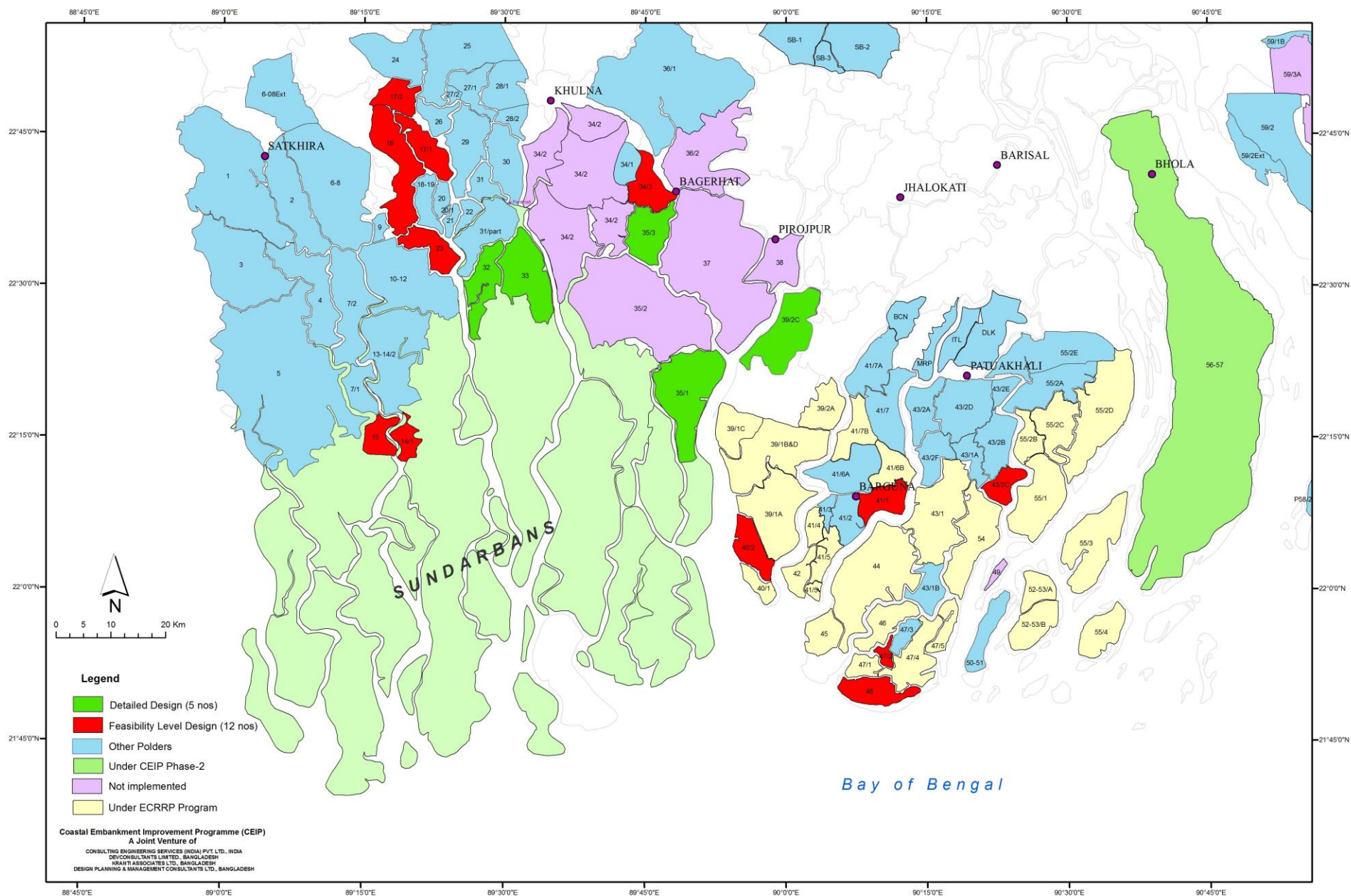
iii) Earthquake

Bangladesh and northeast Indian states have long been one of the seismically active regions of the world, and they have experienced numerous large earthquakes during the past 200 years at an average rate of one in every 30 years.

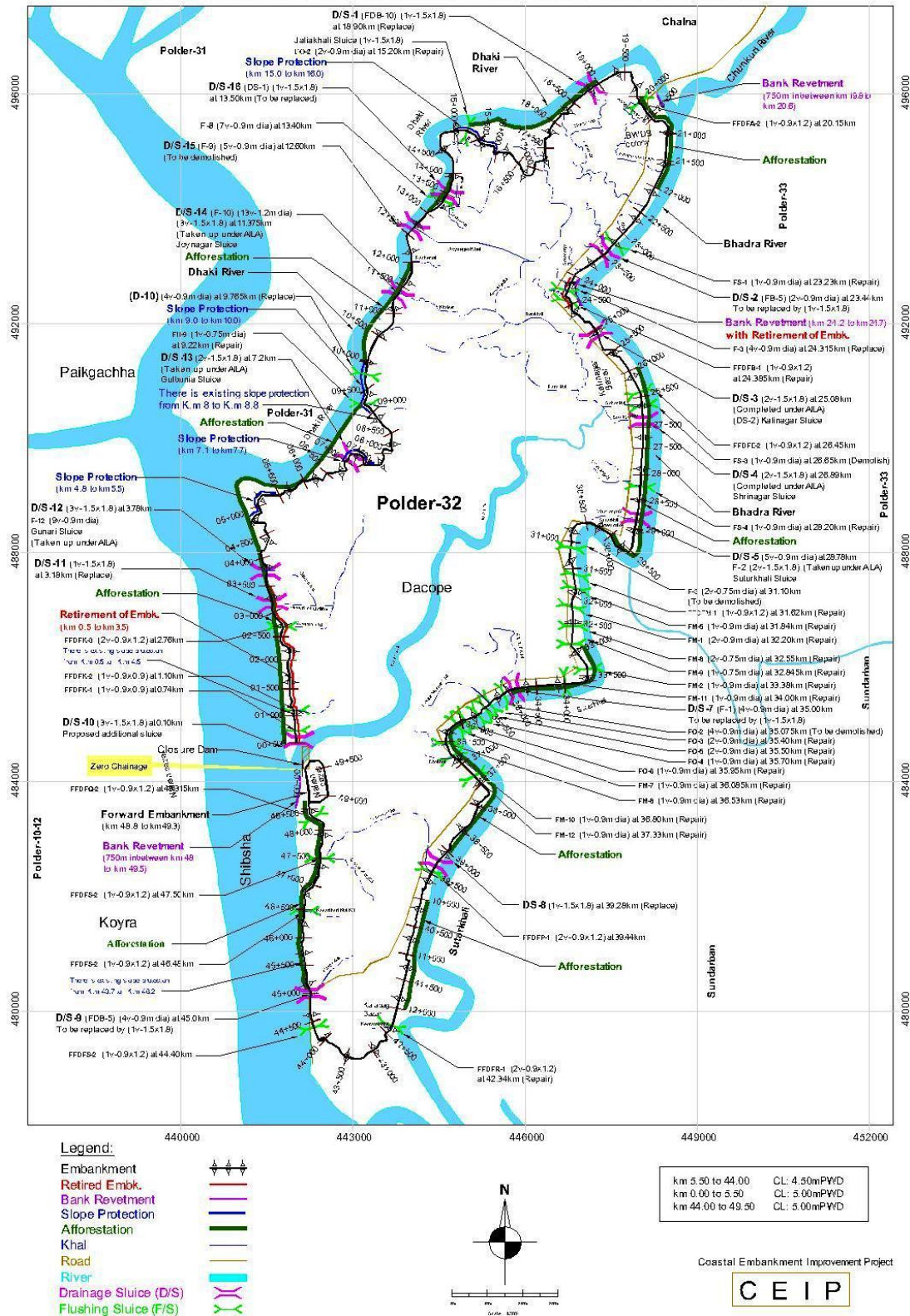
The catastrophic earthquakes of 1762 and 1782 are believed to have been partially responsible for the diversion of the Old Brahmaputra River from the west of Mymensingh to the present Jamuna Channel and the diversion of the Ganges River from its main Arial Khan distributaries to the present Padma channel. Since 1860 over 20 shallow and intermediate major earthquake epicenters have been recorded in Bangladesh and surrounding area.



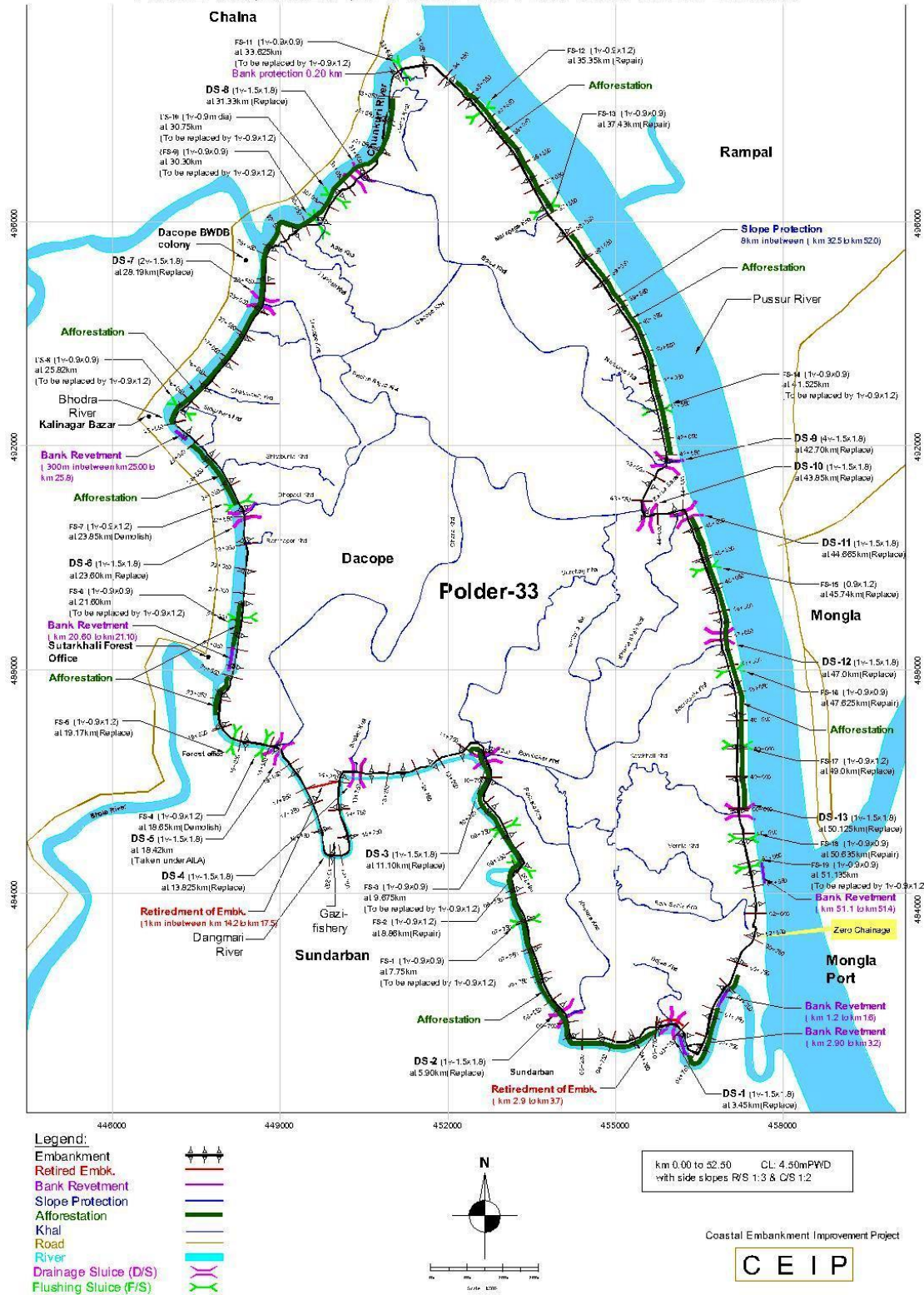
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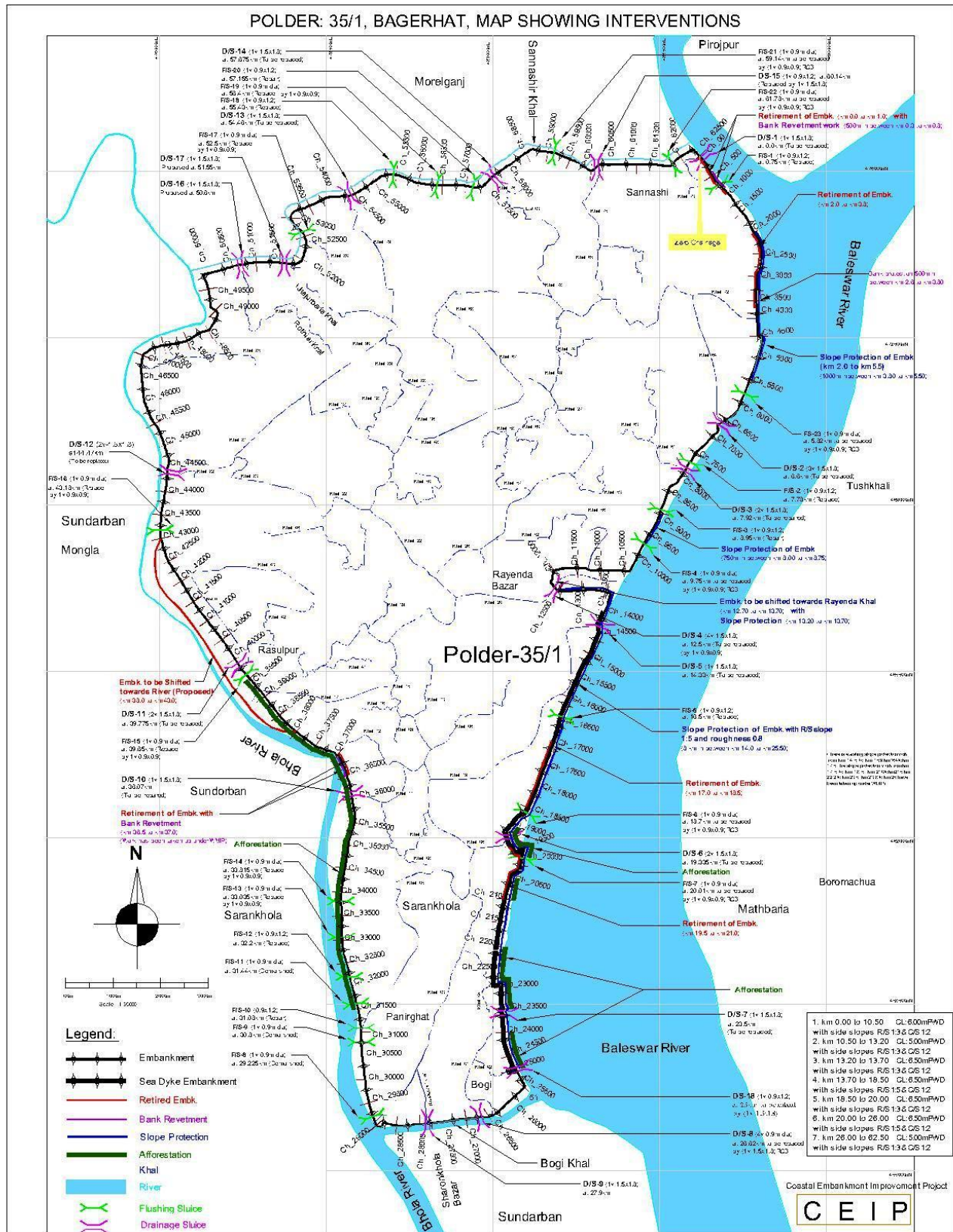


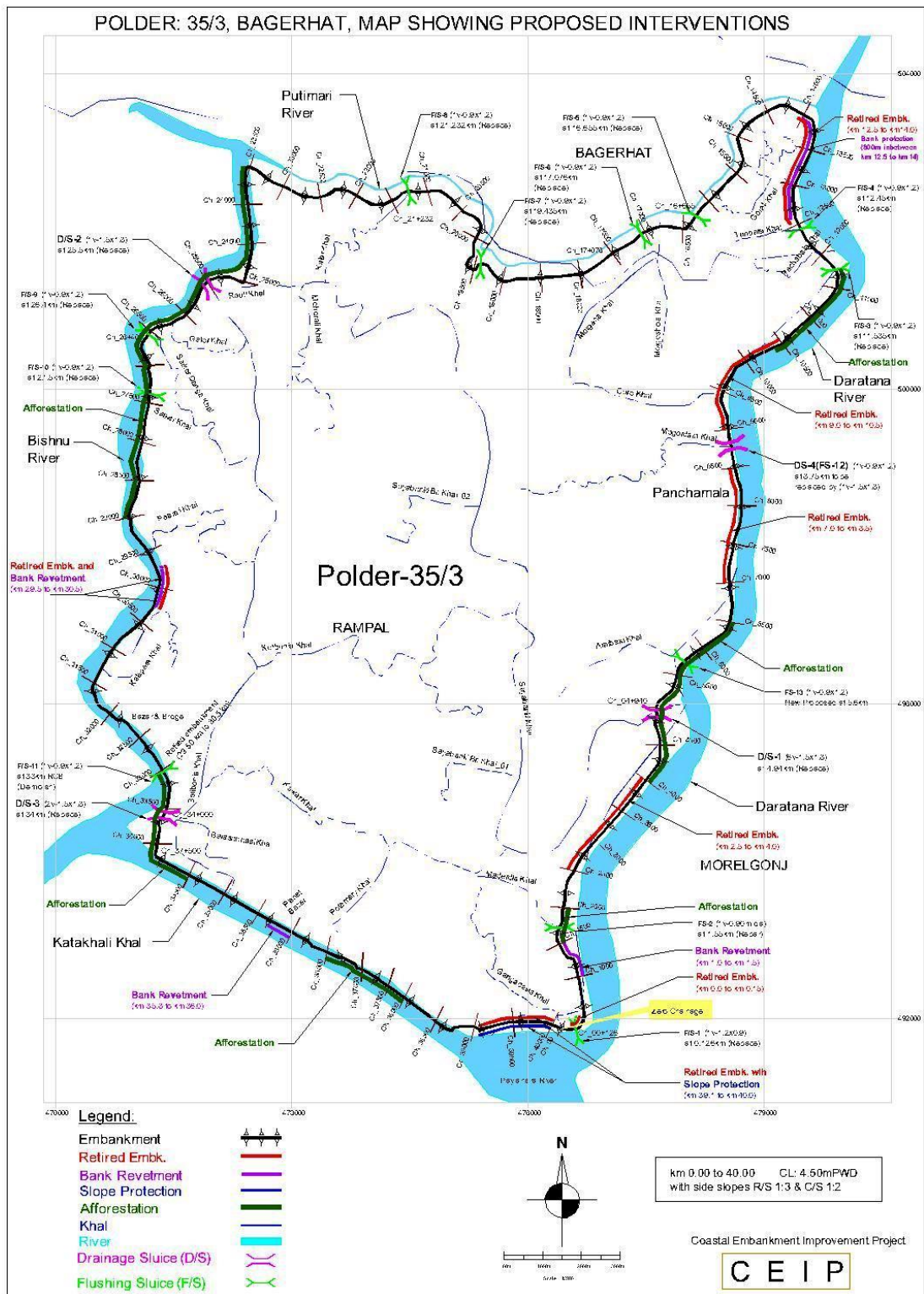
POLDER: 32, KHULNA, MAP SHOWING PROPOSED INTERVENTIONS



POLDER: 33, KHULNA, MAP SHOWING PROPOSED INTERVENTIONS







Drawings

Approved drawings of the Polders (Polder No.32, 33, 35/1 and 35/3) under Package No.CEIP-1/W-01 under Coastal Embankment Improvement Project, Phase I (CEIP-I) are enclosed in a 4(four) separate bound volume in **Annex-A**.



Section VIII-General Conditions (GC)

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General Conditions

1. General Provisions

1.1 Definitions

In the Conditions of Contract (“these Conditions”), which include Particular Conditions, Parts A and B, and these General Conditions, the following words and expressions shall have the meanings stated. Words indicating persons or parties include corporations and other legal entities, except where the context requires otherwise.

1.1.1 The Contract

1.1.1.1 “Contract” means the Contract Agreement, the Letter of Acceptance, the Letter of Tender, these Conditions, the Specification, the Drawings, the Schedules, and the further documents (if any) which are listed in the Contract Agreement or in the Letter of Acceptance.

1.1.1.2 “Contract Agreement” means the contract agreement referred to in Sub-Clause 1.6 [Contract Agreement].

1.1.1.3 “Letter of Acceptance” means the letter of formal acceptance, signed by the Employer, of the Letter of Tender, including any annexed memoranda comprising agreements between and signed by both Parties. If there is no such letter of acceptance, the expression “Letter of Acceptance” means the Contract Agreement and the date of issuing or receiving the Letter of Acceptance means the date of signing the Contract Agreement.

1.1.1.4 “Letter of Tender” means the document entitled letter of tender or letter of bid, which was completed by the Contractor and includes the signed offer to the Employer for the Works.

1.1.1.5 “Specification” means the document entitled specification, as included in the Contract, and any additions and modifications to the specification in accordance with the Contract. Such document specifies the Works.

1.1.1.6 “Drawings” means the drawings of the Works, as included in the Contract, and any additional and modified drawings issued by (or on behalf of) the Employer in accordance with the Contract.

1.1.1.7 “Schedules” means the document(s) entitled schedules, completed by the Contractor and submitted with the Letter of Tender, as included in the Contract. Such document may include the Bill of Quantities, data, lists, and schedules of rates and/or prices.

1.1.1.8 “Tender” means the Letter of Tender and all other documents which the Contractor submitted with the Letter of Tender, as included in the Contract.

1.1.1.9 “Bill of Quantities”, “Daywork Schedule” and “Schedule of Payment Currencies” mean the documents so named (if any) which are comprised in the Schedules.

1.1.1.10 “Contract Data” means the pages completed by the Employer entitled contract data which constitute Part A of the Particular Conditions.

1.1.2 Parties and Persons

1.1.2.1 “Party” means the Employer or the Contractor, as the context requires.

1.1.2.2 “Employer” means the person named as employer in the

Contract Data and the legal successors in title to this person.

- 1.1.2.3 “Contractor” means the person(s) named as contractor in the Letter of Tender accepted by the Employer and the legal successors in title to this person(s).
- 1.1.2.4 “Engineer” means the person appointed by the Employer to act as the Engineer for the purposes of the Contract and named in the Contract Data, or other person appointed from time to time by the Employer and notified to the Contractor under Sub-Clause 3.4 [Replacement of the Engineer].
- 1.1.2.5 “Contractor’s Representative” means the person named by the Contractor in the Contract or appointed from time to time by the Contractor under Sub-Clause 4.3 [Contractor’s Representative], who acts on behalf of the Contractor.
- 1.1.2.6 “Employer’s Personnel” means the Engineer, the assistants referred to in Sub-Clause 3.2 [Delegation by the Engineer] and all other staff, labour and other employees of the Engineer and of the Employer; and any other personnel notified to the Contractor, by the Employer or the Engineer, as Employer’s Personnel.
- 1.1.2.7 “Contractor’s Personnel” means the Contractor’s Representative and all personnel whom the Contractor utilises on Site, who may include the staff, labour and other employees of the Contractor and of each Subcontractor; and any other personnel assisting the Contractor in the execution of the Works.
- 1.1.2.8 “Subcontractor” means any person named in the Contract as a subcontractor, or any person appointed as a subcontractor, for a part of the Works; and the legal successors in title to each of these persons.
- 1.1.2.9 “DB” means the person or three persons appointed under Sub-Clause 20.2 [Appointment of the Dispute Board] or Sub-Clause 20.3 [Failure to Agree on the Composition of the Dispute Board]
- 1.1.2.10 “FIDIC” means the Fédération Internationale des Ingénieurs-Conseils, the international federation of consulting engineers.
- 1.1.2.11 “Bank” means the financing institution (if any) named in the Contract Data.
- 1.1.2.12 “Borrower” means the person (if any) named as the borrower in the Contract Data.
- 1.1.3.1 “Base Date” means the date 28 days prior to the latest date for submission of the Tender.
- 1.1.3.2 “Commencement Date” means the date notified under Sub-Clause 8.1 [Commencement of Works].
- 1.1.3.3 “Time for Completion” means the time for completing the Works or a Section (as the case may be) under Sub-Clause 8.2 [Time for Completion], as stated in the Contract Data (with any extension under Sub-Clause 8.4 [Extension of Time for Completion]), calculated from the Commencement Date.
- 1.1.3.4 “Tests on Completion” means the tests which are specified in the Contract or agreed by both Parties or instructed as a Variation, and which are carried out under Clause 9 [Tests on Completion] before the Works or a Section (as the case

1.1.3 Dates, Tests, Periods and Completion

may be) are taken over by the Employer.

1.1.3.5 "Taking-Over Certificate" means a certificate issued under Clause 10 [Employer's Taking Over].

1.1.3.6 "Tests after Completion" means the tests (if any) which are specified in the Contract and which are carried out in accordance with the Specification after the Works or a Section (as the case may be) are taken over by the Employer.

1.1.3.7 "Defects Notification Period" means the period for notifying defects in the Works or a Section (as the case may be) under Sub-Clause 11.1 [Completion of Outstanding Work and Remedying Defects], which extends over 365 days except if otherwise stated in the Contract Data (with any extension under Sub-Clause 11.3 [Extension of Defects Notification Period]), calculated from the date on which the Works or Section is completed as certified under Sub-Clause 10.1 [Taking Over of the Works and Sections].

1.1.3.8 "Performance Certificate" means the certificate issued under Sub-Clause 11.9 [Performance Certificate].

1.1.3.9 "Day" means a calendar day and "year" means 365 days.

1.1.4 Money and Payments

1.1.4.1 "Accepted Contract Amount" means the amount accepted in the Letter of Acceptance for the execution and completion of the Works and the remedying of any defects.

1.1.4.2 "Contract Price" means the price defined in Sub-Clause 14.1 [The Contract Price], and includes adjustments in accordance with the Contract.

1.1.4.3 "Cost" means all expenditure reasonably incurred (or to be incurred) by the Contractor, whether on or off the Site, including overhead and similar charges, but does not include profit.

1.1.4.4 "Final Payment Certificate" means the payment certificate issued under Sub-Clause 14.13 [Issue of Final Payment Certificate].

1.1.4.5 "Final Statement" means the statement defined in Sub-Clause 14.11 [Application for Final Payment Certificate].

1.1.4.6 "Foreign Currency" means a currency in which part (or all) of the Contract Price is payable, but not the Local Currency.

1.1.4.7 "Interim Payment Certificate" means a payment certificate issued under Clause 14 [Contract Price and Payment], other than the Final Payment Certificate.

1.1.4.8 "Local Currency" means the currency of the Country.

1.1.4.9 "Payment Certificate" means a payment certificate issued under Clause 14 [Contract Price and Payment].

1.1.4.10 "Provisional Sum" means a sum (if any) which is specified in the Contract as a provisional sum, for the execution of any part of the Works or for the supply of Plant, Materials or services under Sub-Clause 13.5 [Provisional Sums].

1.1.4.11 "Retention Money" means the accumulated retention moneys which the Employer retains under Sub-Clause 14.3 [Application for Interim Payment Certificates] and pays under Sub-Clause 14.9 [Payment of Retention Money].

1.1.4.12 "Statement" means a statement submitted by the Contractor



as part of an application, under Clause 14 [Contract Price and Payment], for a payment certificate.

1.1.5 Works and Goods

- 1.1.5.1 "Contractor's Equipment" means all apparatus, machinery, vehicles and other things required for the execution and completion of the Works and the remedying of any defects. However, Contractor's Equipment excludes Temporary Works, Employer's Equipment (if any), Plant, Materials and any other things intended to form or forming part of the Permanent Works.
- 1.1.5.2 "Goods" means Contractor's Equipment, Materials, Plant and Temporary Works, or any of them as appropriate.
- 1.1.5.3 "Materials" means things of all kinds (other than Plant) intended to form or forming part of the Permanent Works, including the supply-only materials (if any) to be supplied by the Contractor under the Contract.
- 1.1.5.4 "Permanent Works" means the permanent works to be executed by the Contractor under the Contract.
- 1.1.5.5 "Plant" means the apparatus, machinery and other equipment intended to form or forming part of the Permanent Works, including vehicles purchased for the Employer and relating to the construction or operation of the Works.
- 1.1.5.6 "Section" means a part of the Works specified in the Contract Data as a Section (if any).
- 1.1.5.7 "Temporary Works" means all temporary works of every kind (other than Contractor's Equipment) required on Site for the execution and completion of the Permanent Works and the remedying of any defects.
- 1.1.5.8 "Works" mean the Permanent Works and the Temporary Works, or either of them as appropriate.

1.1.6 Other Definitions

- 1.1.6.1 "Contractor's Documents" means the calculations, computer programs and other software, drawings, manuals, models and other documents of a technical nature (if any) supplied by the Contractor under the Contract.
- 1.1.6.2 "Country" means the country in which the Site (or most of it) is located, where the Permanent Works are to be executed.
- 1.1.6.3 "Employer's Equipment" means the apparatus, machinery and vehicles (if any) made available by the Employer for the use of the Contractor in the execution of the Works, as stated in the Specification; but does not include Plant which has not been taken over by the Employer.
- 1.1.6.4 "Force Majeure" is defined in Clause 19 [Force Majeure].
- 1.1.6.5 "Laws" means all national (or state) legislation, statutes, ordinances and other laws, and regulations and by-laws of any legally constituted public authority.
- 1.1.6.6 "Performance Security" means the security (or securities, if any) under Sub-Clause 4.2 [Performance Security].
- 1.1.6.7 "Site" means the places where the Permanent Works are to be executed, including storage and working areas, and to which Plant and Materials are to be delivered, and any other places as may be specified in the Contract as forming part of the Site.
- 1.1.6.8 "Unforeseeable" means not reasonably foreseeable by an

experienced contractor by the Base Date.

1.1.6.9 "Variation" means any change to the Works, which is instructed or approved as a variation under Clause 13 [Variations and Adjustments].

1.1.6.10 "Notice of Dissatisfaction" means the notice given by either Party to the other under Sub-Clause 20.4 [Obtaining Dispute Board's Decision] indicating its dissatisfaction and intention to commence arbitration.

1.2 Interpretation

In the Contract, except where the context requires otherwise:

- (a) words indicating one gender include all genders;
- (b) words indicating the singular also include the plural and words indicating the plural also include the singular;
- (c) provisions including the word "agree", "agreed" or "agreement" require the agreement to be recorded in writing;
- (d) "written" or "in writing" means hand-written, type-written, printed or electronically made, and resulting in a permanent record; and
- (e) the word "tender" is synonymous with "bid" and "tenderer" with "bidder" and the words "tender documents" with "bidding documents"

The marginal words and other headings shall not be taken into consideration in the interpretation of these Conditions.

In these Conditions, provisions including the expression "Cost plus profit" require this profit to be one-twentieth (5%) of this Cost unless otherwise indicated in the Contract Data.

1.3 Communications

Wherever these Conditions provide for the giving or issuing of approvals, certificates, consents, determinations, notices, requests and discharges, these communications shall be:

- (a) in writing and delivered by hand (against receipt), sent by mail or courier, or transmitted using any of the agreed systems of electronic transmission as stated in the Contract Data; and
- (b) delivered, sent or transmitted to the address for the recipient's communications as stated in the Contract Data. However:
 - (i) if the recipient gives notice of another address, communications shall thereafter be delivered accordingly; and
 - (ii) if the recipient has not stated otherwise when requesting an approval or consent, it may be sent to the address from which the request was issued.

Approvals, certificates, consents and determinations shall not be unreasonably withheld or delayed. When a certificate is issued to a Party, the certifier shall send a copy to the other Party. When a notice is issued to a Party, by the other Party or the Engineer, a copy shall be sent to the Engineer or the other Party, as the case may be.



- 1.4 Law and Language** The Contract shall be governed by the law of the country or other jurisdiction stated in the Contract Data.
- The ruling language of the Contract shall be that stated in the Contract Data.
- The language for communications shall be that stated in the Contract Data. If no language is stated there, the language for communications shall be the ruling language of the Contract.
- 1.5 Priority of Documents** The documents forming the Contract are to be taken as mutually explanatory of one another. For the purposes of interpretation, the priority of the documents shall be in accordance with the following sequence:
- (a) the Contract Agreement (if any),
 - (b) the Letter of Acceptance,
 - (c) the Letter of Tender,
 - (d) the Particular Conditions – Part A,
 - (e) the Particular Conditions – Part B
 - (f) these General Conditions
 - (g) the Specification,
 - (h) the Drawings, and
 - (i) the Schedules and any other documents forming part of the Contract.
- If an ambiguity or discrepancy is found in the documents, the Engineer shall issue any necessary clarification or instruction.
- 1.6 Contract Agreement** The Parties shall enter into a Contract Agreement within 28 days after the Contractor receives the Letter of Acceptance, unless the Particular Conditions establish otherwise. The Contract Agreement shall be based upon the form annexed to the Particular Conditions. The costs of stamp duties and similar charges (if any) imposed by law in connection with entry into the Contract Agreement shall be borne by the Employer.
- 1.7 Assignment** Neither Party shall assign the whole or any part of the Contract or any benefit or interest in or under the Contract. However, either Party:
- (a) may assign the whole or any part with the prior agreement of the other Party, at the sole discretion of such other Party, and
 - (b) may, as security in favour of a bank or financial institution, assign its right to any moneys due, or to become due, under the Contract.
- 1.8 Care and Supply of Documents** The Specification and Drawings shall be in the custody and care of the Employer. Unless otherwise stated in the Contract, two copies of the Contract and of each subsequent Drawing shall be supplied to the Contractor, who may make or request further copies at the cost of the Contractor.
- Each of the Contractor's Documents shall be in the custody and care of the Contractor, unless and until taken over by the Employer. Unless otherwise stated in the Contract, the Contractor shall supply to the Engineer six copies of each of the Contractor's Documents.

The Contractor shall keep, on the Site, a copy of the Contract, publications named in the Specification, the Contractor's Documents (if any), the Drawings and Variations and other communications given under the Contract. The Employer's Personnel shall have the right of access to all these documents at all reasonable times.

If a Party becomes aware of an error or defect in a document which was prepared for use in executing the Works, the Party shall promptly give notice to the other Party of such error or defect.

1.9 Delayed Drawings or Instructions

The Contractor shall give notice to the Engineer whenever the Works are likely to be delayed or disrupted if any necessary drawing or instruction is not issued to the Contractor within a particular time, which shall be reasonable. The notice shall include details of the necessary drawing or instruction, details of why and by when it should be issued, and the nature and amount of the delay or disruption likely to be suffered if it is late.

If the Contractor suffers delay and/or incurs Cost as a result of a failure of the Engineer to issue the notified drawing or instruction within a time which is reasonable and is specified in the notice with supporting details, the Contractor shall give a further notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost plus profit, which shall be included in the Contract Price.

After receiving this further notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

However, if and to the extent that the Engineer's failure was caused by any error or delay by the Contractor, including an error in, or delay in the submission of, any of the Contractor's Documents, the Contractor shall not be entitled to such extension of time, Cost or profit.

1.10 Employer's Use of Contractor's Documents

As between the Parties, the Contractor shall retain the copyright and other intellectual property rights in the Contractor's Documents and other design documents made by (or on behalf of) the Contractor.

The Contractor shall be deemed (by signing the Contract) to give to the Employer a non-terminable transferable non-exclusive royalty-free license to copy, use and communicate the Contractor's Documents, including making and using modifications of them. This license shall:

- (a) apply throughout the actual or intended working life (whichever is longer) of the relevant parts of the Works,
- (b) entitle any person in proper possession of the relevant part of the Works to copy, use and communicate the Contractor's Documents for the purposes of completing, operating, maintaining, altering, adjusting, repairing and demolishing the Works, and
- (c) in the case of Contractor's Documents which are in the form of computer programs and other software, permit their use on any computer on the Site and other places as envisaged by the Contract, including replacements of any computers supplied by the Contractor.

The Contractor's Documents and other design documents made by (or on behalf of) the Contractor shall not, without the Contractor's consent, be used, copied or communicated to a third party by (or on behalf of) the Employer for purposes other than those permitted under this Sub-Clause.

1.11 Contractor's Use of Employer's Documents

As between the Parties, the Employer shall retain the copyright and other intellectual property rights in the Specification, the Drawings and other documents made by (or on behalf of) the Employer. The Contractor may, at his cost, copy, use, and obtain communication of these documents for the purposes of the Contract. They shall not, without the Employer's consent, be copied, used or communicated to a third party by the Contractor, except as necessary for the purposes of the Contract.

1.12 Confidential Details

The Contractor's and the Employer's Personnel shall disclose all such confidential and other information as may be reasonably required in order to verify compliance with the Contract and allow its proper implementation.

Each of them shall treat the details of the Contract as private and confidential, except to the extent necessary to carry out their respective obligations under the Contract or to comply with applicable Laws. Each of them shall not publish or disclose any particulars of the Works prepared by the other Party without the previous agreement of the other Party. However, the Contractor shall be permitted to disclose any publicly available information, or information otherwise required to establish his qualifications to compete for other projects.

1.13 Compliance with Laws

The Contractor shall, in performing the Contract, comply with applicable Laws. Unless otherwise stated in the Particular Conditions:

- (a) the Employer shall have obtained (or shall obtain) the planning, zoning, building permit or similar permission for the Permanent Works, and any other permissions described in the Specification as having been (or to be) obtained by the Employer; and the Employer shall indemnify and hold the Contractor harmless against and from the consequences of any failure to do so; and
- (b) the Contractor shall give all notices, pay all taxes, duties and fees, and obtain all permits, licenses and approvals, as required by the Laws in relation to the execution and completion of the Works and the remedying of any defects; and the Contractor shall indemnify and hold the Employer harmless against and from the consequences of any failure to do so, unless the Contractor is impeded to accomplish these actions and shows evidence of its diligence.

1.14 Joint and Several Liability

If the Contractor constitutes (under applicable Laws) a joint venture, consortium or other unincorporated grouping of two or more persons:

- (a) these persons shall be deemed to be jointly and severally liable to the Employer for the performance of the Contract;
- (b) these persons shall notify the Employer of their leader who shall have authority to bind the Contractor and each of these persons; and
- (c) the Contractor shall not alter its composition or legal status without the prior consent of the Employer.

1.15 Inspections and Audit by the Bank

The Contractor shall permit the Bank and/or persons appointed by the Bank to inspect the Site and/or the Contractor's accounts and records relating to the performance of the Contract and to have such accounts and records audited by auditors appointed by the Bank if required by the Bank.

2. The Employer

2.1 Right of Access to the Site

The Employer shall give the Contractor right of access to and possession of, all parts of the Site within the time (or times) stated in the Contract Data. The right and possession may not be exclusive to the Contractor. If, under the Contract, the Employer is required to give (to the Contractor) possession of any foundation, structure, plant or means of access, the Employer shall do so in the time and manner stated in the Specification. However, the Employer may withhold any such right or possession until the Performance Security has been received.

If no such time is stated in the Contract Data, the Employer shall give the Contractor right of access to, and possession of, the Site within such times as required to enable the Contractor to proceed without disruption in accordance with the programme submitted under Sub-Clause 8.3 [Programme].

If the Contractor suffers delay and/or incurs Cost as a result of a failure by the Employer to give any such right or possession within such time, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost plus profit, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

However, if and to the extent that the Employer's failure was caused by any error or delay by the Contractor, including an error in, or delay in the submission of, any of the Contractor's Documents, the Contractor shall not be entitled to such extension of time, Cost or profit.

2.2 Permits, Licenses or Approvals

The Employer shall provide, at the request of the Contractor, such reasonable assistance as to allow the Contractor to obtain properly:

- (a) copies of the Laws of the Country which are relevant to the Contract but are not readily available, and
- (b) any permits, licenses or approvals required by the Laws of the Country:
 - (i) which the Contractor is required to obtain under Sub-Clause 1.13 [Compliance with Laws],
 - (ii) for the delivery of Goods, including clearance through customs, and
 - (iii) for the export of Contractor's Equipment when it is removed from the Site.

2.3 Employer's Personnel

The Employer shall be responsible for ensuring that the Employer's Personnel and the Employer's other contractors on the Site:

- (a) co-operate with the Contractor's efforts under Sub-Clause 4.6 [Co-operation], and
- (b) take actions similar to those which the Contractor is required to take under sub-paragraphs (a), (b) and (c) of Sub-Clause 4.8 [Safety Procedures] and under Sub-Clause 4.18 [Protection of the Environment].

2.4 Employer's Financial Arrangements

The Employer shall submit, before the Commencement Date and thereafter within 28 days after receiving any request from the Contractor, reasonable evidence that financial arrangements have been made and are being maintained which will enable the Employer to pay the Contract Price punctually (as estimated at that time) in accordance with Clause 14 [Contract Price and Payment]. Before the Employer makes any material change to his financial arrangements, the Employer shall give notice to the Contractor with detailed particulars.

In addition, if the Bank has notified to the Borrower that the Bank has suspended disbursements under its loan, which finances in whole or in part the execution of the Works, the Employer shall give notice of such suspension to the Contractor with detailed particulars, including the date of such notification, with a copy to the Engineer, within 7 days of the Borrower having received the suspension notification from the Bank. If alternative funds will be available in appropriate currencies to the Employer to continue making payments to the Contractor beyond a date 60 days after the date of Bank notification of the suspension, the Employer shall provide reasonable evidence in his notice of the extent to which such funds will be available.

2.5 Employer's Claims

If the Employer considers himself to be entitled to any payment under any Clause of these Conditions or otherwise in connection with the Contract, and/or to any extension of the Defects Notification Period, the Employer or the Engineer shall give notice and particulars to the Contractor. However, notice is not required for payments due under Sub-Clause 4.19 [Electricity, Water and Gas], under Sub-Clause 4.20 [Employer's Equipment and Free-Issue Materials], or for other services requested by the Contractor.

The notice shall be given as soon as practicable and no longer than 28 days after the Employer became aware, or should have become aware, of the event or circumstances giving rise to the claim. A notice relating to any extension of the Defects Notification Period shall be given before the expiry of such period.

The particulars shall specify the Clause or other basis of the claim, and shall include substantiation of the amount and/or extension to which the Employer considers himself to be entitled in connection with the Contract. The Engineer shall then proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine (i) the amount (if any) which the Employer is entitled to be paid by the Contractor, and/or (ii) the extension (if any) of the Defects Notification Period in accordance with Sub-Clause 11.3 [Extension of Defects Notification Period].

This amount may be included as a deduction in the Contract Price and Payment Certificates. The Employer shall only be entitled to set off against or make any deduction from an amount certified in a Payment Certificate, or to otherwise claim against the Contractor, in accordance with this Sub-Clause.

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3. The Engineer

3.1 Engineer's Duties and Authority

The Employer shall appoint the Engineer who shall carry out the duties assigned to him in the Contract. The Engineer's staff shall include suitably qualified engineers and other professionals who are competent to carry out these duties.

The Engineer shall have no authority to amend the Contract.

The Engineer may exercise the authority attributable to the Engineer as specified in or necessarily to be implied from the Contract. If the Engineer is required to obtain the approval of the Employer before exercising a specified authority, the requirements shall be as stated in the Particular Conditions. The Employer shall promptly inform the Contractor of any change to the authority attributed to the Engineer.

However, whenever the Engineer exercises a specified authority for which the Employer's approval is required, then (for the purposes of the Contract) the Employer shall be deemed to have given approval.

Except as otherwise stated in these Conditions:

- (a) whenever carrying out duties or exercising authority, specified in or implied by the Contract, the Engineer shall be deemed to act for the Employer;
- (b) the Engineer has no authority to relieve either Party of any duties, obligations or responsibilities under the Contract;
- (c) any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test, or similar act by the Engineer (including absence of disapproval) shall not relieve the Contractor from any responsibility he has under the Contract, including responsibility for errors, omissions, discrepancies and non-compliances; and
- (d) any act by the Engineer in response to a Contractor's request except as otherwise expressly specified shall be notified in writing to the Contractor within 28 days of receipt.

The following provisions shall apply:

The Engineer shall obtain the specific approval of the Employer before taking action under the following Sub-Clauses of these Conditions:

- (a) Sub-Clause 4.12: agreeing or determining an extension of time and/or additional cost.
- (b) Sub-Clause 13.1: instructing a Variation, except;
 - (i) in an emergency situation as determined by the Engineer, or
 - (ii) if such a Variation would increase the Accepted Contract Amount by less than the percentage specified in the Contract Data.
- (c) Sub-Clause 13.3: Approving a proposal for Variation submitted by the Contractor in accordance with Sub Clause 13.1 or 13.2.
- (d) Sub-Clause 13.4: Specifying the amount payable in each of the applicable currencies

Notwithstanding the obligation, as set out above, to obtain approval, if, in the opinion of the Engineer, an emergency occurs affecting the safety of life or of the Works or of adjoining property, he may, without relieving the Contractor of any of his duties and responsibility under the Contract, instruct the Contractor to execute all such work or to do all such things

as may, in the opinion of the Engineer, be necessary to abate or reduce the risk. The Contractor shall forthwith comply, despite the absence of approval of the Employer, with any such instruction of the Engineer. The Engineer shall determine an addition to the Contract Price, in respect of such instruction, in accordance with Clause 13 and shall notify the Contractor accordingly, with a copy to the Employer.

3.2 Delegation by the Engineer

The Engineer may from time to time assign duties and delegate authority to assistants, and may also revoke such assignment or delegation. These assistants may include a resident engineer, and/or independent inspectors appointed to inspect and/or test items of Plant and/or Materials. The assignment, delegation or revocation shall be in writing and shall not take effect until copies have been received by both Parties. However, unless otherwise agreed by both Parties, the Engineer shall not delegate the authority to determine any matter in accordance with Sub-Clause 3.5 [Determinations].

Each assistant, to whom duties have been assigned or authority has been delegated, shall only be authorized to issue instructions to the Contractor to the extent defined by the delegation. Any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test, or similar act by an assistant, in accordance with the delegation, shall have the same effect as though the act had been an act of the Engineer. However:

- (a) any failure to disapprove any work, Plant or Materials shall not constitute approval, and shall therefore not prejudice the right of the Engineer to reject the work, Plant or Materials;
- (b) if the Contractor questions any determination or instruction of an assistant, the Contractor may refer the matter to the Engineer, who shall promptly confirm, reverse or vary the determination or instruction.

3.3 Instructions of the Engineer

The Engineer may issue to the Contractor (at any time) instructions and additional or modified Drawings which may be necessary for the execution of the Works and the remedying of any defects, all in accordance with the Contract. The Contractor shall only take instructions from the Engineer, or from an assistant to whom the appropriate authority has been delegated under this Clause. If an instruction constitutes a Variation, Clause 13 [Variations and Adjustments] shall apply.

The Contractor shall comply with the instructions given by the Engineer or delegated assistant, on any matter related to the Contract. Whenever practicable, their instructions shall be given in writing. If the Engineer or a delegated assistant:

- (a) gives an oral instruction,
- (b) receives a written confirmation of the instruction, from (or on behalf of) the Contractor, within two working days after giving the instruction, and
- (c) does not reply by issuing a written rejection and/or instruction within two working days after receiving the confirmation,

then the confirmation shall constitute the written instruction of the Engineer or delegated assistant (as the case may be).

3.4 Replacement of the Engineer

If the Employer intends to replace the Engineer, the Employer shall, not less than 21 days before the intended date of replacement, give notice to the Contractor of the name, address and relevant experience of the intended replacement Engineer. If the Contractor considers the intended replacement Engineer to be unsuitable, he has the right to raise



objection against him by notice to the Employer, with supporting particulars, and the Employer shall give full and fair consideration to this objection.

3.5 Determinations

Whenever these Conditions provide that the Engineer shall proceed in accordance with this Sub-Clause 3.5 to agree or determine any matter, the Engineer shall consult with each Party in an endeavour to reach agreement. If agreement is not achieved, the Engineer shall make a fair determination in accordance with the Contract, taking due regard of all relevant circumstances.

The Engineer shall give notice to both Parties of each agreement or determination, with supporting particulars, within 28 days from the receipt of the corresponding claim or request except when otherwise specified. Each Party shall give effect to each agreement or determination unless and until revised under Clause 20 [Claims, Disputes and Arbitration].

4. The Contractor

4.1 Contractor's General Obligations

The Contractor shall design (to the extent specified in the Contract), execute and complete the Works in accordance with the Contract and with the Engineer's instructions, and shall remedy any defects in the Works.

The Contractor shall provide the Plant and Contractor's Documents specified in the Contract, and all Contractor's Personnel, Goods, consumables and other things and services, whether of a temporary or permanent nature, required in and for this design, execution, completion and remedying of defects.

All equipment, material, and services to be incorporated in or required for the Works shall have their origin in any eligible source country as defined by the Bank.

The Contractor shall be responsible for the adequacy, stability and safety of all Site operations and of all methods of construction. Except to the extent specified in the Contract, the Contractor (i) shall be responsible for all Contractor's Documents, Temporary Works, and such design of each item of Plant and Materials as is required for the item to be in accordance with the Contract, and (ii) shall not otherwise be responsible for the design or specification of the Permanent Works.

The Contractor shall, whenever required by the Engineer, submit details of the arrangements and methods which the Contractor proposes to adopt for the execution of the Works. No significant alteration to these arrangements and methods shall be made without this having previously been notified to the Engineer..

If the Contract specifies that the Contractor shall design any part of the Permanent Works, then unless otherwise stated in the Particular Conditions:

- (a) the Contractor shall submit to the Engineer the Contractor's Documents for this part in accordance with the procedures specified in the Contract;
- (b) these Contractor's Documents shall be in accordance with the Specification and Drawings, shall be written in the language for communications defined in Sub-Clause 1.4 [Law and Language], and shall include additional information required by the Engineer to add to the Drawings for co-ordination of each Party's designs;

- (c) the Contractor shall be responsible for this part and it shall, when the Works are completed, be fit for such purposes for which the part is intended as are specified in the Contract; and
- (d) prior to the commencement of the Tests on Completion, the Contractor shall submit to the Engineer the “as-built” documents and, if applicable, operation and maintenance manuals in accordance with the Specification and in sufficient detail for the Employer to operate, maintain, dismantle, reassemble, adjust and repair this part of the Works. Such part shall not be considered to be completed for the purposes of taking-over under Sub-Clause 10.1 [Taking Over of the Works and Sections] until these documents and manuals have been submitted to the Engineer.



4.2 Performance Security

The Contractor shall obtain (at his cost) a Performance Security for proper performance, in the amount stated in the Contract Data and denominated in the currency(ies) of the Contract or in a freely convertible currency acceptable to the Employer. If an amount is not stated in the Contract Data, this Sub-Clause shall not apply.

The Contractor shall deliver the Performance Security to the Employer within 28 days after receiving the Letter of Acceptance, and shall send a copy to the Engineer. The Performance Security shall be issued by a reputable bank or financial institution selected by the Contractor, and shall be in the form annexed to the Particular Conditions, as stipulated by the Employer in the Contract Data, or in another form approved by the Employer.

The Contractor shall ensure that the Performance Security is valid and enforceable until the Contractor has executed and completed the Works and remedied any defects. If the terms of the Performance Security specify its expiry date, and the Contractor has not become entitled to receive the Performance Certificate by the date 28 days prior to the expiry date, the Contractor shall extend the validity of the Performance Security until the Works have been completed and any defects have been remedied.

The Employer shall not make a claim under the Performance Security, except for amounts to which the Employer is entitled under the Contract.

The Employer shall indemnify and hold the Contractor harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from a claim under the Performance Security to the extent to which the Employer was not entitled to make the claim.

The Employer shall return the Performance Security to the Contractor within 21 days after receiving a copy of the Performance Certificate.

Without limitation to the provisions of the rest of this Sub-Clause, whenever the Engineer determines an addition or a reduction to the Contract Price as a result of a change in cost and/or legislation, or as a result of a Variation, amounting to more than 25 percent of the portion of the Contract Price payable in a specific currency, the Contractor shall at the Engineer's request promptly increase, or may decrease, as the case may be, the value of the Performance Security in that currency by an equal percentage.

4.3 Contractor's Representative

The Contractor shall appoint the Contractor's Representative and shall give him all authority necessary to act on the Contractor's behalf under the Contract.

Unless the Contractor's Representative is named in the Contract, the Contractor shall, prior to the Commencement Date, submit to the Engineer for consent the name and particulars of the person the Contractor proposes to appoint as Contractor's Representative. If consent is withheld or subsequently revoked in terms of Sub-Clause 6.9 [Contractor's Personnel], or if the appointed person fails to act as Contractor's Representative, the Contractor shall similarly submit the name and particulars of another suitable person for such appointment.

The Contractor shall not, without the prior consent of the Engineer, revoke the appointment of the Contractor's Representative or appoint a replacement.

The whole time of the Contractor's Representative shall be given to directing the Contractor's performance of the Contract. If the Contractor's Representative is to be temporarily absent from the Site during the execution of the Works, a suitable replacement person shall be appointed, subject to the Engineer's prior consent, and the Engineer shall be notified accordingly.



The Contractor's Representative shall, on behalf of the Contractor, receive instructions under Sub-Clause 3.3 [Instructions of the Engineer].

The Contractor's Representative may delegate any powers, functions and authority to any competent person, and may at any time revoke the delegation. Any delegation or revocation shall not take effect until the Engineer has received prior notice signed by the Contractor's Representative, naming the person and specifying the powers, functions and authority being delegated or revoked.

The Contractor's Representative shall be fluent in the language for communications defined in Sub-Clause 1.4 [Law and Language]. If the Contractor's Representative's delegates are not fluent in the said language, the Contractor shall make competent interpreters available during all working hours in a number deemed sufficient by the Engineer.

4.4 Subcontractors

The Contractor shall not subcontract the whole of the Works.

The Contractor shall be responsible for the acts or defaults of any Subcontractor, his agents or employees, as if they were the acts or defaults of the Contractor. Unless otherwise stated in the Particular Conditions:

- (a) the Contractor shall not be required to obtain consent to suppliers solely of Materials, or to a subcontract for which the Subcontractor is named in the Contract;
- (b) the prior consent of the Engineer shall be obtained to other proposed Subcontractors;
- (c) the Contractor shall give the Engineer not less than 28 days' notice of the intended date of the commencement of each Subcontractor's work, and of the commencement of such work on the Site; and
- (d) each subcontract shall include provisions which would entitle the Employer to require the subcontract to be assigned to the Employer under Sub-Clause 4.5 [Assignment of Benefit of Subcontract] (if or when applicable) or in the event of termination under Sub-Clause 15.2 [Termination by Employer].

The Contractor shall ensure that the requirements imposed on the Contractor by Sub-Clause 1.12 [Confidential Details] apply equally to each Subcontractor.

Where practicable, the Contractor shall give fair and reasonable opportunity for contractors from the Country to be appointed as Subcontractors.

4.5 Assignment of Benefit of Subcontract

If a Subcontractor's obligations extend beyond the expiry date of the relevant Defects Notification Period and the Engineer, prior to this date, instructs the Contractor to assign the benefit of such obligations to the Employer, then the Contractor shall do so. Unless otherwise stated in the assignment, the Contractor shall have no liability to the Employer for the work carried out by the Subcontractor after the assignment takes effect.

4.6 Co-operation

The Contractor shall, as specified in the Contract or as instructed by the Engineer, allow appropriate opportunities for carrying out work to:

- (a) the Employer's Personnel,
- (b) any other contractors employed by the Employer, and
- (c) the personnel of any legally constituted public authorities,

who may be employed in the execution on or near the Site of any work not included in the Contract.

Any such instruction shall constitute a Variation if and to the extent that it causes the Contractor to suffer delays and/or to incur Unforeseeable Cost. Services for these personnel and other contractors may include the use of Contractor's Equipment, Temporary Works or access arrangements which are the responsibility of the Contractor.

If, under the Contract, the Employer is required to give to the Contractor possession of any foundation, structure, plant or means of access in accordance with Contractor's Documents, the Contractor shall submit such documents to the Engineer in the time and manner stated in the Specification.

4.7 Setting Out

The Contractor shall set out the Works in relation to original points, lines and levels of reference specified in the Contract or notified by the Engineer. The Contractor shall be responsible for the correct positioning of all parts of the Works, and shall rectify any error in the positions, levels, dimensions or alignment of the Works.

The Employer shall be responsible for any errors in these specified or notified items of reference, but the Contractor shall use reasonable efforts to verify their accuracy before they are used.

If the Contractor suffers delay and/or incurs Cost from executing work which was necessitated by an error in these items of reference, and an experienced contractor could not reasonably have discovered such error and avoided this delay and/or Cost, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost plus profit, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine (i) whether and (if so) to what extent the error could not reasonably have been discovered, and (ii) the matters described in sub-paragraphs (a) and (b) above related to this.

4.8 Safety Procedures

The Contractor shall:

- (a) comply with all applicable safety regulations,
- (b) take care for the safety of all persons entitled to be on the Site,
- (c) use reasonable efforts to keep the Site and Works clear of unnecessary obstruction so as to avoid danger to these persons,
- (d) provide fencing, lighting, guarding and watching of the Works until completion and taking over under Clause 10 [Employer's Taking Over], and
- (e) provide any Temporary Works (including roadways, footways, guards and fences) which may be necessary, because of the execution of the Works, for the use and protection of the public and of owners and occupiers of adjacent land.

4.9 Quality Assurance The Contractor shall institute a quality assurance system to demonstrate compliance with the requirements of the Contract. The system shall be in accordance with the details stated in the Contract. The Engineer shall be entitled to audit any aspect of the system.

Details of all procedures and compliance documents shall be submitted to the Engineer for information before each design and execution stage is commenced. When any document of a technical nature is issued to the Engineer, evidence of the prior approval by the Contractor himself shall be apparent on the document itself.

Compliance with the quality assurance system shall not relieve the Contractor of any of his duties, obligations or responsibilities under the Contract.

4.10 Site Data The Employer shall have made available to the Contractor for his information, prior to the Base Date, all relevant data in the Employer's possession on sub-surface and hydrological conditions at the Site, including environmental aspects. The Employer shall similarly make available to the Contractor all such data which come into the Employer's possession after the Base Date. The Contractor shall be responsible for interpreting all such data.

To the extent which was practicable (taking account of cost and time), the Contractor shall be deemed to have obtained all necessary information as to risks, contingencies and other circumstances which may influence or affect the Tender or Works. To the same extent, the Contractor shall be deemed to have inspected and examined the Site, its surroundings, the above data and other available information, and to have been satisfied before submitting the Tender as to all relevant matters, including (without limitation):

- (a) the form and nature of the Site, including sub-surface conditions,
- (b) the hydrological and climatic conditions,
- (c) the extent and nature of the work and Goods necessary for the execution and completion of the Works and the remedying of any defects,
- (d) the Laws, procedures and labour practices of the Country, and
- (e) the Contractor's requirements for access, accommodation, facilities, personnel, power, transport, water and other services.

4.11 Sufficiency of the Accepted Contract Amount

The Contractor shall be deemed to:

- (a) have satisfied himself as to the correctness and sufficiency of the Accepted Contract Amount, and
- (b) have based the Accepted Contract Amount on the data, interpretations, necessary information, inspections, examinations and satisfaction as to all relevant matters referred to in Sub-Clause 4.10 [Site Data].

Unless otherwise stated in the Contract, the Accepted Contract Amount covers all the Contractor's obligations under the Contract (including those under Provisional Sums, if any) and all things necessary for the proper execution and completion of the Works and the remedying of any defects.

4.12 Unforeseeable Physical Conditions

In this Sub-Clause, "physical conditions" means natural physical conditions and man-made and other physical obstructions and pollutants, which the Contractor encounters at the Site when executing the Works, including sub-

surface and hydrological conditions but excluding climatic conditions.

If the Contractor encounters adverse physical conditions which he considers to have been Unforeseeable, the Contractor shall give notice to the Engineer as soon as practicable.

This notice shall describe the physical conditions, so that they can be inspected by the Engineer, and shall set out the reasons why the Contractor considers them to be Unforeseeable. The Contractor shall continue executing the Works, using such proper and reasonable measures as are appropriate for the physical conditions, and shall comply with any instructions which the Engineer may give. If an instruction constitutes a Variation, Clause 13 [Variations and Adjustments] shall apply.

If and to the extent that the Contractor encounters physical conditions which are Unforeseeable, gives such a notice, and suffers delay and/or incurs Cost due to these conditions, the Contractor shall be entitled subject to notice under Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost, which shall be included in the Contract Price.

Upon receiving such notice and inspecting and/or investigating these physical conditions, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine (i) whether and (if so) to what extent these physical conditions were Unforeseeable, and (ii) the matters described in sub-paragraphs (a) and (b) above related to this extent.

However, before additional Cost is finally agreed or determined under sub-paragraph (ii), the Engineer may also review whether other physical conditions in similar parts of the Works (if any) were more favourable than could reasonably have been foreseen when the Contractor submitted the Tender. If and to the extent that these more favourable conditions were encountered, the Engineer may proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine the reductions in Cost which were due to these conditions, which may be included (as deductions) in the Contract Price and Payment Certificates. However, the net effect of all adjustments under sub-paragraph (b) and all these reductions, for all the physical conditions encountered in similar parts of the Works, shall not result in a net reduction in the Contract Price.

The Engineer shall take account of any evidence of the physical conditions foreseen by the Contractor when submitting the Tender, which shall be made available by the Contractor, but shall not be bound by the Contractor's interpretation of any such evidence.

4.13 Rights of Way and Facilities

Unless otherwise specified in the Contract the Employer shall provide effective access to and possession of the Site including special and/or temporary rights-of-way which are necessary for the Works. The Contractor shall obtain, at his risk and cost, any additional rights of way or facilities outside the Site which he may require for the purposes of the Works.

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4.14 Avoidance of Interference

The Contractor shall not interfere unnecessarily or improperly with:

- (a) the convenience of the public, or
- (b) the access to and use and occupation of all roads and footpaths, irrespective of whether they are public or in the possession of the Employer or of others.

The Contractor shall indemnify and hold the Employer harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from any such unnecessary or improper interference.

4.15 Access Route

The Contractor shall be deemed to have been satisfied as to the suitability and availability of access routes to the Site at Base Date. The Contractor shall use reasonable efforts to prevent any road or bridge from being damaged by the Contractor's traffic or by the Contractor's Personnel. These efforts shall include the proper use of appropriate vehicles and routes.

Except as otherwise stated in these Conditions:

- (a) the Contractor shall (as between the Parties) be responsible for any maintenance which may be required for his use of access routes;
- (b) the Contractor shall provide all necessary signs or directions along access routes, and shall obtain any permission which may be required from the relevant authorities for his use of routes, signs and directions;
- (c) the Employer shall not be responsible for any claims which may arise from the use or otherwise of any access route;
- (d) the Employer does not guarantee the suitability or availability of particular access routes; and
- (e) Costs due to non-suitability or non-availability, for the use required by the Contractor, of access routes shall be borne by the Contractor.

4.16 Transport of Goods

Unless otherwise stated in the Particular Conditions:

- (a) the Contractor shall give the Engineer not less than 21 days' notice of the date on which any Plant or a major item of other Goods will be delivered to the Site;
- (b) the Contractor shall be responsible for packing, loading, transporting, receiving, unloading, storing and protecting all Goods and other things required for the Works; and
- (c) the Contractor shall indemnify and hold the Employer harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from the transport of Goods, and shall negotiate and pay all claims arising from their transport.

- 4.17 Contractor's Equipment** The Contractor shall be responsible for all Contractor's Equipment. When brought on to the Site, Contractor's Equipment shall be deemed to be exclusively intended for the execution of the Works. The Contractor shall not remove from the Site any major items of Contractor's Equipment without the consent of the Engineer. However, consent shall not be required for vehicles transporting Goods or Contractor's Personnel off Site.
- 4.18 Protection of the Environment** The Contractor shall take all reasonable steps to protect the environment (both on and off the Site) and to limit damage and nuisance to people and property resulting from pollution, noise and other results of his operations.
- The Contractor shall ensure that emissions, surface discharges and effluent from the Contractor's activities shall not exceed the values stated in the Specification or prescribed by applicable Laws.
- 4.19 Electricity, Water and Gas** The Contractor shall, except as stated below, be responsible for the provision of all power, water and other services he may require for his construction activities and to the extent defined in the Specifications, for the tests.
- The Contractor shall be entitled to use for the purposes of the Works such supplies of electricity, water, gas and other services as may be available on the Site and of which details and prices are given in the Specification. The Contractor shall, at his risk and cost, provide any apparatus necessary for his use of these services and for measuring the quantities consumed.
- The quantities consumed and the amounts due (at these prices) for such services shall be agreed or determined by the Engineer in accordance with Sub-Clause 2.5 [Employer's Claims] and Sub-Clause 3.5 [Determinations]. The Contractor shall pay these amounts to the Employer.

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4.20 Employer's Equipment and Free-Issue Materials

The Employer shall make the Employer's Equipment (if any) available for the use of the Contractor in the execution of the Works in accordance with the details, arrangements and prices stated in the Specification. Unless otherwise stated in the Specification:

- (a) the Employer shall be responsible for the Employer's Equipment, except that
- (b) the Contractor shall be responsible for each item of Employer's Equipment whilst any of the Contractor's Personnel is operating it, driving it, directing it or in possession or control of it.

The appropriate quantities and the amounts due (at such stated prices) for the use of Employer's Equipment shall be agreed or determined by the Engineer in accordance with Sub-Clause 2.5 [Employer's Claims] and Sub-Clause 3.5 [Determinations]. The Contractor shall pay these amounts to the Employer.

The Employer shall supply, free of charge, the "free-issue materials" (if any) in accordance with the details stated in the Specification. The Employer shall, at his risk and cost, provide these materials at the time and place specified in the Contract. The Contractor shall then visually inspect them, and shall promptly give notice to the Engineer of any shortage, defect or default in these materials. Unless otherwise agreed by both Parties, the Employer shall immediately rectify the notified shortage, defect or default.

After this visual inspection, the free-issue materials shall come under the care, custody and control of the Contractor. The Contractor's obligations of inspection, care, custody and control shall not relieve the Employer of liability for any shortage, defect or default not apparent from a visual inspection.



4.21 Progress Reports Unless otherwise stated in the Particular Conditions, monthly progress reports shall be prepared by the Contractor and submitted to the Engineer in six copies. The first report shall cover the period up to the end of the first calendar month following the Commencement Date. Reports shall be submitted monthly thereafter, each within 7 days after the last day of the period to which it relates.

Reporting shall continue until the Contractor has completed all work which is known to be outstanding at the completion date stated in the Taking-Over Certificate for the Works.

Each report shall include:

- (a) charts and detailed descriptions of progress, including each stage of design (if any), Contractor's Documents, procurement, manufacture, delivery to Site, construction, erection and testing; and including these stages for work by each nominated Subcontractor (as defined in Clause 5 [Nominated Subcontractors]),
- (b) photographs showing the status of manufacture and of progress on the Site;
- (c) for the manufacture of each main item of Plant and Materials, the name of the manufacturer, manufacture location, percentage progress, and the actual or expected dates of:
 - (i) commencement of manufacture,
 - (ii) Contractor's inspections,
 - (iii) tests, and
 - (iv) shipment and arrival at the Site;
- (d) the details described in Sub-Clause 6.10 [Records of Contractor's Personnel and Equipment];
- (e) copies of quality assurance documents, test results and certificates of Materials;
- (f) list of notices given under Sub-Clause 2.5 [Employer's Claims] and notices given under Sub-Clause 20.1 [Contractor's Claims];
- (g) safety statistics, including details of any hazardous incidents and activities relating to environmental aspects and public relations; and
- (h) comparisons of actual and planned progress, with details of any events or circumstances which may jeopardise the completion in accordance with the Contract, and the measures being (or to be) adopted to overcome delays.

4.22 Security of the Site Unless otherwise stated in the Particular Conditions:

- (a) the Contractor shall be responsible for keeping unauthorised persons off the Site, and
- (b) authorised persons shall be limited to the Contractor's Personnel and the Employer's Personnel; and to any other personnel notified

to the Contractor, by the Employer or the Engineer, as authorised personnel of the Employer's other contractors on the Site.

4.23 Contractor's Operations on Site

The Contractor shall confine his operations to the Site, and to any additional areas which may be obtained by the Contractor and agreed by the Engineer as additional working areas. The Contractor shall take all necessary precautions to keep Contractor's Equipment and Contractor's Personnel within the Site and these additional areas, and to keep them off adjacent land..

During the execution of the Works, the Contractor shall keep the Site free from all unnecessary obstruction, and shall store or dispose of any Contractor's Equipment or surplus materials. The Contractor shall clear away and remove from the Site any wreckage, rubbish and Temporary Works which are no longer required.

Upon the issue of a Taking-Over Certificate, the Contractor shall clear away and remove, from that part of the Site and Works to which the Taking-Over Certificate refers, all Contractor's Equipment, surplus material, wreckage, rubbish and Temporary Works. The Contractor shall leave that part of the Site and the Works in a clean and safe condition. However, the Contractor may retain on Site, during the Defects Notification Period, such Goods as are required for the Contractor to fulfil obligations under the Contract.

4.24 Fossils

All fossils, coins, articles of value or antiquity, and structures and other remains or items of geological or archaeological interest found on the Site shall be placed under the care and authority of the Employer. The Contractor shall take reasonable precautions to prevent Contractor's Personnel or other persons from removing or damaging any of these findings.

The Contractor shall, upon discovery of any such finding, promptly give notice to the Engineer, who shall issue instructions for dealing with it. If the Contractor suffers delay and/or incurs Cost from complying with the instructions, the Contractor shall give a further notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost, which shall be included in the Contract Price.

After receiving this further notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

5. Nominated Subcontractors

5.1 Definition of "nominated Subcontractor"

In the Contract, "nominated Subcontractor" means a Subcontractor:

- (a) who is stated in the Contract as being a nominated Subcontractor, or
- (b) whom the Engineer, under Clause 13 [Variations and Adjustments], instructs the Contractor to employ as a Subcontractor subject to Sub-Clause 5.2 [Objection to Notification].

5.2 Objection to Nomination

The Contractor shall not be under any obligation to employ a nominated Subcontractor against whom the Contractor raises reasonable objection by notice to the Engineer as soon as practicable, with supporting particulars. An objection shall be deemed reasonable if it arises from (among other things) any of the following matters, unless the Employer agrees in writing to indemnify the Contractor against and from the consequences of the matter:

- (a) there are reasons to believe that the Subcontractor does not have sufficient competence, resources or financial strength;
- (b) the nominated Subcontractor does not accept to indemnify the Contractor against and from any negligence or misuse of Goods by the nominated Subcontractor, his agents and employees; or
- (c) the nominated Subcontractor does not accept to enter into a subcontract which specifies that, for the subcontracted work (including design, if any), the nominated Subcontractor shall:
 - (i) undertake to the Contractor such obligations and liabilities as will enable the Contractor to discharge his obligations and liabilities under the Contract;
 - (ii) indemnify the Contractor against and from all obligations and liabilities arising under or in connection with the Contract and from the consequences of any failure by the Subcontractor to perform these obligations or to fulfil these liabilities, and
 - (iii) be paid only if and when the Contractor has received from the Employer payments for sums due under the Subcontract referred to under Sub-Clause 5.3 [Payment to nominated Subcontractors].

5.3 Payments to nominated Subcontractors

The Contractor shall pay to the nominated Subcontractor the amounts shown on the nominated Subcontractor's invoices approved by the Contractor which the Engineer certifies to be due in accordance with the subcontract. These amounts plus other charges shall be included in the Contract Price in accordance with sub-paragraph (b) of Sub-Clause 13.5 [Provisional Sums], except as stated in Sub-Clause 5.4 [Evidence of Payments].

5.4 Evidence of Payments

Before issuing a Payment Certificate which includes an amount payable to a nominated Subcontractor, the Engineer may request the Contractor to supply reasonable evidence that the nominated Subcontractor has received all amounts due in accordance with previous Payment Certificates, less applicable deductions for retention or otherwise. Unless the Contractor:

- (a) submits this reasonable evidence to the Engineer, or
- (b)
 - (i) satisfies the Engineer in writing that the Contractor is reasonably entitled to withhold or refuse to pay these amounts, and
 - (ii) submits to the Engineer reasonable evidence that the nominated Subcontractor has been notified of the Contractor's entitlement,

then the Employer may (at his sole discretion) pay, direct to the nominated Subcontractor, part or all of such amounts previously

certified (less applicable deductions) as are due to the nominated Subcontractor and for which the Contractor has failed to submit the evidence described in sub-paragraphs (a) or (b) above. The Contractor shall then repay, to the Employer, the amount which the nominated Subcontractor was directly paid by the Employer.

6. Staff and Labour

- 6.1 Engagement of Staff and Labour** Except as otherwise stated in the Specification, the Contractor shall make arrangements for the engagement of all staff and labour, local or otherwise, and for their payment, feeding, transport, and, when appropriate, housing.
- The Contractor is encouraged, to the extent practicable and reasonable, to employ staff and labour with appropriate qualifications and experience from sources within the Country.
- 6.2 Rates of Wages and Conditions of Labour** The Contractor shall pay rates of wages, and observe conditions of labour, which are not lower than those established for the trade or industry where the work is carried out. If no established rates or conditions are applicable, the Contractor shall pay rates of wages and observe conditions which are not lower than the general level of wages and conditions observed locally by employers whose trade or industry is similar to that of the Contractor.
- The Contractor shall inform the Contractor's Personnel about their liability to pay personal income taxes in the Country in respect of such of their salaries, wages, allowances and any benefits as are subject to tax under the Laws of the Country for the time being in force, and the Contractor shall perform such duties in regard to such deductions thereof as may be imposed on him by such Laws.
- 6.3 Persons in the Service of Employer** The Contractor shall not recruit, or attempt to recruit, staff and labour from amongst the Employer's Personnel.
- 6.4 Labour Laws** The Contractor shall comply with all the relevant labour Laws applicable to the Contractor's Personnel, including Laws relating to their employment, health, safety, welfare, immigration and emigration, and shall allow them all their legal rights.
- The Contractor shall require his employees to obey all applicable Laws, including those concerning safety at work.
- 6.5 Working Hours** No work shall be carried out on the Site on locally recognised days of rest, or outside the normal working hours stated in the Contract Data, unless:
- (a) otherwise stated in the Contract,
 - (b) the Engineer gives consent, or
 - (c) the work is unavoidable, or necessary for the protection of life or property or for the safety of the Works, in which case the Contractor shall immediately advise the Engineer.
- 6.6 Facilities for Staff and Labour** Except as otherwise stated in the Specification, the Contractor shall provide and maintain all necessary accommodation and welfare facilities for the Contractor's Personnel. The Contractor shall also provide facilities for the Employer's Personnel as stated in the Specification.
- The Contractor shall not permit any of the Contractor's Personnel to maintain any temporary or permanent living quarters within the structures forming part of the Permanent Works.

6.7 Health and Safety

The Contractor shall at all times take all reasonable precautions to maintain the health and safety of the Contractor's Personnel. In collaboration with local health authorities, the Contractor shall ensure that medical staff, first aid facilities, sick bay and ambulance service are available at all times at the Site and at any accommodation for Contractor's and Employer's Personnel, and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics.

The Contractor shall appoint an accident prevention officer at the Site, responsible for maintaining safety and protection against accidents. This person shall be qualified for this responsibility, and shall have the authority to issue instructions and take protective measures to prevent accidents. Throughout the execution of the Works, the Contractor shall provide whatever is required by this person to exercise this responsibility and authority.

The Contractor shall send, to the Engineer, details of any accident as soon as practicable after its occurrence. The Contractor shall maintain records and make reports concerning health, safety and welfare of persons, and damage to property, as the Engineer may reasonably require.

HIV-AIDS Prevention. The Contractor shall conduct an HIV-AIDS awareness programme via an approved service provider, and shall undertake such other measures as are specified in this Contract to reduce the risk of the transfer of the HIV virus between and among the Contractor's Personnel and the local community, to promote early diagnosis and to assist affected individuals.

The Contractor shall throughout the contract (including the Defects Notification Period): (i) conduct Information, Education and Communication (IEC) campaigns, at least every other month, addressed to all the Site staff and labour (including all the Contractor's employees, all Subcontractors and any other Contractor's or Employer's personnel employees, and all truck drivers and crew making deliveries to Site for construction activities) and to the immediate local communities, concerning the risks, dangers and impact, and appropriate avoidance behaviour with respect to, of Sexually Transmitted Diseases (STD) - or Sexually Transmitted Infections (STI) in general and HIV/AIDS in particular; (ii) provide male or female condoms for all Site staff and labour as appropriate; and (iii) provide for STI and HIV/AIDS screening, diagnosis, counselling and referral to a dedicated national STI and HIV/AIDS programme, (unless otherwise agreed) of all Site staff and labour.

The Contractor shall include in the programme to be submitted for the execution of the Works under Sub-Clause 8.3 an alleviation programme for Site staff and labour and their families in respect of Sexually Transmitted Infections (STI) and Sexually Transmitted Diseases (STD) including HIV/AIDS. The STI, STD and HIV/AIDS alleviation programme shall indicate when, how and at what cost the Contractor plans to satisfy the requirements of this Sub-Clause and the related specification. For each component, the programme shall detail the resources to be provided or utilised and any related sub-contracting proposed. The programme shall also include provision of a detailed cost estimate with supporting documentation. Payment to the Contractor for preparation and implementation this programme shall not exceed the Provisional Sum dedicated for this purpose.



- 6.8 Contractor's Superintendence** Throughout the execution of the Works, and as long thereafter as is necessary to fulfill the Contractor's obligations, the Contractor shall provide all necessary superintendence to plan, arrange, direct, manage, inspect and test the work.
- Superintendence shall be given by a sufficient number of persons having adequate knowledge of the language for communications (defined in Sub-Clause 1.4 [Law and Language]) and of the operations to be carried out (including the methods and techniques required, the hazards likely to be encountered and methods of preventing accidents), for the satisfactory and safe execution of the Works.
- 6.9 Contractor's Personnel** The Contractor's Personnel shall be appropriately qualified, skilled and experienced in their respective trades or occupations. The Engineer may require the Contractor to remove (or cause to be removed) any person employed on the Site or Works, including the Contractor's Representative if applicable, who:
- (a) persists in any misconduct or lack of care,
 - (b) carries out duties incompetently or negligently,
 - (c) fails to conform with any provisions of the Contract, or
 - (d) persists in any conduct which is prejudicial to safety, health, or the protection of the environment.
- If appropriate, the Contractor shall then appoint (or cause to be appointed) a suitable replacement person.
- 6.10 Records of Contractor's Personnel and Equipment** The Contractor shall submit, to the Engineer, details showing the number of each class of Contractor's Personnel and of each type of Contractor's Equipment on the Site. Details shall be submitted each calendar month, in a form approved by the Engineer, until the Contractor has completed all work which is known to be outstanding at the completion date stated in the Taking-Over Certificate for the Works.
- 6.11 Disorderly Conduct** The Contractor shall at all times take all reasonable precautions to prevent any unlawful, riotous or disorderly conduct by or amongst the Contractor's Personnel, and to preserve peace and protection of persons and property on and near the Site.
- 6.12 Foreign Personnel** The Contractor may bring in to the Country any foreign personnel who are necessary for the execution of the Works to the extent allowed by the applicable Laws. The Contractor shall ensure that these personnel are provided with the required residence visas and work permits. The Employer will, if requested by the Contractor, use his best endeavours in a timely and expeditious manner to assist the Contractor in obtaining any local, state, national or government permission required for bringing in the Contractor's personnel..
- The Contractor shall be responsible for the return of these personnel to the place where they were recruited or to their domicile. In the event of the death in the Country of any of these personnel or members of their families, the Contractor shall similarly be responsible for making the appropriate arrangements for their return or burial.
- 6.13 Supply of Foodstuffs** The Contractor shall arrange for the provision of a sufficient supply of suitable food as may be stated in the Specification at reasonable prices for the Contractor's Personnel for the purposes of or in connection with the Contract.

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| 6.14 Supply of Water | The Contractor shall, having regard to local conditions, provide on the Site an adequate supply of drinking and other water for the use of the Contractor's Personnel. |
| 6.15 Measures against Insect and Pest Nuisance | The Contractor shall at all times take the necessary precautions to protect the Contractor's Personnel employed on the Site from insect and pest nuisance, and to reduce the danger to their health. The Contractor shall comply with all the regulations of the local health authorities, including use of appropriate insecticide. |
| 6.16 Alcoholic Liquor or Drugs | The Contractor shall not, otherwise than in accordance with the Laws of the Country, import, sell, give, barter or otherwise dispose of any alcoholic liquor or drugs, or permit or allow importation, sale, gift, barter or disposal thereof by Contractor's Personnel. |
| 6.17 Arms and Ammunition | The Contractor shall not give, barter, or otherwise dispose of, to any person, any arms or ammunition of any kind, or allow Contractor's Personnel to do so. |
| 6.18 Festivals and Religious Customs | The Contractor shall respect the Country's recognized festivals, days of rest and religious or other customs. |
| 6.19 Funeral Arrangements | The Contractor shall be responsible, to the extent required by local regulations, for making any funeral arrangements for any of his local employees who may die while engaged upon the Works. |
| 6.20 Prohibition of Forced or Compulsory Labour | The Contractor shall not employ forced labour, which consists of any work or service, not voluntarily performed, that is exacted from an individual under threat of force or penalty, and includes any kind of involuntary or compulsory labour, such as indentured labour, bonded labour or similar labour-contracting arrangements. |
| 6.21 Prohibition of Harmful Child Labour | The Contractor shall not employ children in a manner that is economically exploitative, or is likely to be hazardous, or to interfere with, the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development. Where the relevant labour laws of the Country have provisions for employment of minors, the Contractor shall follow those laws applicable to the Contractor. Children below the age of 18 years shall not be employed in dangerous work. |
| 6.22 Employment Records of Workers | The Contractor shall keep complete and accurate records of the employment of labour at the Site. The records shall include the names, ages, genders, hours worked and wages paid to all workers. These records shall be summarized on a monthly basis and submitted to the Engineer. These records shall be included in the details to be submitted by the Contractor under Sub-Clause 6.10 [Records of Contractor's Personnel and Equipment]. |

6.23 Workers' Organisations

In countries where the relevant labour laws recognise workers' rights to form and to join workers' organisations of their choosing without interference and to bargain collectively, the Contractor shall comply with such laws. Where the relevant labour laws substantially restrict workers' organisations, the Contractor shall enable alternative means for the Contractor's Personnel to express their grievances and protect their rights regarding working conditions and terms of employment. In either case described above, and where the relevant labour laws are silent, the Contractor shall not discourage the Contractor's Personnel from forming or joining workers' organisations of their choosing or from bargaining collectively, and shall not discriminate or retaliate against the Contractor's Personnel who participate, or seek to participate, in such organisations and bargain collectively. The Contractor shall engage with such workers' representatives. Workers' organisations are expected to fairly represent the workers in the workforce.

6.24 Non-Discrimination and Equal Opportunity

The Contractor shall not make employment decisions on the basis of personal characteristics unrelated to inherent job requirements. The Contractor shall base the employment relationship on the principle of equal opportunity and fair treatment, and shall not discriminate with respect to aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, promotion, termination of employment or retirement, and discipline. In countries where the relevant labour laws provide for non-discrimination in employment, the Contractor shall comply with such laws. When the relevant labour laws are silent on non-discrimination in employment, the Contractor shall meet this Sub-Clause's requirements. Special measures of protection or assistance to remedy past discrimination or selection for a particular job based on the inherent requirements of the job shall not be deemed discrimination.

7. Plant, Materials and Workmanship

7.1 Manner of Execution

The Contractor shall carry out the manufacture of Plant, the production and manufacture of Materials, and all other execution of the Works:

- (a) in the manner (if any) specified in the Contract,
- (b) in a proper workmanlike and careful manner, in accordance with recognised good practice, and
- (c) with properly equipped facilities and non-hazardous Materials, except as otherwise specified in the Contract.

7.2 Samples

The Contractor shall submit the following samples of Materials, and relevant information, to the Engineer for consent prior to using the Materials in or for the Works:

- (a) manufacturer's standard samples of Materials and samples specified in the Contract, all at the Contractor's cost, and
- (b) additional samples instructed by the Engineer as a Variation.

Each sample shall be labelled as to origin and intended use in the Works.

7.3 Inspection

The Employer's Personnel shall at all reasonable times:

- (a) have full access to all parts of the Site and to all places from which natural Materials are being obtained, and
- (b) during production, manufacture and construction (at the Site and elsewhere), be entitled to examine, inspect, measure and test the materials and workmanship, and to check the progress of manufacture of Plant and production and manufacture of Materials.

The Contractor shall give the Employer's Personnel full opportunity to carry out these activities, including providing access, facilities, permissions and safety equipment. No such activity shall relieve the Contractor from any obligation or responsibility.

The Contractor shall give notice to the Engineer whenever any work is ready and before it is covered up, put out of sight, or packaged for storage or transport. The Engineer shall then either carry out the examination, inspection, measurement or testing without unreasonable delay, or promptly give notice to the Contractor that the Engineer does not require to do so. If the Contractor fails to give the notice, he shall, if and when required by the Engineer, uncover the work and thereafter reinstate and make good, all at the Contractor's cost.

7.4 Testing

This Sub-Clause shall apply to all tests specified in the Contract, other than the Tests after Completion (if any).

Except as otherwise specified in the Contract, the Contractor shall provide all apparatus, assistance, documents and other information, electricity, equipment, fuel, consumables, instruments, labour, materials, and suitably qualified and experienced staff, as are necessary to carry out the specified tests efficiently. The Contractor shall agree, with the Engineer, the time and place for the specified testing of any Plant, Materials and other parts of the Works.

The Engineer may, under Clause 13 [Variations and Adjustments], vary the location or details of specified tests, or instruct the Contractor to carry out additional tests. If these varied or additional tests show that the tested Plant, Materials or workmanship is not in accordance with the Contract, the cost of carrying out this Variation shall be borne by the Contractor, notwithstanding other provisions of the Contract.

The Engineer shall give the Contractor not less than 24 hours' notice of the Engineer's intention to attend the tests. If the Engineer does not attend at the time and place agreed, the Contractor may proceed with the tests, unless otherwise instructed by the Engineer, and the tests shall then be deemed to have been made in the Engineer's presence.

If the Contractor suffers delay and/or incurs Cost from complying with these instructions or as a result of a delay for which the Employer is responsible, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost plus profit, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

The Contractor shall promptly forward to the Engineer duly certified reports of the tests. When the specified tests have been passed, the Engineer shall endorse the Contractor's test certificate, or issue a certificate to him, to that effect. If the Engineer has not attended the tests, he shall be deemed to have accepted the readings as accurate.

7.5 Rejection

If, as a result of an examination, inspection, measurement or testing, any Plant, Materials or workmanship is found to be defective or otherwise not in accordance with the Contract, the Engineer may reject the Plant, Materials or workmanship by giving notice to the Contractor, with reasons. The Contractor shall then promptly make good the defect and ensure that the rejected item complies with the Contract.

If the Engineer requires this Plant, Materials or workmanship to be retested, the tests shall be repeated under the same terms and conditions. If the rejection and retesting cause the Employer to incur additional costs, the Contractor shall subject to Sub-Clause 2.5 [Employer's Claims] pay these costs to the Employer.

7.6 Remedial Work

Notwithstanding any previous test or certification, the Engineer may instruct the Contractor to:

- (a) remove from the Site and replace any Plant or Materials which is not in accordance with the Contract,
- (b) remove and re-execute any other work which is not in accordance with the Contract, and
- (c) execute any work which is urgently required for the safety of the Works, whether because of an accident, unforeseeable event or otherwise.

The Contractor shall comply with the instruction within a reasonable time, which shall be the time (if any) specified in the instruction, or immediately if urgency is specified under sub-paragraph (c).

If the Contractor fails to comply with the instruction, the Employer shall be entitled to employ and pay other persons to carry out the work. Except to the extent that the Contractor would have been entitled to payment for the work, the Contractor shall subject to Sub-Clause 2.5 [Employer's Claims] pay to the Employer all costs arising from this failure.

7.7 Ownership of Plant and Materials

Except as otherwise provided in the Contract, each item of Plant and Materials shall, to the extent consistent with the Laws of the Country, become the property of the Employer at whichever is the earlier of the following times, free from liens and other encumbrances:

- (a) when it is incorporated in the Works;
- (b) when the Contractor is paid the corresponding value of the Plant and Materials under Sub-Clause 8.10 [Payment for Plant and Materials in Event of Suspension].

7.8 Royalties

Unless otherwise stated in the Specification, the Contractor shall pay all royalties, rents and other payments for:

- (a) natural Materials obtained from outside the Site, and
- (b) the disposal of material from demolitions and excavations and of other surplus material (whether natural or man-made), except to the extent that disposal areas within the Site are specified in the Contract.

8. Commencement, Delays and Suspension

8.1 Commencement of Works Except as otherwise specified in the Particular Conditions of Contract, the Commencement Date shall be the date at which the following precedent conditions have all been fulfilled and the Engineer's notification recording the agreement of both Parties on such fulfillment and instructing to commence the Work is received by the Contractor:

- (a) signature of the Contract Agreement by both Parties, and if required, approval of the Contract by relevant authorities of the Country;
- (b) delivery to the Contractor of reasonable evidence of the Employer's financial arrangements (under Sub-Clause 2.4 [Employer's Financial Arrangements]);
- (c) except if otherwise specified in the Contract Data, effective access to and possession of the Site given to the Contractor together with such permission(s) under (a) of Sub-Clause 1.13 [Compliance with Laws] as required for the commencement of the Works
- (d) receipt by the Contractor of the Advance Payment under Sub-Clause 14.2 [Advance Payment] provided that the corresponding bank guarantee has been delivered by the Contractor.

If the said Engineer's instruction is not received by the Contractor within 180 days from his receipt of the Letter of Acceptance, the Contractor shall be entitled to terminate the Contract under Sub-Clause 16.2 [Termination by Contractor].

The Contractor shall commence the execution of the Works as soon as is reasonably practicable after the Commencement Date, and shall then proceed with the Works with due expedition and without delay.

8.2 Time for Completion The Contractor shall complete the whole of the Works, and each Section (if any), within the Time for Completion for the Works or Section (as the case may be), including:

- (a) achieving the passing of the Tests on Completion, and
- (b) completing all work which is stated in the Contract as being required for the Works or Section to be considered to be completed for the purposes of taking-over under Sub-Clause 10.1 [Taking Over of the Works and Sections].

8.3 Programme The Contractor shall submit a detailed time programme to the Engineer within 28 days after receiving the notice under Sub-Clause 8.1 [Commencement of Works]. The Contractor shall also submit a revised programme whenever the previous programme is inconsistent with actual progress or with the Contractor's obligations. Each programme shall include:

- (e) the order in which the Contractor intends to carry out the Works, including the anticipated timing of each stage of design (if any), Contractor's Documents, procurement, manufacture of Plant, delivery to Site, construction, erection and testing,
- (f) each of these stages for work by each nominated Subcontractor (as defined in Clause 5 [Nominated Subcontractors]),

- (g) the sequence and timing of inspections and tests specified in the Contract, and
- (h) a supporting report which includes:
 - (iv) a general description of the methods which the Contractor intends to adopt, and of the major stages, in the execution of the Works, and
 - (v) details showing the Contractor's reasonable estimate of the number of each class of Contractor's Personnel and of each type of Contractor's Equipment, required on the Site for each major stage.

Unless the Engineer, within 21 days after receiving a programme, gives notice to the Contractor stating the extent to which it does not comply with the Contract, the Contractor shall proceed in accordance with the programme, subject to his other obligations under the Contract. The Employer's Personnel shall be entitled to rely upon the programme when planning their activities.

The Contractor shall promptly give notice to the Engineer of specific probable future events or circumstances which may adversely affect the work, increase the Contract Price or delay the execution of the Works. The Engineer may require the Contractor to submit an estimate of the anticipated effect of the future event or circumstances, and/or a proposal under Sub-Clause 13.3 [Variation Procedure].

If, at any time, the Engineer gives notice to the Contractor that a programme fails (to the extent stated) to comply with the Contract or to be consistent with actual progress and the Contractor's stated intentions, the Contractor shall submit a revised programme to the Engineer in accordance with this Sub-Clause.

8.4 Extension of Time for Completion

The Contractor shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to an extension of the Time for Completion if and to the extent that completion for the purposes of Sub-Clause 10.1 [Taking Over of the Works and Sections] is or will be delayed by any of the following causes:

- (a) a Variation (unless an adjustment to the Time for Completion has been agreed under Sub-Clause 13.3 [Variation Procedure]) or other substantial change in the quantity of an item of work included in the Contract,
- (b) a cause of delay giving an entitlement to extension of time under a Sub-Clause of these Conditions,
- (c) exceptionally adverse climatic conditions,
- (d) Unforeseeable shortages in the availability of personnel or Goods caused by epidemic or governmental actions, or
- (e) any delay, impediment or prevention caused by or attributable to the Employer, the Employer's Personnel, or the Employer's other contractors.

If the Contractor considers himself to be entitled to an extension of the Time for Completion, the Contractor shall give notice to the Engineer in accordance with Sub-Clause 20.1 [Contractor's Claims]. When determining each extension of time under Sub-Clause 20.1, the Engineer shall review previous determinations and may increase, but

shall not decrease, the total extension of time.

8.5 Delays Caused by Authorities

If the following conditions apply, namely:

- (a) the Contractor has diligently followed the procedures laid down by the relevant legally constituted public authorities in the Country,
- (b) these authorities delay or disrupt the Contractor's work, and
- (c) the delay or disruption was Unforeseeable,

then this delay or disruption will be considered as a cause of delay under sub-paragraph (b) of Sub-Clause 8.4 [Extension of Time for Completion].

8.6 Rate of Progress

If, at any time:

- (a) actual progress is too slow to complete within the Time for Completion, and/or
- (b) progress has fallen (or will fall) behind the current programme under Sub-Clause 8.3 [Programme],

other than as a result of a cause listed in Sub-Clause 8.4 [Extension of Time for Completion], then the Engineer may instruct the Contractor to submit, under Sub-Clause 8.3 [Programme], a revised programme and supporting report describing the revised methods which the Contractor proposes to adopt in order to expedite progress and complete within the Time for Completion.

Unless the Engineer notifies otherwise, the Contractor shall adopt these revised methods, which may require increases in the working hours and/or in the numbers of Contractor's Personnel and/or Goods, at the risk and cost of the Contractor. If these revised methods cause the Employer to incur additional costs, the Contractor shall subject to notice under Sub-Clause 2.5 [Employer's Claims] pay these costs to the Employer, in addition to delay damages (if any) under Sub-Clause 8.7 below.

Additional costs of revised methods including acceleration measures, instructed by the Engineer to reduce delays resulting from causes listed under Sub-Clause 8.4 [Extension of Time for Completion] shall be paid by the Employer, without generating, however, any other additional payment benefit to the Contractor.

8.7 Delay Damages

If the Contractor fails to comply with Sub-Clause 8.2 [Time for Completion], the Contractor shall subject to notice under Sub-Clause 2.5 [Employer's Claims] pay delay damages to the Employer for this default. These delay damages shall be the sum stated in the Contract Data, which shall be paid for every day which shall elapse between the relevant Time for Completion and the date stated in the Taking-Over Certificate. However, the total amount due under this Sub-Clause shall not exceed the maximum amount of delay damages (if any) stated in the Contract Data.

These delay damages shall be the only damages due from the Contractor for such default, other than in the event of termination under Sub-Clause 15.2 [Termination by Employer] prior to completion of the Works. These damages shall not relieve the Contractor from his obligation to complete the Works, or from any other duties, obligations or responsibilities which he may have under the Contract.

8.8 Suspension of Work

The Engineer may at any time instruct the Contractor to suspend progress of part or all of the Works. During such suspension, the Contractor shall protect, store and secure such part or the Works

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against any deterioration, loss or damage.

The Engineer may also notify the cause for the suspension. If and to the extent that the cause is notified and is the responsibility of the Contractor, the following Sub-Clauses 8.9, 8.10 and 8.11 shall not apply.

8.9 Consequences of Suspension

If the Contractor suffers delay and/or incurs Cost from complying with the Engineer's instructions under Sub-Clause 8.8 [Suspension of Work] and/or from resuming the work, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

The Contractor shall not be entitled to an extension of time for, or to payment of the Cost incurred in, making good the consequences of the Contractor's faulty design, workmanship or materials, or of the Contractor's failure to protect, store or secure in accordance with Sub-Clause 8.8 [Suspension of Work].

8.10 Payment for Plant and Materials in Event of Suspension

The Contractor shall be entitled to payment of the value (as at the date of suspension) of Plant and/or Materials which have not been delivered to Site, if:

- (a) the work on Plant or delivery of Plant and/or Materials has been suspended for more than 28 days, and
- (b) the Contractor has marked the Plant and/or Materials as the Employer's property in accordance with the Engineer's instructions.

8.11 Prolonged Suspension

If the suspension under Sub-Clause 8.8 [Suspension of Work] has continued for more than 84 days, the Contractor may request the Engineer's permission to proceed. If the Engineer does not give permission within 28 days after being requested to do so, the Contractor may, by giving notice to the Engineer, treat the suspension as an omission under Clause 13 [Variations and Adjustments] of the affected part of the Works. If the suspension affects the whole of the Works, the Contractor may give notice of termination under Sub-Clause 16.2 [Termination by Contractor].

8.12 Resumption of Work

After the permission or instruction to proceed is given, the Contractor and the Engineer shall jointly examine the Works and the Plant and Materials affected by the suspension. The Contractor shall make good any deterioration or defect in or loss of the Works or Plant or Materials, which has occurred during the suspension after receiving from the Engineer an instruction to this effect under Clause 13 [Variations and Adjustments].

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9. Tests on Completion

9.1 Contractor's Obligations

The Contractor shall carry out the Tests on Completion in accordance with this Clause and Sub-Clause 7.4 [Testing], after providing the documents in accordance with sub-paragraph (d) of Sub-Clause 4.1 [Contractor's General Obligations].

The Contractor shall give to the Engineer not less than 21 days' notice of the date after which the Contractor will be ready to carry out each of the Tests on Completion. Unless otherwise agreed, Tests on Completion shall be carried out within 14 days after this date, on such day or days as the Engineer shall instruct.

In considering the results of the Tests on Completion, the Engineer shall make allowances for the effect of any use of the Works by the Employer on the performance or other characteristics of the Works. As soon as the Works, or a Section, have passed any Tests on Completion, the Contractor shall submit a certified report of the results of these Tests to the Engineer.

9.2 Delayed Tests

If the Tests on Completion are being unduly delayed by the Employer, Sub-Clause 7.4 [Testing] (fifth paragraph) and/or Sub-Clause 10.3 [Interference with Tests on Completion] shall be applicable.

If the Tests on Completion are being unduly delayed by the Contractor, the Engineer may by notice require the Contractor to carry out the Tests within 21 days after receiving the notice. The Contractor shall carry out the Tests on such day or days within that period as the Contractor may fix and of which he shall give notice to the Engineer.

If the Contractor fails to carry out the Tests on Completion within the period of 21 days, the Employer's Personnel may proceed with the Tests at the risk and cost of the Contractor. The Tests on Completion shall then be deemed to have been carried out in the presence of the Contractor and the results of the Tests shall be accepted as accurate.

9.3 Retesting

If the Works, or a Section, fail to pass the Tests on Completion, Sub-Clause 7.5 [Rejection] shall apply, and the Engineer or the Contractor may require the failed Tests, and Tests on Completion on any related work, to be repeated under the same terms and conditions.

9.4 Failure to Pass Tests on Completion

If the Works, or a Section, fail to pass the Tests on Completion repeated under Sub-Clause 9.3 [Retesting], the Engineer shall be entitled to:

- (a) order further repetition of Tests on Completion under Sub-Clause 9.3;
- (b) if the failure deprives the Employer of substantially the whole benefit of the Works or Section, reject the Works or Section (as the case may be), in which event the Employer shall have the same remedies as are provided in sub-paragraph (c) of Sub-Clause 11.4 [Failure to Remedy Defects]; or
- (c) issue a Taking-Over Certificate, if the Employer so requests.

In the event of sub-paragraph (c), the Contractor shall proceed in accordance with all other obligations under the Contract, and the Contract Price shall be reduced by such amount as shall be appropriate to cover the reduced value to the Employer as a result of this failure. Unless the relevant reduction for this failure is stated (or its method of calculation is defined) in the Contract, the Employer may require the reduction to be (i) agreed by both Parties (in full satisfaction of this failure only) and paid before this Taking-Over Certificate is issued, or (ii) determined and paid under Sub-Clause 2.5 [Employer's Claims] and Sub-Clause 3.5 [Determinations].

10. Employer's Taking Over

10.1 Taking Over of the Works and Sections

Except as stated in Sub-Clause 9.4 [Failure to Pass Tests on Completion], the Works shall be taken over by the Employer when (i) the Works have been completed in accordance with the Contract, including the matters described in Sub-Clause 8.2 [Time for Completion] and except as allowed in sub-paragraph (a) below, and (ii) a Taking-Over Certificate for the Works has been issued, or is deemed to have been issued in accordance with this Sub-Clause.

The Contractor may apply by notice to the Engineer for a Taking-Over Certificate not earlier than 14 days before the Works will, in the Contractor's opinion, be complete and ready for taking over. If the Works are divided into Sections, the Contractor may similarly apply for a Taking-Over Certificate for each Section.

The Engineer shall, within 28 days after receiving the Contractor's application:

- (a) issue the Taking-Over Certificate to the Contractor, stating the date on which the Works or Section were completed in accordance with the Contract, except for any minor outstanding work and defects which will not substantially affect the use of the Works or Section for their intended purpose (either until or whilst this work is completed and these defects are remedied); or
- (b) reject the application, giving reasons and specifying the work required to be done by the Contractor to enable the Taking-Over Certificate to be issued. The Contractor shall then complete this work before issuing a further notice under this Sub-Clause.

If the Engineer fails either to issue the Taking-Over Certificate or to reject the Contractor's application within the period of 28 days, and if the Works or Section (as the case may be) are substantially in accordance with the Contract, the Taking-Over Certificate shall be deemed to have been issued on the last day of that period.

10.2 Taking Over of Parts of the Works

The Engineer may, at the sole discretion of the Employer, issue a Taking-Over Certificate for any part of the Permanent Works.

The Employer shall not use any part of the Works (other than as a temporary measure which is either specified in the Contract or agreed by both Parties) unless and until the Engineer has issued a Taking-Over Certificate for this part. However, if the Employer does use any part of the Works before the Taking-Over Certificate is issued:

- (a) the part which is used shall be deemed to have been taken over as from the date on which it is used,
- (b) the Contractor shall cease to be liable for the care of such part as from this date, when responsibility shall pass to the Employer, and
- (c) if requested by the Contractor, the Engineer shall issue a Taking-Over Certificate for this part.

After the Engineer has issued a Taking-Over Certificate for a part of the Works, the Contractor shall be given the earliest opportunity to take such steps as may be necessary to carry out any outstanding Tests on Completion. The Contractor shall carry out these Tests on Completion as soon as practicable before the expiry date of the relevant Defects Notification Period.

If the Contractor incurs Cost as a result of the Employer taking over and/or using a part of the Works, other than such use as is specified in

the Contract or agreed by the Contractor, the Contractor shall (i) give notice to the Engineer and (ii) be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to payment of any such Cost plus profit, which shall be included in the Contract Price. After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine this Cost and profit.

If a Taking-Over Certificate has been issued for a part of the Works (other than a Section), the delay damages thereafter for completion of the remainder of the Works shall be reduced. Similarly, the delay damages for the remainder of the Section (if any) in which this part is included shall also be reduced. For any period of delay after the date stated in this Taking-Over Certificate, the proportional reduction in these delay damages shall be calculated as the proportion which the value of the part so certified bears to the value of the Works or Section (as the case may be) as a whole. The Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these proportions. The provisions of this paragraph shall only apply to the daily rate of delay damages under Sub-Clause 8.7 [Delay Damages], and shall not affect the maximum amount of these damages.

10.3 Interference with Tests on Completion

If the Contractor is prevented, for more than 14 days, from carrying out the Tests on Completion by a cause for which the Employer is responsible, the Employer shall be deemed to have taken over the Works or Section (as the case may be) on the date when the Tests on Completion would otherwise have been completed.

The Engineer shall then issue a Taking-Over Certificate accordingly, and the Contractor shall carry out the Tests on Completion as soon as practicable, before the expiry date of the Defects Notification Period. The Engineer shall require the Tests on Completion to be carried out by giving 14 days' notice and in accordance with the relevant provisions of the Contract.

If the Contractor suffers delay and/or incurs Cost as a result of this delay in carrying out the Tests on Completion, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost plus profit, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

10.4 Surfaces Requiring Reinstatement

Except as otherwise stated in a Taking-Over Certificate, a certificate for a Section or part of the Works shall not be deemed to certify completion of any ground or other surfaces requiring reinstatement.

11. Defects Liability

11.1 Completion of Outstanding Work and Remedying Defects

In order that the Works and Contractor's Documents, and each Section, shall be in the condition required by the Contract (fair wear and tear excepted) by the expiry date of the relevant Defects Notification Period or as soon as practicable thereafter, the Contractor shall:

- (a) complete any work which is outstanding on the date stated in a Taking-Over Certificate, within such reasonable time as is instructed by the Engineer, and

- (b) execute all work required to remedy defects or damage, as may be notified by (or on behalf of) the Employer on or before the expiry date of the Defects Notification Period for the Works or Section (as the case may be).

If a defect appears or damage occurs, the Contractor shall be notified accordingly, by (or on behalf of) the Employer.

11.2 Cost of Remedying Defects

All work referred to in sub-paragraph (b) of Sub-Clause 11.1 [Completion of Outstanding Work and Remedying Defects] shall be executed at the risk and cost of the Contractor, if and to the extent that the work is attributable to:

- (a) any design for which the Contractor is responsible,
- (b) Plant, Materials or workmanship not being in accordance with the Contract, or
- (c) failure by the Contractor to comply with any other obligation.

If and to the extent that such work is attributable to any other cause, the Contractor shall be notified promptly by (or on behalf of) the Employer, and Sub-Clause 13.3 [Variation Procedure] shall apply.

11.3 Extension of Defects Notification Period

The Employer shall be entitled subject to Sub-Clause 2.5 [Employer's Claims] to an extension of the Defects Notification Period for the Works or a Section if and to the extent that the Works, Section or a major item of Plant (as the case may be, and after taking over) cannot be used for the purposes for which they are intended by reason of a defect or by reason of damage attributable to the Contractor. However, a Defects Notification Period shall not be extended by more than two years.

If delivery and/or erection of Plant and/or Materials was suspended under Sub-Clause 8.8 [Suspension of Work] or Sub-Clause 16.1 [Contractor's Entitlement to Suspend Work], the Contractor's obligations under this Clause shall not apply to any defects or damage occurring more than two years after the Defects Notification Period for the Plant and/or Materials would otherwise have expired.

11.4 Failure to Remedy Defects

If the Contractor fails to remedy any defect or damage within a reasonable time, a date may be fixed by (or on behalf of) the Employer, on or by which the defect or damage is to be remedied. The Contractor shall be given reasonable notice of this date.

If the Contractor fails to remedy the defect or damage by this notified date and this remedial work was to be executed at the cost of the Contractor under Sub-Clause 11.2 [Cost of Remedying Defects], the Employer may (at his option):

- (a) carry out the work himself or by others, in a reasonable manner and at the Contractor's cost, but the Contractor shall have no responsibility for this work; and the Contractor shall subject to Sub-Clause 2.5 [Employer's Claims] pay to the Employer the costs reasonably incurred by the Employer in remedying the defect or damage;
- (b) require the Engineer to agree or determine a reasonable reduction in the Contract Price in accordance with Sub-Clause 3.5 [Determinations]; or
- (c) if the defect or damage deprives the Employer of substantially the whole benefit of the Works or any major part of the Works, terminate the Contract as a whole, or in respect of such major part

which cannot be put to the intended use. Without prejudice to any other rights, under the Contract or otherwise, the Employer shall then be entitled to recover all sums paid for the Works or for such part (as the case may be), plus financing costs and the cost of dismantling the same, clearing the Site and returning Plant and Materials to the Contractor.

- 11.5 Removal of Defective Work** If the defect or damage cannot be remedied expeditiously on the Site and the Employer gives consent, the Contractor may remove from the Site for the purposes of repair such items of Plant as are defective or damaged. This consent may require the Contractor to increase the amount of the Performance Security by the full replacement cost of these items, or to provide other appropriate security.
- 11.6 Further Tests** If the work of remedying of any defect or damage may affect the performance of the Works, the Engineer may require the repetition of any of the tests described in the Contract. The requirement shall be made by notice within 28 days after the defect or damage is remedied.
- These tests shall be carried out in accordance with the terms applicable to the previous tests, except that they shall be carried out at the risk and cost of the Party liable, under Sub-Clause 11.2 [Cost of Remedying Defects], for the cost of the remedial work.
- 11.7 Right of Access** Until the Performance Certificate has been issued, the Contractor shall have such right of access to the Works as is reasonably required in order to comply with this Clause, except as may be inconsistent with the Employer's reasonable security restrictions.
- 11.8 Contractor to Search** The Contractor shall, if required by the Engineer, search for the cause of any defect, under the direction of the Engineer. Unless the defect is to be remedied at the cost of the Contractor under Sub-Clause 11.2 [Cost of Remedying Defects], the Cost of the search plus profit shall be agreed or determined by the Engineer in accordance with Sub-Clause 3.5 [Determinations] and shall be included in the Contract Price.
- 11.9 Performance Certificate** Performance of the Contractor's obligations shall not be considered to have been completed until the Engineer has issued the Performance Certificate to the Contractor, stating the date on which the Contractor completed his obligations under the Contract.
- The Engineer shall issue the Performance Certificate within 28 days after the latest of the expiry dates of the Defects Notification Periods, or as soon thereafter as the Contractor has supplied all the Contractor's Documents and completed and tested all the Works, including remedying any defects. A copy of the Performance Certificate shall be issued to the Employer.
- Only the Performance Certificate shall be deemed to constitute acceptance of the Works.
- 11.10 Unfulfilled Obligations** After the Performance Certificate has been issued, each Party shall remain liable for the fulfillment of any obligation which remains unperformed at that time. For the purposes of determining the nature and extent of unperformed obligations, the Contract shall be deemed to remain in force.
- 11.11 Clearance of Site** Upon receiving the Performance Certificate, the Contractor shall remove any remaining Contractor's Equipment, surplus material, wreckage, rubbish and Temporary Works from the Site.
- If all these items have not been removed within 28 days after receipt by the Contractor of the Performance Certificate, the Employer may sell or otherwise dispose of any remaining items. The Employer shall be entitled to be paid the costs incurred in connection with, or attributable to, such sale or disposal and restoring the Site.
- Any balance of the moneys from the sale shall be paid to the Contractor.



If these moneys are less than the Employer's costs, the Contractor shall pay the outstanding balance to the Employer.

12. Measurement and Evaluation

12.1 Works to be Measured

The Works shall be measured, and valued for payment, in accordance with this Clause. The Contractor shall show in each application under Sub-Clauses 14.3 [Application for Interim Payment Certificates], 14.10 [Statement on Completion] and 14.11 [Application for Final Payment Certificate] the quantities and other particulars detailing the amounts which he considers to be entitled under the Contract.

Whenever the Engineer requires any part of the Works to be measured, reasonable notice shall be given to the Contractor's Representative, who shall:

- (a) promptly either attend or send another qualified representative to assist the Engineer in making the measurement, and
- (b) supply any particulars requested by the Engineer.

If the Contractor fails to attend or send a representative, the measurement made by (or on behalf of) the Engineer shall be accepted as accurate.

Except as otherwise stated in the Contract, wherever any Permanent Works are to be measured from records, these shall be prepared by the Engineer. The Contractor shall, as and when requested, attend to examine and agree the records with the Engineer, and shall sign the same when agreed. If the Contractor does not attend, the records shall be accepted as accurate.

If the Contractor examines and disagrees the records, and/or does not sign them as agreed, then the Contractor shall give notice to the Engineer of the respects in which the records are asserted to be inaccurate. After receiving this notice, the Engineer shall review the records and either confirm or vary them and certify the payment of the undisputed part. If the Contractor does not so give notice to the Engineer within 14 days after being requested to examine the records, they shall be accepted as accurate.

12.2 Method of Measurement

Except as otherwise stated in the Contract and notwithstanding local practice:

- (a) measurement shall be made of the net actual quantity of each item of the Permanent Works, and
- (b) the method of measurement shall be in accordance with the Bill of Quantities or other applicable Schedules.

12.3 Evaluation

Except as otherwise stated in the Contract, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine the Contract Price by evaluating each item of work, applying the measurement agreed or determined in accordance with the above Sub-Clauses 12.1 and 12.2 and the appropriate rate or price for the item.

For each item of work, the appropriate rate or price for the item shall be the rate or price specified for such item in the Contract or, if there is no such item, specified for similar work.

Any item of work included in the Bill of Quantities for which no rate or price was specified shall be considered as included in other rates and



prices in the Bill of Quantities and will not be paid for separately.

However, a new rate or price shall be appropriate for an item of work if:

(a)

- (i) the measured quantity of the item is changed by more than 25% from the quantity of this item in the Bill of Quantities or other Schedule,
- (ii) this change in quantity multiplied by such specified rate for this item exceeds 0.25% of the Accepted Contract Amount,
- (iii) this change in quantity directly changes the Cost per unit quantity of this item by more than 1%, and
- (iv) this item is not specified in the Contract as a "fixed rate item";

or

(b)

- (i) the work is instructed under Clause 13 [Variations and Adjustments],
- (ii) no rate or price is specified in the Contract for this item, and
- (iii) no specified rate or price is appropriate because the item of work is not of similar character, or is not executed under similar conditions, as any item in the Contract.

Each new rate or price shall be derived from any relevant rates or prices in the Contract, with reasonable adjustments to take account of the matters described in sub-paragraph (a) and/or (b), as applicable. If no rates or prices are relevant for the derivation of a new rate or price, it shall be derived from the reasonable Cost of executing the work, together with profit, taking account of any other relevant matters.

Until such time as an appropriate rate or price is agreed or determined, the Engineer shall determine a provisional rate or price for the purposes of Interim Payment Certificates as soon as the concerned work commences.

12.4 Omissions

Whenever the omission of any work forms part (or all) of a Variation, the value of which has not been agreed, if:

- (a) the Contractor will incur (or has incurred) cost which, if the work had not been omitted, would have been deemed to be covered by a sum forming part of the Accepted Contract Amount;
- (b) the omission of the work will result (or has resulted) in this sum not forming part of the Contract Price; and
- (c) this cost is not deemed to be included in the evaluation of any substituted work;

then the Contractor shall give notice to the Engineer accordingly, with supporting particulars. Upon receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine this cost, which shall be included in the Contract Price.

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13. Variations and Adjustments

13.1 Right to Vary

Variations may be initiated by the Engineer at any time prior to issuing the Taking-Over Certificate for the Works, either by an instruction or by a request for the Contractor to submit a proposal.

The Contractor shall execute and be bound by each Variation, unless the Contractor promptly gives notice to the Engineer stating (with supporting particulars) that (i) the Contractor cannot readily obtain the Goods required for the Variation, or (ii) such Variation triggers a substantial change in the sequence or progress of the Works. Upon receiving this notice, the Engineer shall cancel, confirm or vary the instruction.

Each Variation may include:

- (a) changes to the quantities of any item of work included in the Contract (however, such changes do not necessarily constitute a Variation),
- (b) changes to the quality and other characteristics of any item of work,
- (c) changes to the levels, positions and/or dimensions of any part of the Works,
- (d) omission of any work unless it is to be carried out by others,
- (e) any additional work, Plant, Materials or services necessary for the Permanent Works, including any associated Tests on Completion, boreholes and other testing and exploratory work, or
- (f) changes to the sequence or timing of the execution of the Works.

The Contractor shall not make any alteration and/or modification of the Permanent Works, unless and until the Engineer instructs or approves a Variation.

13.2 Value Engineering

The Contractor may, at any time, submit to the Engineer a written proposal which (in the Contractor's opinion) will, if adopted, (i) accelerate completion, (ii) reduce the cost to the Employer of executing, maintaining or operating the Works, (iii) improve the efficiency or value to the Employer of the completed Works, or (iv) otherwise be of benefit to the Employer.

The proposal shall be prepared at the cost of the Contractor and shall include the items listed in Sub-Clause 13.3 [Variation Procedure].

If a proposal, which is approved by the Engineer, includes a change in the design of part of the Permanent Works, then unless otherwise agreed by both Parties:

- (a) the Contractor shall design this part,
- (b) sub-paragraphs (a) to (d) of Sub-Clause 4.1 [Contractor's General Obligations] shall apply, and
- (c) if this change results in a reduction in the contract value of this part, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine a fee, which shall be included in the Contract Price. This fee shall be half (50%) of the difference between the following amounts:
 - (i) such reduction in contract value, resulting from the change,

excluding adjustments under Sub-Clause 13.7 [Adjustments for Changes in Legislation] and Sub-Clause 13.8 [Adjustments for Changes in Cost], and

- (ii) the reduction (if any) in the value to the Employer of the varied works, taking account of any reductions in quality, anticipated life or operational efficiencies.

However, if amount (i) is less than amount (ii), there shall not be a fee.

13.3 Variation Procedure

If the Engineer requests a proposal, prior to instructing a Variation, the Contractor shall respond in writing as soon as practicable, either by giving reasons why he cannot comply (if this is the case) or by submitting:

- (a) a description of the proposed work to be performed and a programme for its execution,
- (b) the Contractor's proposal for any necessary modifications to the programme according to Sub-Clause 8.3 [Programme] and to the Time for Completion, and
- (c) the Contractor's proposal for evaluation of the Variation.

The Engineer shall, as soon as practicable after receiving such proposal (under Sub-Clause 13.2 [Value Engineering] or otherwise), respond with approval, disapproval or comments. The Contractor shall not delay any work whilst awaiting a response.

Each instruction to execute a Variation, with any requirements for the recording of Costs, shall be issued by the Engineer to the Contractor, who shall acknowledge receipt.

Each Variation shall be evaluated in accordance with Clause 12 [Measurement and Evaluation], unless the Engineer instructs or approves otherwise in accordance with this Clause.

13.4 Payment in Applicable Currencies

If the Contract provides for payment of the Contract Price in more than one currency, then whenever an adjustment is agreed, approved or determined as stated above, the amount payable in each of the applicable currencies shall be specified. For this purpose, reference shall be made to the actual or expected currency proportions of the Cost of the varied work, and to the proportions of various currencies specified for payment of the Contract Price.

13.5 Provisional Sums

Each Provisional Sum shall only be used, in whole or in part, in accordance with the Engineer's instructions, and the Contract Price shall be adjusted accordingly. The total sum paid to the Contractor shall include only such amounts, for the work, supplies or services to which the Provisional Sum relates, as the Engineer shall have instructed. For each Provisional Sum, the Engineer may instruct:

- (a) work to be executed (including Plant, Materials or services to be supplied) by the Contractor and valued under Sub-Clause 13.3 [Variation Procedure]; and/or
- (b) Plant, Materials or services to be purchased by the Contractor, from a nominated Subcontractor (as defined in Clause 5 [Nominated Subcontractors]) or otherwise; and for which there shall be included in the Contract Price:
 - (i) the actual amounts paid (or due to be paid) by the Contractor, and

- (ii) a sum for overhead charges and profit, calculated as a percentage of these actual amounts by applying the relevant percentage rate (if any) stated in the appropriate Schedule. If there is no such rate, the percentage rate stated in the Contract Data shall be applied.

The Contractor shall, when required by the Engineer, produce quotations, invoices, vouchers and accounts or receipts in substantiation.

13.6 Daywork

For work of a minor or incidental nature, the Engineer may instruct that a Variation shall be executed on a daywork basis. The work shall then be valued in accordance with the Daywork Schedule included in the Contract, and the following procedure shall apply. If a Daywork Schedule is not included in the Contract, this Sub-Clause shall not apply.

Before ordering Goods for the work, the Contractor shall submit quotations to the Engineer. When applying for payment, the Contractor shall submit invoices, vouchers and accounts or receipts for any Goods.

Except for any items for which the Daywork Schedule specifies that payment is not due, the Contractor shall deliver each day to the Engineer accurate statements in duplicate which shall include the following details of the resources used in executing the previous day's work:

- (a) the names, occupations and time of Contractor's Personnel,
- (b) the identification, type and time of Contractor's Equipment and Temporary Works, and
- (c) the quantities and types of Plant and Materials used.

One copy of each statement will, if correct, or when agreed, be signed by the Engineer and returned to the Contractor. The Contractor shall then submit priced statements of these resources to the Engineer, prior to their inclusion in the next Statement under Sub-Clause 14.3 [Application for Interim Payment Certificates].

13.7 Adjustments for Changes in Legislation

The Contract Price shall be adjusted to take account of any increase or decrease in Cost resulting from a change in the Laws of the Country (including the introduction of new Laws and the repeal or modification of existing Laws) or in the judicial or official governmental interpretation of such Laws, made after the Base Date, which affect the Contractor in the performance of obligations under the Contract.

If the Contractor suffers (or will suffer) delay and/or incurs (or will incur) additional Cost as a result of these changes in the Laws or in such interpretations, made after the Base Date, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

Notwithstanding the foregoing, the Contractor shall not be entitled to an extension of time if the relevant delay has already been taken into account in the determination of a previous extension of time and such Cost shall not be separately paid if the same shall already have been taken into account in the indexing of any inputs to the table of adjustment data in accordance with the provisions of Sub-Clause 13.8 [Adjustments for Changes in Cost].

13.8 Adjustments for Changes in Cost

In this Sub-Clause, “table of adjustment data” means the completed table of adjustment data for local and foreign currencies included in the Schedules. If there is no such table of adjustment data, this Sub-Clause shall not apply.

If this Sub-Clause applies, the amounts payable to the Contractor shall be adjusted for rises or falls in the cost of labour, Goods and other inputs to the Works, by the addition or deduction of the amounts determined by the formulae prescribed in this Sub-Clause. To the extent that full compensation for any rise or fall in Costs is not covered by the provisions of this or other Clauses, the Accepted Contract Amount shall be deemed to have included amounts to cover the contingency of other rises and falls in costs.

The adjustment to be applied to the amount otherwise payable to the Contractor, as valued in accordance with the appropriate Schedule and certified in Payment Certificates, shall be determined from formulae for each of the currencies in which the Contract Price is payable. No adjustment is to be applied to work valued on the basis of Cost or current prices. The formulae shall be of the following general type:

$P_n = a + b L_n / L_o + c E_n / E_o + d M_n / M_o + \dots$ where:

“ P_n ” is the adjustment multiplier to be applied to the estimated contract value in the relevant currency of the work carried out in period “ n ”, this period being a month unless otherwise stated in the Contract Data ;

“ a ” is a fixed coefficient, stated in the relevant table of adjustment data, representing the non-adjustable portion in contractual payments;

“ b ”, “ c ”, “ d ”, ... are coefficients representing the estimated proportion of each cost element related to the execution of the Works, as stated in the relevant table of adjustment data; such tabulated cost elements may be indicative of resources such as labour, equipment and materials;

“ L_n ”, “ E_n ”, “ M_n ”, ... are the current cost indices or reference prices for period “ n ”, expressed in the relevant currency of payment, each of which is applicable to the relevant tabulated cost element on the date 49 days prior to the last day of the period (to which the particular Payment Certificate relates); and

“ L_o ”, “ E_o ”, “ M_o ”, ... are the base cost indices or reference prices, expressed in the relevant currency of payment, each of which is applicable to the relevant tabulated cost element on the Base Date.

The cost indices or reference prices stated in the table of adjustment data shall be used. If their source is in doubt, it shall be determined by the Engineer. For this purpose, reference shall be made to the values of the indices at stated dates (quoted in the fourth and fifth columns respectively of the table) for the purposes of clarification of the source; although these dates (and thus these values) may not correspond to the base cost indices.

In cases where the “currency of index” is not the relevant currency of payment, each index shall be converted into the relevant currency of payment at the selling rate, established by the central bank of the Country, of this relevant currency on the above date for which the index is required to be applicable.

Until such time as each current cost index is available, the Engineer

shall determine a provisional index for the issue of Interim Payment Certificates. When a current cost index is available, the adjustment shall be recalculated accordingly.

If the Contractor fails to complete the Works within the Time for Completion, adjustment of prices thereafter shall be made using either (i) each index or price applicable on the date 49 days prior to the expiry of the Time for Completion of the Works, or (ii) the current index or price, whichever is more favourable to the Employer.

The weightings (coefficients) for each of the factors of cost stated in the table(s) of adjustment data shall only be adjusted if they have been rendered unreasonable, unbalanced or inapplicable, as a result of Variations.

14. Contract Price and Payment

14.1 The Contract Price Unless otherwise stated in the Particular Conditions:

- (a) the Contract Price shall be agreed or determined under Sub-Clause 12.3 [Evaluation] and be subject to adjustments in accordance with the Contract;
- (b) the Contractor shall pay all taxes, duties and fees required to be paid by him under the Contract, and the Contract Price shall not be adjusted for any of these costs except as stated in Sub-Clause 13.7 [Adjustments for Changes in Legislation];
- (c) any quantities which may be set out in the Bill of Quantities or other Schedule are estimated quantities and are not to be taken as the actual and correct quantities:
 - (i) of the Works which the Contractor is required to execute, or
 - (ii) for the purposes of Clause 12 [Measurement and Evaluation]; and
- (d) the Contractor shall submit to the Engineer, within 28 days after the Commencement Date, a proposed breakdown of each lump sum price in the Schedules. The Engineer may take account of the breakdown when preparing Payment Certificates, but shall not be bound by it.

Notwithstanding the provisions of subparagraph (b), Contractor's Equipment, including essential spare parts therefor, imported by the Contractor for the sole purpose of executing the Contract shall be exempt from the payment of import duties and taxes upon importation.

14.2 Advance Payment

The Employer shall make an advance payment, as an interest-free loan for mobilization and cash flow support, when the Contractor submits a guarantee in accordance with this Sub-Clause. The total advance payment, the number and timing of installments (if more than one), and the applicable currencies and proportions, shall be as stated in the Contract Data.

Unless and until the Employer receives this guarantee, or if the total advance payment is not stated in the Contract Data, this Sub-Clause shall not apply.

The Engineer shall deliver to the Employer and to the Contractor an Interim Payment Certificate for the advance payment or its first installment after receiving a Statement (under Sub-Clause 14.3

[Application for Interim Payment Certificates]) and after the Employer receives (i) the Performance Security in accordance with Sub-Clause 4.2 [Performance Security] and (ii) a guarantee in amounts and currencies equal to the advance payment. This guarantee shall be issued by a reputable bank or financial institution selected by the Contractor and shall be in the form annexed to the Particular Conditions or in another form approved by the Employer.

The Contractor shall ensure that the guarantee is valid and enforceable until the advance payment has been repaid, but its amount shall be progressively reduced by the amount repaid by the Contractor as indicated in the Payment Certificates. If the terms of the guarantee specify its expiry date, and the advance payment has not been repaid by the date 28 days prior to the expiry date, the Contractor shall extend the validity of the guarantee until the advance payment has been repaid.

Unless stated otherwise in the Contract Data, the advance payment shall be repaid through percentage deductions from the interim payments determined by the Engineer in accordance with Sub-Clause 14.6 [Issue of Interim Payment Certificates], as follows:

- (a) deductions shall commence in the next interim Payment Certificate following that in which the total of all certified interim payments (excluding the advance payment and deductions and repayments of retention) exceeds 30 percent (30%) of the Accepted Contract Amount less Provisional Sums; and
- (b) deductions shall be made at the amortization rate stated in the Contract Data of the amount of each Interim Payment Certificate (excluding the advance payment and deductions for its repayments as well as deductions for retention money) in the currencies and proportions of the advance payment until such time as the advance payment has been repaid; provided that the advance payment shall be completely repaid prior to the time when 90 percent (90%) of the Accepted Contract Amount less Provisional Sums has been certified for payment.

If the advance payment has not been repaid prior to the issue of the Taking-Over Certificate for the Works or prior to termination under Clause 15 [Termination by Employer], Clause 16 [Suspension and Termination by Contractor] or Clause 19 [Force Majeure] (as the case may be), the whole of the balance then outstanding shall immediately become due and in case of termination under Clause 15 [Termination by Employer], except for Sub-Clause 15.5 [Employer's Entitlement to Termination for Convenience], payable by the Contractor to the Employer.

14.3 Application for Interim Payment Certificates

The Contractor shall submit a Statement in six copies to the Engineer after the end of each month, in a form approved by the Engineer, showing in detail the amounts to which the Contractor considers himself to be entitled, together with supporting documents which shall include the report on the progress during this month in accordance with Sub-Clause 4.21 [Progress Reports].

The Statement shall include the following items, as applicable, which shall be expressed in the various currencies in which the Contract Price is payable, in the sequence listed:

- (a) the estimated contract value of the Works executed and the Contractor's Documents produced up to the end of the month (including Variations but excluding items described in sub-paragraphs (b) to (g) below);

- (b) any amounts to be added and deducted for changes in legislation and changes in cost, in accordance with Sub-Clause 13.7 [Adjustments for Changes in Legislation] and Sub-Clause 13.8 [Adjustments for Changes in Cost];
- (c) any amount to be deducted for retention, calculated by applying the percentage of retention stated in the Contract Data to the total of the above amounts, until the amount so retained by the Employer reaches the limit of Retention Money (if any) stated in the Contract Data;
- (d) any amounts to be added for the advance payment and (if more than one instalment) and to be deducted for its repayments in accordance with Sub-Clause 14.2 [Advance Payment];
- (e) any amounts to be added and deducted for Plant and Materials in accordance with Sub-Clause 14.5 [Plant and Materials intended for the Works];
- (f) any other additions or deductions which may have become due under the Contract or otherwise, including those under Clause 20 [Claims, Disputes and Arbitration]; and
- (g) the deduction of amounts certified in all previous Payment Certificates.

14.4 Schedule of Payments

If the Contract includes a schedule of payments specifying the instalments in which the Contract Price will be paid, then unless otherwise stated in this schedule:

- (a) the instalments quoted in this schedule of payments shall be the estimated contract values for the purposes of sub-paragraph (a) of Sub-Clause 14.3 [Application for Interim Payment Certificates];;
- (b) Sub-Clause 14.5 [Plant and Materials intended for the Works] shall not apply; and
- (c) if these instalments are not defined by reference to the actual progress achieved in executing the Works, and if actual progress is found to be less or more than that on which this schedule of payments was based, then the Engineer may proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine revised instalments, which shall take account of the extent to which progress is less or more than that on which the instalments were previously based.

If the Contract does not include a schedule of payments, the Contractor shall submit non-binding estimates of the payments which he expects to become due during each quarterly period. The first estimate shall be submitted within 42 days after the Commencement Date. Revised estimates shall be submitted at quarterly intervals, until the Taking-Over Certificate has been issued for the Works.

14.5 Plant and Materials intended for the Works

If this Sub-Clause applies, Interim Payment Certificates shall include, under sub-paragraph (e) of Sub-Clause 14.3, (i) an amount for Plant and Materials which have been sent to the Site for incorporation in the Permanent Works, and (ii) a reduction when the contract value of such Plant and Materials is included as part of the Permanent Works under sub-paragraph (a) of Sub-Clause 14.3 [Application for Interim Payment Certificates].

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If the lists referred to in sub-paragraphs (b)(i) or (c)(i) below are not included in the Schedules, this Sub-Clause shall not apply.

The Engineer shall determine and certify each addition if the following conditions are satisfied:

- (a) the Contractor has:
 - (i) kept satisfactory records (including the orders, receipts, Costs and use of Plant and Materials) which are available for inspection, and
 - (ii) submitted a statement of the Cost of acquiring and delivering the Plant and Materials to the Site, supported by satisfactory evidence;

and either:

- (b) the relevant Plant and Materials:
 - (i) are those listed in the Schedules for payment when shipped,
 - (ii) have been shipped to the Country, en route to the Site, in accordance with the Contract; and
 - (iii) are described in a clean shipped bill of lading or other evidence of shipment, which has been submitted to the Engineer together with evidence of payment of freight and insurance, any other documents reasonably required, and a bank guarantee in a form and issued by an entity approved by the Employer in amounts and currencies equal to the amount due under this Sub-Clause: this guarantee may be in a similar form to the form referred to in Sub-Clause 14.2 [Advance Payment] and shall be valid until the Plant and Materials are properly stored on Site and protected against loss, damage or deterioration;

or

- (c) the relevant Plant and Materials:
 - (i) are those listed in the Schedules for payment when delivered to the Site, and
 - (ii) have been delivered to and are properly stored on the Site, are protected against loss, damage or deterioration, and appear to be in accordance with the Contract.

The additional amount to be certified shall be the equivalent of eighty percent (80%) of the Engineer's determination of the cost of the Plant and Materials (including delivery to Site), taking account of the documents mentioned in this Sub-Clause and of the contract value of the Plant and Materials.

The currencies for this additional amount shall be the same as those in which payment will become due when the contract value is included under sub-paragraph (a) of Sub-Clause 14.3 [Application for Interim Payment Certificates]. At that time, the Payment Certificate shall include the applicable reduction which shall be equivalent to, and in the same currencies and proportions as, this additional amount for the relevant Plant and Materials.

14.6 Issue of Interim Payment

No amount will be certified or paid until the Employer has received and approved the Performance Security. Thereafter, the Engineer shall,



Certificates

within 28 days after receiving a Statement and supporting documents, deliver to the Employer and to the Contractor an Interim Payment Certificate which shall state the amount which the Engineer fairly determines to be due, with all supporting particulars for any reduction or withholding made by the Engineer on the Statement if any.

However, prior to issuing the Taking-Over Certificate for the Works, the Engineer shall not be bound to issue an Interim Payment Certificate in an amount which would (after retention and other deductions) be less than the minimum amount of Interim Payment Certificates (if any) stated in the Contract Data. In this event, the Engineer shall give notice to the Contractor accordingly.

An Interim Payment Certificate shall not be withheld for any other reason, although:

- (a) if any thing supplied or work done by the Contractor is not in accordance with the Contract, the cost of rectification or replacement may be withheld until rectification or replacement has been completed; and/or
- (b) if the Contractor was or is failing to perform any work or obligation in accordance with the Contract, and had been so notified by the Engineer, the value of this work or obligation may be withheld until the work or obligation has been performed.

The Engineer may in any Payment Certificate make any correction or modification that should properly be made to any previous Payment Certificate. A Payment Certificate shall not be deemed to indicate the Engineer's acceptance, approval, consent or satisfaction.

14.7 Payment

The Employer shall pay to the Contractor:

- (a) the first instalment of the advance payment within 42 days after issuing the Letter of Acceptance or within 21 days after receiving the documents in accordance with Sub-Clause 4.2 [Performance Security] and Sub-Clause 14.2 [Advance Payment], whichever is later;
- (b) the amount certified in each Interim Payment Certificate within 56 days after the Engineer receives the Statement and supporting documents; or, at a time when the Bank's loan or credit (from which part of the payments to the Contractor is being made) is suspended, the amount shown on any statement submitted by the Contractor within 14 days after such statement is submitted, any discrepancy being rectified in the next payment to the Contractor; and
- (c) the amount certified in the Final Payment Certificate within 56 days after the Employer receives this Payment Certificate; or, at a time when the Bank's loan or credit (from which part of the payments to the Contractor is being made) is suspended, the undisputed amount shown in the Final Statement within 56 days after the date of notification of the suspension in accordance with Sub-Clause 16.2 [Termination by Contractor].

Payment of the amount due in each currency shall be made into the bank account, nominated by the Contractor, in the payment country (for this currency) specified in the Contract.

14.8 Delayed Payment

If the Contractor does not receive payment in accordance with Sub-Clause 14.7 [Payment], the Contractor shall be entitled to receive financing charges compounded monthly on the amount unpaid during the period of delay. This period shall be deemed to commence on the

date for payment specified in Sub-Clause 14.7 [Payment], irrespective (in the case of its sub-paragraph (b)) of the date on which any Interim Payment Certificate is issued.

Unless otherwise stated in the Particular Conditions, these financing charges shall be calculated at the annual rate of three percentage points above the discount rate of the central bank in the country of the currency of payment, or if not available, the interbank offered rate, and shall be paid in such currency.

The Contractor shall be entitled to this payment without formal notice or certification, and without prejudice to any other right or remedy.

14.9 Payment of Retention Money

When the Taking-Over Certificate has been issued for the Works, the first half of the Retention Money shall be certified by the Engineer for payment to the Contractor. If a Taking-Over Certificate is issued for a Section or part of the Works, a proportion of the Retention Money shall be certified and paid. This proportion shall be half (50%) of the proportion calculated by dividing the estimated contract value of the Section or part, by the estimated final Contract Price.

Promptly after the latest of the expiry dates of the Defects Notification Periods, the outstanding balance of the Retention Money shall be certified by the Engineer for payment to the Contractor. If a Taking-Over Certificate was issued for a Section, a proportion of the second half of the Retention Money shall be certified and paid promptly after the expiry date of the Defects Notification Period for the Section. This proportion shall be half (50%) of the proportion calculated by dividing the estimated contract value of the Section by the estimated final Contract Price.

However, if any work remains to be executed under Clause 11 [Defects Liability], the Engineer shall be entitled to withhold certification of the estimated cost of this work until it has been executed.

When calculating these proportions, no account shall be taken of any adjustments under Sub-Clause 13.7 [Adjustments for Changes in Legislation] and Sub-Clause 13.8 [Adjustments for Changes in Cost].

Unless otherwise stated in the Particular Conditions, when the Taking-Over Certificate has been issued for the Works and the first half of the Retention Money has been certified for payment by the Engineer, the Contractor shall be entitled to substitute a guarantee, in the form annexed to the Particular Conditions or in another form approved by the Employer and issued by a reputable bank or financial institution selected by the Contractor, for the second half of the Retention Money. The Contractor shall ensure that the guarantee is in the amounts and currencies of the second half of the Retention Money and is valid and enforceable until the Contractor has executed and completed the Works and remedied any defects, as specified for the Performance Security in Sub-Clause 4.2. On receipt by the Employer of the required guarantee, the Engineer shall certify and the Employer shall pay the second half of the Retention Money. The release of the second half of the Retention Money against a guarantee shall then be in lieu of the release under the second paragraph of this Sub-Clause. The Employer shall return the guarantee to the Contractor within 21 days after receiving a copy of the Performance Certificate.

If the Performance Security required under Sub-Clause 4.2 is in the form of a demand guarantee, and the amount guaranteed under it when the Taking-Over Certificate is issued is more than half of the Retention Money, then the Retention Money guarantee will not be required. If the amount guaranteed under the Performance Security when the Taking-Over Certificate is issued is less than half of the Retention Money, the Retention Money guarantee will only be required for the difference between half of the Retention Money and the amount guaranteed under



the Performance Security.

14.10 Statement at Completion

Within 84 days after receiving the Taking-Over Certificate for the Works, the Contractor shall submit to the Engineer six copies of a Statement at completion with supporting documents, in accordance with Sub-Clause 14.3 [Application for Interim Payment Certificates], showing:

- (a) the value of all work done in accordance with the Contract up to the date stated in the Taking-Over Certificate for the Works,
- (b) any further sums which the Contractor considers to be due, and
- (c) an estimate of any other amounts which the Contractor considers will become due to him under the Contract. Estimated amounts shall be shown separately in this Statement at completion.

The Engineer shall then certify in accordance with Sub-Clause 14.6 [Issue of Interim Payment Certificates].

14.11 Application for Final Payment Certificate

Within 56 days after receiving the Performance Certificate, the Contractor shall submit, to the Engineer, six copies of a draft final statement with supporting documents showing in detail in a form approved by the Engineer:

- (a) the value of all work done in accordance with the Contract, and
- (b) any further sums which the Contractor considers to be due to him under the Contract or otherwise.

If the Engineer disagrees with or cannot verify any part of the draft final statement, the Contractor shall submit such further information as the Engineer may reasonably require within 28 days from receipt of said draft and shall make such changes in the draft as may be agreed between them. The Contractor shall then prepare and submit to the Engineer the final statement as agreed. This agreed statement is referred to in these Conditions as the "Final Statement".

However if, following discussions between the Engineer and the Contractor and any changes to the draft final statement which are agreed, it becomes evident that a dispute exists, the Engineer shall deliver to the Employer (with a copy to the Contractor) an Interim Payment Certificate for the agreed parts of the draft final statement. Thereafter, if the dispute is finally resolved under Sub-Clause 20.4 [Obtaining Dispute Board's Decision] or Sub-Clause 20.5 [Amicable Settlement], the Contractor shall then prepare and submit to the Employer (with a copy to the Engineer) a Final Statement.

14.12 Discharge

When submitting the Final Statement, the Contractor shall submit a discharge which confirms that the total of the Final Statement represents full and final settlement of all moneys due to the Contractor under or in connection with the Contract. This discharge may state that it becomes effective when the Contractor has received the Performance Security and the outstanding balance of this total, in which event the discharge shall be effective on such date.

14.13 Issue of Final Payment Certificate

Within 28 days after receiving the Final Statement and discharge in accordance with Sub-Clause 14.11 [Application for Final Payment Certificate] and Sub-Clause 14.12 [Discharge], the Engineer shall deliver, to the Employer and to the Contractor, the Final Payment Certificate which shall state:

- (a) the amount which he fairly determines is finally due, and
- (b) after giving credit to the Employer for all amounts previously paid



by the Employer and for all sums to which the Employer is entitled, the balance (if any) due from the Employer to the Contractor or from the Contractor to the Employer, as the case may be.

If the Contractor has not applied for a Final Payment Certificate in accordance with Sub-Clause 14.11 [Application for Final Payment Certificate] and Sub-Clause 14.12 [Discharge], the Engineer shall request the Contractor to do so. If the Contractor fails to submit an application within a period of 28 days, the Engineer shall issue the Final Payment Certificate for such amount as he fairly determines to be due.

14.14 Cessation of Employer's Liability

The Employer shall not be liable to the Contractor for any matter or thing under or in connection with the Contract or execution of the Works, except to the extent that the Contractor shall have included an amount expressly for it:

- (a) in the Final Statement and also
- (b) (except for matters or things arising after the issue of the Taking-Over Certificate for the Works) in the Statement at completion described in Sub-Clause 14.10 [Statement at Completion].

However, this Sub-Clause shall not limit the Employer's liability under his indemnification obligations, or the Employer's liability in any case of fraud, deliberate default or reckless misconduct by the Employer.

14.15 Currencies of Payment

The Contract Price shall be paid in the currency or currencies named in the Schedule of Payment Currencies. If more than one currency is so named, payments shall be made as follows:

- (a) if the Accepted Contract Amount was expressed in Local Currency only:
 - (i) the proportions or amounts of the Local and Foreign Currencies, and the fixed rates of exchange to be used for calculating the payments, shall be as stated in the Schedule of Payment Currencies, except as otherwise agreed by both Parties;
 - (ii) payments and deductions under Sub-Clause 13.5 [Provisional Sums] and Sub-Clause 13.7 [Adjustments for Changes in Legislation] shall be made in the applicable currencies and proportions; and
 - (iii) other payments and deductions under sub-paragraphs (a) to (d) of Sub-Clause 14.3 [Application for Interim Payment Certificates] shall be made in the currencies and proportions specified in sub-paragraph (a)(i) above;
- (b) payment of the damages specified in the Contract Data, shall be made in the currencies and proportions specified in the Schedule of Payment Currencies;
- (c) other payments to the Employer by the Contractor shall be made in the currency in which the sum was expended by the Employer, or in such currency as may be agreed by both Parties;
- (d) if any amount payable by the Contractor to the Employer in a particular currency exceeds the sum payable by the Employer to the Contractor in that currency, the Employer may recover the balance of this amount from the sums otherwise payable to the

Contractor in other currencies; and

- (e) if no rates of exchange are stated in the Schedule of Payment Currencies, they shall be those prevailing on the Base Date and determined by the central bank of the Country.

15. Termination by Employer

15.1 Notice to Correct If the Contractor fails to carry out any obligation under the Contract, the Engineer may by notice require the Contractor to make good the failure and to remedy it within a specified reasonable time.

15.2 Termination by Employer The Employer shall be entitled to terminate the Contract if the Contractor:

- (a) fails to comply with Sub-Clause 4.2 [Performance Security] or with a notice under Sub-Clause 15.1 [Notice to Correct],
- (b) abandons the Works or otherwise plainly demonstrates the intention not to continue performance of his obligations under the Contract,
- (c) without reasonable excuse fails:
 - (i) to proceed with the Works in accordance with Clause 8 [Commencement, Delays and Suspension], or
 - (ii) to comply with a notice issued under Sub-Clause 7.5 [Rejection] or Sub-Clause 7.6 [Remedial Work], within 28 days after receiving it,
- (d) subcontracts the whole of the Works or assigns the Contract without the required agreement,
- (e) becomes bankrupt or insolvent, goes into liquidation, has a receiving or administration order made against him, compounds with his creditors, or carries on business under a receiver, trustee or manager for the benefit of his creditors, or if any act is done or event occurs which (under applicable Laws) has a similar effect to any of these acts or events, or
- (f) gives or offers to give (directly or indirectly) to any person any bribe, gift, gratuity, commission or other thing of value, as an inducement or reward:
 - (i) for doing or forbearing to do any action in relation to the Contract, or
 - (ii) for showing or forbearing to show favour or disfavour to any person in relation to the Contract,

or if any of the Contractor's Personnel, agents or Subcontractors gives or offers to give (directly or indirectly) to any person any such inducement or reward as is described in this sub-paragraph (f). However, lawful inducements and rewards to Contractor's Personnel shall not entitle termination.

In any of these events or circumstances, the Employer may, upon giving 14 days' notice to the Contractor, terminate the Contract and expel the Contractor from the Site. However, in the case of sub-paragraph (e) or (f), the Employer may by notice terminate the Contract immediately.

The Employer's election to terminate the Contract shall not prejudice

any other rights of the Employer, under the Contract or otherwise.

The Contractor shall then leave the Site and deliver any required Goods, all Contractor's Documents, and other design documents made by or for him, to the Engineer. However, the Contractor shall use his best efforts to comply immediately with any reasonable instructions included in the notice (i) for the assignment of any subcontract, and (ii) for the protection of life or property or for the safety of the Works.

After termination, the Employer may complete the Works and/or arrange for any other entities to do so. The Employer and these entities may then use any Goods, Contractor's Documents and other design documents made by or on behalf of the Contractor.

The Employer shall then give notice that the Contractor's Equipment and Temporary Works will be released to the Contractor at or near the Site. The Contractor shall promptly arrange their removal, at the risk and cost of the Contractor. However, if by this time the Contractor has failed to make a payment due to the Employer, these items may be sold by the Employer in order to recover this payment. Any balance of the proceeds shall then be paid to the Contractor.

15.3 Valuation at Date of Termination

As soon as practicable after a notice of termination under Sub-Clause 15.2 [Termination by Employer] has taken effect, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine the value of the Works, Goods and Contractor's Documents, and any other sums due to the Contractor for work executed in accordance with the Contract.

15.4 Payment after Termination

After a notice of termination under Sub-Clause 15.2 [Termination by Employer] has taken effect, the Employer may:

- (a) proceed in accordance with Sub-Clause 2.5 [Employer's Claims],
- (b) withhold further payments to the Contractor until the costs of execution, completion and remedying of any defects, damages for delay in completion (if any), and all other costs incurred by the Employer, have been established, and/or
- (c) recover from the Contractor any losses and damages incurred by the Employer and any extra costs of completing the Works, after allowing for any sum due to the Contractor under Sub-Clause 15.3 [Valuation at Date of Termination]. After recovering any such losses, damages and extra costs, the Employer shall pay any balance to the Contractor.

15.5 Employer's Entitlement to Termination for Convenience

The Employer shall be entitled to terminate the Contract, at any time for the Employer's convenience, by giving notice of such termination to the Contractor. The termination shall take effect 28 days after the later of the dates on which the Contractor receives this notice or the Employer returns the Performance Security. The Employer shall not terminate the Contract under this Sub-Clause in order to execute the Works himself or to arrange for the Works to be executed by another contractor or to avoid a termination of the Contract by the Contractor under Clause 16.2 [Termination by Contractor].

After this termination, the Contractor shall proceed in accordance with Sub-Clause 16.3 [Cessation of Work and Removal of Contractor's Equipment] and shall be paid in accordance with Sub-Clause 16.4 [Payment on Termination].

15.6 Corrupt or Fraudulent Practices

If the Employer determines, based on reasonable evidence, that the Contractor has engaged in corrupt, fraudulent, collusive or coercive practices, in competing for or in executing the Contract, then the Employer may, after giving 14 days notice to the Contractor, terminate



the Contract and expel him from the Site, and the provisions of Clause 15 shall apply as if such termination had been made under Sub-Clause 15.2 [Termination by Employer].

Should any employee of the Contractor be determined, based on reasonable evidence, to have engaged in corrupt, fraudulent or coercive practice during the execution of the work then that employee shall be removed in accordance with Sub-Clause 6.9 [Contractor's Personnel].

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;²¹
- (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;²²
- (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;²³
- (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;²⁴
- (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 Sub-Clause 1.15 [Inspections and Audits by the Bank].

16. Suspension and Termination by Contractor

16.1 Contractor's Entitlement to Suspend Work

If the Engineer fails to certify in accordance with Sub-Clause 14.6 [Issue of Interim Payment Certificates] or the Employer fails to comply with Sub-Clause 2.4 [Employer's Financial Arrangements] or Sub-Clause 14.7 [Payment], the Contractor may, after giving not less than 21 days' notice to the Employer, suspend work (or reduce the rate of work) unless and until the Contractor has received the Payment Certificate, reasonable evidence

²¹ "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.

²² "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.

²³ "Parties" refers to participants in the procurement process (including public officials) attempting to establish bid prices at artificial, non competitive levels.

²⁴ "Party" refers to a participant in the procurement process or contract execution.

or payment, as the case may be and as described in the notice.

Notwithstanding the above, if the Bank has suspended disbursements under the loan or credit from which payments to the Contractor are being made, in whole or in part, for the execution of the Works, and no alternative funds are available as provided for in Sub-Clause 2.4 [Employer's Financial Arrangements], the Contractor may by notice suspend work or reduce the rate of work at any time, but not less than 7 days after the Borrower having received the suspension notification from the Bank.

The Contractor's action shall not prejudice his entitlements to financing charges under Sub-Clause 14.8 [Delayed Payment] and to termination under Sub-Clause 16.2 [Termination by Contractor].

If the Contractor subsequently receives such Payment Certificate, evidence or payment (as described in the relevant Sub-Clause and in the above notice) before giving a notice of termination, the Contractor shall resume normal working as soon as is reasonably practicable.

If the Contractor suffers delay and/or incurs Cost as a result of suspending work (or reducing the rate of work) in accordance with this Sub-Clause, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost plus profit, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

16.2 Termination by Contractor

The Contractor shall be entitled to terminate the Contract if:

- (a) the Contractor does not receive the reasonable evidence within 42 days after giving notice under Sub-Clause 16.1 [Contractor's Entitlement to Suspend Work] in respect of a failure to comply with Sub-Clause 2.4 [Employer's Financial Arrangements],
- (b) the Engineer fails, within 56 days after receiving a Statement and supporting documents, to issue the relevant Payment Certificate,
- (c) the Contractor does not receive the amount due under an Interim Payment Certificate within 42 days after the expiry of the time stated in Sub-Clause 14.7 [Payment] within which payment is to be made (except for deductions in accordance with Sub-Clause 2.5 [Employer's Claims]),
- (d) the Employer substantially fails to perform his obligations under the Contract in such manner as to materially and adversely affect the economic balance of the Contract and/or the ability of the Contractor to perform the Contract,
- (e) the Employer fails to comply with Sub-Clause 1.6 [Contract Agreement] or Sub-Clause 1.7 [Assignment],
- (f) a prolonged suspension affects the whole of the Works as described in Sub-Clause 8.11 [Prolonged Suspension], or

- (g) the Employer becomes bankrupt or insolvent, goes into liquidation, has a receiving or administration order made against him, compounds with his creditors, or carries on business under a receiver, trustee or manager for the benefit of his creditors, or if any act is done or event occurs which (under applicable Laws) has a similar effect to any of these acts or events.
- (h) the Contractor does not receive the Engineer's instruction recording the agreement of both Parties on the fulfilment of the conditions for the Commencement of Works under Sub-Clause 8.1 [Commencement of Works].

In any of these events or circumstances, the Contractor may, upon giving 14 days' notice to the Employer, terminate the Contract. However, in the case of sub-paragraph (f) or (g), the Contractor may by notice terminate the Contract immediately.

In the event the Bank suspends the loan or credit from which part or whole of the payments to the Contractor are being made, if the Contractor has not received the sums due to him upon expiration of the 14 days referred to in Sub-Clause 14.7 [Payment] for payments under Interim Payment Certificates, the Contractor may, without prejudice to the Contractor's entitlement to financing charges under Sub-Clause 14.8 [Delayed Payment], take one of the following actions, namely (i) suspend work or reduce the rate of work under Sub-Clause 16.1 above, or (ii) terminate the Contract by giving notice to the Employer, with a copy to the Engineer, such termination to take effect 14 days after the giving of the notice.

The Contractor's election to terminate the Contract shall not prejudice any other rights of the Contractor, under the Contract or otherwise.

16.3 Cessation of Work and Removal of Contractor's Equipment

After a notice of termination under Sub-Clause 15.5 [Employer's Entitlement to Termination for Convenience], Sub-Clause 16.2 [Termination by Contractor] or Sub-Clause 19.6 [Optional Termination, Payment and Release] has taken effect, the Contractor shall promptly:

- (a) cease all further work, except for such work as may have been instructed by the Engineer for the protection of life or property or for the safety of the Works,
- (b) hand over Contractor's Documents, Plant, Materials and other work, for which the Contractor has received payment, and
- (c) remove all other Goods from the Site, except as necessary for safety, and leave the Site.

16.4 Payment on Termination

After a notice of termination under Sub-Clause 16.2 [Termination by Contractor] has taken effect, the Employer shall promptly:

- (a) return the Performance Security to the Contractor,
- (b) pay the Contractor in accordance with Sub-Clause 19.6 [Optional Termination, Payment and Release], and
- (c) pay to the Contractor the amount of any loss or damage sustained by the Contractor as a result of this termination.

17. Risk and Responsibility

17.1 Indemnities

The Contractor shall indemnify and hold harmless the Employer, the Employer's Personnel, and their respective agents, against and from all



claims, damages, losses and expenses (including legal fees and expenses) in respect of:

- (a) bodily injury, sickness, disease or death, of any person whatsoever arising out of or in the course of or by reason of the Contractor's design (if any), the execution and completion of the Works and the remedying of any defects, unless attributable to any negligence, wilful act or breach of the Contract by the Employer, the Employer's Personnel, or any of their respective agents, and
- (b) damage to or loss of any property, real or personal (other than the Works), to the extent that such damage or loss arises out of or in the course of or by reason of the Contractor's design (if any), the execution and completion of the Works and the remedying of any defects, unless and to the extent that any such damage or loss is attributable to any negligence, wilful act or breach of the Contract by the Employer, the Employer's Personnel, their respective agents, or anyone directly or indirectly employed by any of them.

The Employer shall indemnify and hold harmless the Contractor, the Contractor's Personnel, and their respective agents, against and from all claims, damages, losses and expenses (including legal fees and expenses) in respect of (1) bodily injury, sickness, disease or death, which is attributable to any negligence, wilful act or breach of the Contract by the Employer, the Employer's Personnel, or any of their respective agents, and (2) the matters for which liability may be excluded from insurance cover, as described in sub-paragraphs (d)(i), (ii) and (iii) of Sub-Clause 18.3 [Insurance Against Injury to Persons and Damage to Property].

17.2 Contractor's Care of the Works

The Contractor shall take full responsibility for the care of the Works and Goods from the Commencement Date until the Taking-Over Certificate is issued (or is deemed to be issued under Sub-Clause 10.1 [Taking Over of the Works and Sections]) for the Works, when responsibility for the care of the Works shall pass to the Employer. If a Taking-Over Certificate is issued (or is so deemed to be issued) for any Section or part of the Works, responsibility for the care of the Section or part shall then pass to the Employer.

After responsibility has accordingly passed to the Employer, the Contractor shall take responsibility for the care of any work which is outstanding on the date stated in a Taking-Over Certificate, until this outstanding work has been completed.

If any loss or damage happens to the Works, Goods or Contractor's Documents during the period when the Contractor is responsible for their care, from any cause not listed in Sub-Clause 17.3 [Employer's Risks], the Contractor shall rectify the loss or damage at the Contractor's risk and cost, so that the Works, Goods and Contractor's Documents conform with the Contract.

The Contractor shall be liable for any loss or damage caused by any actions performed by the Contractor after a Taking-Over Certificate has been issued. The Contractor shall also be liable for any loss or damage which occurs after a Taking-Over Certificate has been issued and which arose from a previous event for which the Contractor was liable.

17.3 Employer's Risks

The risks referred to in Sub-Clause 17.4 [Consequences of Employer's Risks] below, insofar as they directly affect the execution of the Works in the Country, are:

- (a) war, hostilities (whether war be declared or not), invasion, act of



foreign enemies,

- (b) rebellion, terrorism, sabotage by persons other than the Contractor's Personnel, revolution, insurrection, military or usurped power, or civil war, within the Country,
- (c) riot, commotion or disorder within the Country by persons other than the Contractor's Personnel,
- (d) munitions of war, explosive materials, ionising radiation or contamination by radio-activity, within the Country, except as may be attributable to the Contractor's use of such munitions, explosives, radiation or radio-activity,
- (e) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds,
- (f) use or occupation by the Employer of any part of the Permanent Works, except as may be specified in the Contract,
- (g) design of any part of the Works by the Employer's Personnel or by others for whom the Employer is responsible, and
- (h) any operation of the forces of nature which is Unforeseeable or against which an experienced contractor could not reasonably have been expected to have taken adequate preventive precautions.

17.4 Consequences of Employer's Risks

If and to the extent that any of the risks listed in Sub-Clause 17.3 above results in loss or damage to the Works, Goods or Contractor's Documents, the Contractor shall promptly give notice to the Engineer and shall rectify this loss or damage to the extent required by the Engineer.

If the Contractor suffers delay and/or incurs Cost from rectifying this loss or damage, the Contractor shall give a further notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost, which shall be included in the Contract Price. In the case of sub-paragraphs (f) and (g) of Sub-Clause 17.3 [Employer's Risks], Cost plus profit shall be payable.

After receiving this further notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

17.5 Intellectual and Industrial Property Rights

In this Sub-Clause, "infringement" means an infringement (or alleged infringement) of any patent, registered design, copyright, trade mark, trade name, trade secret or other intellectual or industrial property right relating to the Works; and "claim" means a claim (or proceedings pursuing a claim) alleging an infringement.

Whenever a Party does not give notice to the other Party of any claim within 28 days of receiving the claim, the first Party shall be deemed to have waived any right to indemnity under this Sub-Clause.

The Employer shall indemnify and hold the Contractor harmless against and from any claim alleging an infringement which is or was:

- (a) an unavoidable result of the Contractor's compliance with the Contract, or

- (b) a result of any Works being used by the Employer:
 - (i) for a purpose other than that indicated by, or reasonably to be inferred from, the Contract, or
 - (ii) in conjunction with any thing not supplied by the Contractor, unless such use was disclosed to the Contractor prior to the Base Date or is stated in the Contract.

The Contractor shall indemnify and hold the Employer harmless against and from any other claim which arises out of or in relation to (i) the manufacture, use, sale or import of any Goods, or (ii) any design for which the Contractor is responsible.

If a Party is entitled to be indemnified under this Sub-Clause, the indemnifying Party may (at its cost) conduct negotiations for the settlement of the claim, and any litigation or arbitration which may arise from it. The other Party shall, at the request and cost of the indemnifying Party, assist in contesting the claim. This other Party (and its Personnel) shall not make any admission which might be prejudicial to the indemnifying Party, unless the indemnifying Party failed to take over the conduct of any negotiations, litigation or arbitration upon being requested to do so by such other Party.

17.6 Limitation of Liability

Neither Party shall be liable to the other Party for loss of use of any Works, loss of profit, loss of any contract or for any indirect or consequential loss or damage which may be suffered by the other Party in connection with the Contract, other than as specifically provided in Sub-Clause 8.7 [Delay Damages]; Sub-Clause 11.2 [Cost of Remedying Defects]; Sub-Clause 15.4 [Payment after Termination]; Sub-Clause 16.4 [Payment on Termination]; Sub-Clause 17.1 [Indemnities]; Sub-Clause 17.4(b) [Consequences of Employer's Risks] and Sub-Clause 17.5 [Intellectual and Industrial Property Rights].

The total liability of the Contractor to the Employer, under or in connection with the Contract other than under Sub-Clause 4.19 [Electricity, Water and Gas], Sub-Clause 4.20 [Employer's Equipment and Free-Issue Materials], Sub-Clause 17.1 [Indemnities] and Sub-Clause 17.5 [Intellectual and Industrial Property Rights], shall not exceed the sum resulting from the application of a multiplier (less or greater than one) to the Accepted Contract Amount, as stated in the Contract Data, or (if such multiplier or other sum is not so stated) the Accepted Contract Amount.

This Sub-Clause shall not limit liability in any case of fraud, deliberate default or reckless misconduct by the defaulting Party.

17.7 Use of Employer's Accommodation / Facilities

The Contractor shall take full responsibility for the care of the Employer provided accommodation and facilities, if any, as detailed in the Specification, from the respective dates of hand-over to the Contractor until cessation of occupation (where hand-over or cessation of occupation may take place after the date stated in the Taking-Over Certificate for the Works).

If any loss or damage happens to any of the above items while the Contractor is responsible for their care arising from any cause whatsoever other than those for which the Employer is liable, the Contractor shall, at his own cost, rectify the loss or damage to the satisfaction of the Engineer.

18. Insurance

18.1 General Requirements for Insurances

In this Clause, "insuring Party" means, for each type of insurance, the Party responsible for effecting and maintaining the insurance specified in the relevant Sub-Clause.

Wherever the Contractor is the insuring Party, each insurance shall be effected with insurers and in terms approved by the Employer. These terms shall be consistent with any terms agreed by both Parties before the date of the Letter of Acceptance. This agreement of terms shall take precedence over the provisions of this Clause.

Wherever the Employer is the insuring Party, each insurance shall be effected with insurers and in terms acceptable to the Contractor. These terms shall be consistent with any terms agreed by both Parties before the date of the Letter of Acceptance. This agreement of terms shall take precedence over the provisions of this Clause.

If a policy is required to indemnify joint insured, the cover shall apply separately to each insured as though a separate policy had been issued for each of the joint insured. If a policy indemnifies additional joint insured, namely in addition to the insured specified in this Clause, (i) the Contractor shall act under the policy on behalf of these additional joint insured except that the Employer shall act for Employer's Personnel, (ii) additional joint insured shall not be entitled to receive payments directly from the insurer or to have any other direct dealings with the insurer, and (iii) the insuring Party shall require all additional joint insured to comply with the conditions stipulated in the policy.

Each policy insuring against loss or damage shall provide for payments to be made in the currencies required to rectify the loss or damage. Payments received from insurers shall be used for the rectification of the loss or damage.

The relevant insuring Party shall, within the respective periods stated in the Contract Data (calculated from the Commencement Date), submit to the other Party:

- (a) evidence that the insurances described in this Clause have been effected, and
- (b) copies of the policies for the insurances described in Sub-Clause 18.2 [Insurance for Works and Contractor's Equipment] and Sub-Clause 18.3 [Insurance against Injury to Persons and Damage to Property].

When each premium is paid, the insuring Party shall submit evidence of payment to the other Party. Whenever evidence or policies are submitted, the insuring Party shall also give notice to the Engineer.

Each Party shall comply with the conditions stipulated in each of the insurance policies. The insuring Party shall keep the insurers informed of any relevant changes to the execution of the Works and ensure that insurance is maintained in accordance with this Clause.

Neither Party shall make any material alteration to the terms of any insurance without the prior approval of the other Party. If an insurer makes (or attempts to make) any alteration, the Party first notified by the insurer shall promptly give notice to the other Party.

If the insuring Party fails to effect and keep in force any of the insurances it is required to effect and maintain under the Contract, or fails to provide satisfactory evidence and copies of policies in accordance with this Sub-Clause, the other Party may (at its option and without prejudice to any other right or remedy) effect insurance for the relevant coverage and pay the premiums due. The insuring Party shall pay the amount of these premiums to the other Party, and the Contract Price shall be adjusted accordingly.

Nothing in this Clause limits the obligations, liabilities or responsibilities of the Contractor or the Employer, under the other terms of the Contract or otherwise. Any amounts not insured or not recovered from the



insurers shall be borne by the Contractor and/or the Employer in accordance with these obligations, liabilities or responsibilities. However, if the insuring Party fails to effect and keep in force an insurance which is available and which it is required to effect and maintain under the Contract, and the other Party neither approves the omission nor effects insurance for the coverage relevant to this default, any moneys which should have been recoverable under this insurance shall be paid by the insuring Party.

Payments by one Party to the other Party shall be subject to Sub-Clause 2.5 [Employer's Claims] or Sub-Clause 20.1 [Contractor's Claims], as applicable.

The Contractor shall be entitled to place all insurance relating to the Contract (including, but not limited to the insurance referred to Clause 18) with insurers from any eligible source country.

18.2 Insurance for Works and Contractor's Equipment

The insuring Party shall insure the Works, Plant, Materials and Contractor's Documents for not less than the full reinstatement cost including the costs of demolition, removal of debris and professional fees and profit. This insurance shall be effective from the date by which the evidence is to be submitted under sub-paragraph (a) of Sub-Clause 18.1 [General Requirements for Insurances], until the date of issue of the Taking-Over Certificate for the Works.

The insuring Party shall maintain this insurance to provide cover until the date of issue of the Performance Certificate, for loss or damage for which the Contractor is liable arising from a cause occurring prior to the issue of the Taking-Over Certificate, and for loss or damage caused by the Contractor in the course of any other operations (including those under Clause 11 [Defects Liability]).

The insuring Party shall insure the Contractor's Equipment for not less than the full replacement value, including delivery to Site. For each item of Contractor's Equipment, the insurance shall be effective while it is being transported to the Site and until it is no longer required as Contractor's Equipment.

Unless otherwise stated in the Particular Conditions, insurances under this Sub-Clause:

- (a) shall be effected and maintained by the Contractor as insuring Party,
- (b) shall be in the joint names of the Parties, who shall be jointly entitled to receive payments from the insurers, payments being held or allocated to the Party actually bearing the costs of rectifying the loss or damage,
- (c) shall cover all loss and damage from any cause not listed in Sub-Clause 17.3 [Employer's Risks],
- (d) shall also cover, to the extent specifically required in the bidding documents of the Contract, loss or damage to a part of the Works which is attributable to the use or occupation by the Employer of another part of the Works, and loss or damage from the risks listed in sub-paragraphs (c), (g) and (h) of Sub-Clause 17.3 [Employer's Risks], excluding (in each case) risks which are not insurable at commercially reasonable terms, with deductibles per occurrence of not more than the amount stated in the Contract Data (if an amount is not so stated, this sub-paragraph (d) shall not apply), and

- (e) may however exclude loss of, damage to, and reinstatement of:
 - (i) a part of the Works which is in a defective condition due to a defect in its design, materials or workmanship (but cover shall include any other parts which are lost or damaged as a direct result of this defective condition and not as described in sub-paragraph (ii) below),
 - (ii) a part of the Works which is lost or damaged in order to reinstate any other part of the Works if this other part is in a defective condition due to a defect in its design, materials or workmanship,
 - (iii) a part of the Works which has been taken over by the Employer, except to the extent that the Contractor is liable for the loss or damage, and
 - (iv) Goods while they are not in the Country, subject to Sub-Clause 14.5 [Plant and Materials intended for the Works].

If, more than one year after the Base Date, the cover described in sub-paragraph (d) above ceases to be available at commercially reasonable terms, the Contractor shall (as insuring Party) give notice to the Employer, with supporting particulars. The Employer shall then (i) be entitled subject to Sub-Clause 2.5 [Employer's Claims] to payment of an amount equivalent to such commercially reasonable terms as the Contractor should have expected to have paid for such cover, and (ii) be deemed, unless he obtains the cover at commercially reasonable terms, to have approved the omission under Sub-Clause 18.1 [General Requirements for Insurances].

18.3 Insurance against Injury to Persons and Damage to Property

The insuring Party shall insure against each Party's liability for any loss, damage, death or bodily injury which may occur to any physical property (except things insured under Sub-Clause 18.2 [Insurance for Works and Contractor's Equipment]) or to any person (except persons insured under Sub-Clause 18.4 [Insurance for Contractor's Personnel]), which may arise out of the Contractor's performance of the Contract and occurring before the issue of the Performance Certificate.

This insurance shall be for a limit per occurrence of not less than the amount stated in the Contract Data, with no limit on the number of occurrences. If an amount is not stated in the Contract Data, this Sub-Clause shall not apply.

Unless otherwise stated in the Particular Conditions, the insurances specified in this Sub-Clause:

- (a) shall be effected and maintained by the Contractor as insuring Party,
- (b) shall be in the joint names of the Parties,
- (c) shall be extended to cover liability for all loss and damage to the Employer's property (except things insured under Sub-Clause 18.2) arising out of the Contractor's performance of the Contract, and
- (d) may however exclude liability to the extent that it arises from:
 - (i) the Employer's right to have the Permanent Works executed on, over, under, in or through any land, and to occupy this land for the Permanent Works,
 - (ii) damage which is an unavoidable result of the Contractor's

obligations to execute the Works and remedy any defects,
and

- (iii) a cause listed in Sub-Clause 17.3 [Employer's Risks], except to the extent that cover is available at commercially reasonable terms.

18.4 Insurance for Contractor's Personnel

The Contractor shall effect and maintain insurance against liability for claims, damages, losses and expenses (including legal fees and expenses) arising from injury, sickness, disease or death of any person employed by the Contractor or any other of the Contractor's Personnel.

The insurance shall cover the Employer and the Engineer against liability for claims, damages, losses and expenses (including legal fees and expenses) arising from injury, sickness, disease or death of any person employed by the Contractor or any other of the Contractor's Personnel, except that this insurance may exclude losses and claims to the extent that they arise from any act or neglect of the Employer or of the Employer's Personnel.

The insurance shall be maintained in full force and effect during the whole time that these personnel are assisting in the execution of the Works. For a Subcontractor's employees, the insurance may be effected by the Subcontractor, but the Contractor shall be responsible for compliance with this Clause.

19. Force Majeure

19.1 Definition of Force Majeure

In this Clause, "Force Majeure" means an exceptional event or circumstance:

- (a) which is beyond a Party's control,
- (b) which such Party could not reasonably have provided against before entering into the Contract,
- (c) which, having arisen, such Party could not reasonably have avoided or overcome, and
- (d) which is not substantially attributable to the other Party.

Force Majeure may include, but is not limited to, exceptional events or circumstances of the kind listed below, so long as conditions (a) to (d) above are satisfied:

- (i) war, hostilities (whether war be declared or not), invasion, act of foreign enemies,
- (ii) rebellion, terrorism, sabotage by persons other than the Contractor's Personnel, revolution, insurrection, military or usurped power, or civil war,
- (iii) riot, commotion, disorder, strike or lockout by persons other than the Contractor's Personnel,
- (iv) munitions of war, explosive materials, ionising radiation or contamination by radio-activity, except as may be attributable to the Contractor's use of such munitions, explosives, radiation or radio-activity, and
- (v) natural catastrophes such as earthquake, hurricane,



typhoon or volcanic activity.

19.2 Notice of Force Majeure

If a Party is or will be prevented from performing its substantial obligations under the Contract by Force Majeure, then it shall give notice to the other Party of the event or circumstances constituting the Force Majeure and shall specify the obligations, the performance of which is or will be prevented. The notice shall be given within 14 days after the Party became aware, or should have become aware, of the relevant event or circumstance constituting Force Majeure.

The Party shall, having given notice, be excused performance of its obligations for so long as such Force Majeure prevents it from performing them.

Notwithstanding any other provision of this Clause, Force Majeure shall not apply to obligations of either Party to make payments to the other Party under the Contract.

19.3 Duty to Minimise Delay

Each Party shall at all times use all reasonable endeavours to minimize any delay in the performance of the Contract as a result of Force Majeure.

A Party shall give notice to the other Party when it ceases to be affected by the Force Majeure.

19.4 Consequences of Force Majeure

If the Contractor is prevented from performing his substantial obligations under the Contract by Force Majeure of which notice has been given under Sub-Clause 19.2 [Notice of Force Majeure], and suffers delay and/or incurs Cost by reason of such Force Majeure, the Contractor shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) if the event or circumstance is of the kind described in sub-paragraphs (i) to (iv) of Sub-Clause 19.1 [Definition of Force Majeure] and, in sub-paragraphs (ii) to (iv), occurs in the Country, payment of any such Cost, including the costs of rectifying or replacing the Works and/or Goods damaged or destroyed by Force Majeure, to the extent they are not indemnified through the insurance policy referred to in Sub-Clause 18.2 [Insurance for Works and Contractor's Equipment].

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

19.5 Force Majeure Affecting Subcontractor

If any Subcontractor is entitled under any contract or agreement relating to the Works to relief from force majeure on terms additional to or broader than those specified in this Clause, such additional or broader force majeure events or circumstances shall not excuse the Contractor's non-performance or entitle him to relief under this Clause.

19.6 Optional Termination, Payment and Release

If the execution of substantially all the Works in progress is prevented for a continuous period of 84 days by reason of Force Majeure of which notice has been given under Sub-Clause 19.2 [Notice of Force Majeure], or for multiple periods which total more than 140 days due to the same notified Force Majeure, then either Party may give to the other Party a notice of termination of the Contract. In this event, the termination shall take effect 7 days after the notice is given, and the Contractor shall proceed in accordance with Sub-Clause 16.3 [Cessation of Work and Removal of Contractor's Equipment].

Upon such termination, the Engineer shall determine the value of the work done and issue a Payment Certificate which shall include:

- (a) the amounts payable for any work carried out for which a price is stated in the Contract;
- (b) the Cost of Plant and Materials ordered for the Works which have been delivered to the Contractor, or of which the Contractor is liable to accept delivery: this Plant and Materials shall become the property of (and be at the risk of) the Employer when paid for by the Employer, and the Contractor shall place the same at the Employer's disposal;
- (c) other Cost or liabilities which in the circumstances were reasonably and necessarily incurred by the Contractor in the expectation of completing the Works;
- (d) the Cost of removal of Temporary Works and Contractor's Equipment from the Site and the return of these items to the Contractor's works in his country (or to any other destination at no greater cost); and
- (e) the Cost of repatriation of the Contractor's staff and labour employed wholly in connection with the Works at the date of termination.

19.7 Release from Performance

Notwithstanding any other provision of this Clause, if any event or circumstance outside the control of the Parties (including, but not limited to, Force Majeure) arises which makes it impossible or unlawful for either or both Parties to fulfil its or their contractual obligations or which, under the law governing the Contract, entitles the Parties to be released from further performance of the Contract, then upon notice by either Party to the other Party of such event or circumstance:

- (a) the Parties shall be discharged from further performance, without prejudice to the rights of either Party in respect of any previous breach of the Contract, and
- (b) the sum payable by the Employer to the Contractor shall be the same as would have been payable under Sub-Clause 19.6 [Optional Termination, Payment and Release] if the Contract had been terminated under Sub-Clause 19.6.

20. Claims, Disputes and Arbitration

20.1 Contractor's Claims

If the Contractor considers himself to be entitled to any extension of the Time for Completion and/or any additional payment, under any Clause of these Conditions or otherwise in connection with the Contract, the Contractor shall give notice to the Engineer, describing the event or circumstance giving rise to the claim. The notice shall be given as soon as practicable, and not later than 28 days after the Contractor became aware, or should have become aware, of the event or circumstance.

If the Contractor fails to give notice of a claim within such period of 28 days, the Time for Completion shall not be extended, the Contractor shall not be entitled to additional payment, and the Employer shall be discharged from all liability in connection with the claim. Otherwise, the following provisions of this Sub-Clause shall apply.

The Contractor shall also submit any other notices which are required by the Contract, and supporting particulars for the claim, all as relevant to such event or circumstance.

The Contractor shall keep such contemporary records as may be necessary to substantiate any claim, either on the Site or at another

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location acceptable to the Engineer. Without admitting the Employer's liability, the Engineer may, after receiving any notice under this Sub-Clause, monitor the record-keeping and/or instruct the Contractor to keep further contemporary records. The Contractor shall permit the Engineer to inspect all these records, and shall (if instructed) submit copies to the Engineer.

Within 42 days after the Contractor became aware (or should have become aware) of the event or circumstance giving rise to the claim, or within such other period as may be proposed by the Contractor and approved by the Engineer, the Contractor shall send to the Engineer a fully detailed claim which includes full supporting particulars of the basis of the claim and of the extension of time and/or additional payment claimed. If the event or circumstance giving rise to the claim has a continuing effect:

- (a) this fully detailed claim shall be considered as interim;
- (b) the Contractor shall send further interim claims at monthly intervals, giving the accumulated delay and/or amount claimed, and such further particulars as the Engineer may reasonably require; and
- (c) the Contractor shall send a final claim within 28 days after the end of the effects resulting from the event or circumstance, or within such other period as may be proposed by the Contractor and approved by the Engineer.

Within 42 days after receiving a claim or any further particulars supporting a previous claim, or within such other period as may be proposed by the Engineer and approved by the Contractor, the Engineer shall respond with approval, or with disapproval and detailed comments. He may also request any necessary further particulars, but shall nevertheless give his response on the principles of the claim within the above defined time period.

Within the above defined period of 42 days, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine (i) the extension (if any) of the Time for Completion (before or after its expiry) in accordance with Sub-Clause 8.4 [Extension of Time for Completion], and/or (ii) the additional payment (if any) to which the Contractor is entitled under the Contract.

Each Payment Certificate shall include such additional payment for any claim as has been reasonably substantiated as due under the relevant provision of the Contract. Unless and until the particulars supplied are sufficient to substantiate the whole of the claim, the Contractor shall only be entitled to payment for such part of the claim as he has been able to substantiate.

If the Engineer does not respond within the timeframe defined in this Clause, either Party may consider that the claim is rejected by the Engineer and any of the Parties may refer to the Dispute Board in accordance with Sub-Clause 20.4 [Obtaining Dispute Board's Decision].

The requirements of this Sub-Clause are in addition to those of any other Sub-Clause which may apply to a claim. If the Contractor fails to comply with this or another Sub-Clause in relation to any claim, any extension of time and/or additional payment shall take account of the extent (if any) to which the failure has prevented or prejudiced proper investigation of the claim, unless the claim is excluded under the second paragraph of this Sub-Clause.

20.2 Appointment of the Dispute Board

Disputes shall be referred to a DB for decision in accordance with Sub-Clause 20.4 [Obtaining Dispute Board's Decision]. The Parties shall

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appoint a DB by the date stated in the Contract Data.

The DB shall comprise, as stated in the Contract Data, either one or three suitably qualified persons ("the members"), each of whom shall be fluent in the language for communication defined in the Contract and shall be a professional experienced in the type of construction involved in the Works and with the interpretation of contractual documents. If the number is not so stated and the Parties do not agree otherwise, the DB shall comprise three persons.

If the Parties have not jointly appointed the DB 21 days before the date stated in the Contract Data and the DB is to comprise three persons, each Party shall nominate one member for the approval of the other Party. The first two members shall recommend and the Parties shall agree upon the third member, who shall act as chairman.

However, if a list of potential members has been agreed by the Parties and is included in the Contract, the members shall be selected from those on the list, other than anyone who is unable or unwilling to accept appointment to the DB.

The agreement between the Parties and either the sole member or each of the three members shall incorporate by reference the General Conditions of Dispute Board Agreement contained in the Appendix to these General Conditions, with such amendments as are agreed between them.

The terms of the remuneration of either the sole member or each of the three members, including the remuneration of any expert whom the DB consults, shall be mutually agreed upon by the Parties when agreeing the terms of appointment. Each Party shall be responsible for paying one-half of this remuneration.

If at any time the Parties so agree, they may jointly refer a matter to the DB for it to give its opinion. Neither Party shall consult the DB on any matter without the agreement of the other Party.

If a member declines to act or is unable to act as a result of death, disability, resignation or termination of appointment, a replacement shall be appointed in the same manner as the replaced person was required to have been nominated or agreed upon, as described in this Sub-Clause.

The appointment of any member may be terminated by mutual agreement of both Parties, but not by the Employer or the Contractor acting alone. Unless otherwise agreed by both Parties, the appointment of the DB (including each member) shall expire when the discharge referred to in Sub-Clause 14.12 [Discharge] shall have become effective.

20.3 Failure to Agree on the Composition of the Dispute Board

If any of the following conditions apply, namely:

- (a) the Parties fail to agree upon the appointment of the sole member of the DB by the date stated in the first paragraph of Sub-Clause 20.2, [Appointment of the Dispute Board],
- (b) either Party fails to nominate a member (for approval by the other Party), or fails to approve a member nominated by the other Party, of a DB of three persons by such date,
- (c) the Parties fail to agree upon the appointment of the third member (to act as chairman) of the DB by such date, or
- (d) the Parties fail to agree upon the appointment of a replacement person within 42 days after the date on which the sole member or



one of the three members declines to act or is unable to act as a result of death, disability, resignation or termination of appointment,

then the appointing entity or official named in the Contract Data shall, upon the request of either or both of the Parties and after due consultation with both Parties, appoint this member of the DB. This appointment shall be final and conclusive. Each Party shall be responsible for paying one-half of the remuneration of the appointing entity or official.

20.4 Obtaining Dispute Board's Decision

If a dispute (of any kind whatsoever) arises between the Parties in connection with, or arising out of, the Contract or the execution of the Works, including any dispute as to any certificate, determination, instruction, opinion or valuation of the Engineer, either Party may refer the dispute in writing to the DB for its decision, with copies to the other Party and the Engineer. Such reference shall state that it is given under this Sub-Clause.

For a DB of three persons, the DB shall be deemed to have received such reference on the date when it is received by the chairman of the DB.

Both Parties shall promptly make available to the DB all such additional information, further access to the Site, and appropriate facilities, as the DB may require for the purposes of making a decision on such dispute. The DB shall be deemed to be not acting as arbitrator(s).

Within 84 days after receiving such reference, or within such other period as may be proposed by the DB and approved by both Parties, the DB shall give its decision, which shall be reasoned and shall state that it is given under this Sub-Clause. The decision shall be binding on both Parties, who shall promptly give effect to it unless and until it shall be revised in an amicable settlement or an arbitral award as described below. Unless the Contract has already been abandoned, repudiated or terminated, the Contractor shall continue to proceed with the Works in accordance with the Contract.

If either Party is dissatisfied with the DB's decision, then either Party may, within 28 days after receiving the decision, give a Notice of Dissatisfaction to the other Party indicating its dissatisfaction and intention to commence arbitration. If the DB fails to give its decision within the period of 84 days (or as otherwise approved) after receiving such reference, then either Party may, within 28 days after this period has expired, give a Notice of Dissatisfaction to the other Party.

In either event, this Notice of Dissatisfaction shall state that it is given under this Sub-Clause, and shall set out the matter in dispute and the reason(s) for dissatisfaction. Except as stated in Sub-Clause 20.7 [Failure to Comply with Dispute Board's Decision] and Sub-Clause 20.8 [Expiry of Dispute Board's Appointment], neither Party shall be entitled to commence arbitration of a dispute unless a Notice of Dissatisfaction has been given in accordance with this Sub-Clause.

If the DB has given its decision as to a matter in dispute to both Parties, and no Notice of Dissatisfaction has been given by either Party within 28 days after it received the DB's decision, then the decision shall become final and binding upon both Parties.

20.5 Amicable Settlement

Where a Notice of Dissatisfaction has been given under Sub-Clause 20.4 above, both Parties shall attempt to settle the dispute amicably before the commencement of arbitration. However, unless both Parties agree otherwise, the Party giving a Notice of Dissatisfaction in accordance with Sub-Clause 20.4 above should move to commence arbitration after the fifty-sixth day from the day on which a Notice of Dissatisfaction was given, even if no attempt at an amicable settlement



has been made.

20.6 Arbitration

Any dispute between the Parties arising out of or in connection with the Contract not settled amicably in accordance with Sub-Clause 20.5 above and in respect of which the DB's decision (if any) has not become final and binding shall be finally settled by arbitration. Arbitration shall be conducted as follows:

- (a) if the contract is with foreign contractors,
 - (i) for contracts financed by all participating Banks except under sub-paragraph (a) (2) below: international arbitration (1) with proceedings administered by the arbitration institution designated in the Contract Data, and conducted under the rules of arbitration of such institution; or, if so specified in the Contract Data, (2) international arbitration in accordance with the arbitration rules of the United Nations Commission on International Trade Law (UNCITRAL); or (3) if neither an arbitration institution nor UNCITRAL arbitration rules are specified in the Contract Data, with proceedings administered by the International Chamber of Commerce (ICC) and conducted under the ICC Rules of Arbitration; by one or more arbitrators appointed in accordance with said arbitration rules
- (b) if the Contract is with domestic contractors, arbitration with proceedings conducted in accordance with the laws of the Employer's country.

The place of arbitration shall be the neutral location specified in the Contract Data; and the arbitration shall be conducted in the language for communications defined in Sub-Clause 1.4 [Law and Language].

The arbitrators shall have full power to open up, review and revise any certificate, determination, instruction, opinion or valuation of the Engineer, and any decision of the DB, relevant to the dispute. Nothing shall disqualify representatives of the Parties and the Engineer from being called as a witness and giving evidence before the arbitrators on any matter whatsoever relevant to the dispute.

Neither Party shall be limited in the proceedings before the arbitrators to the evidence or arguments previously put before the DB to obtain its decision, or to the reasons for dissatisfaction given in its Notice of Dissatisfaction. Any decision of the DB shall be admissible in evidence in the arbitration.

Arbitration may be commenced prior to or after completion of the Works. The obligations of the Parties, the Engineer and the DB shall not be altered by reason of any arbitration being conducted during the progress of the Works.

20.7 Failure to Comply with Dispute Board's Decision

In the event that a Party fails to comply with a final and binding DB decision, then the other Party may, without prejudice to any other rights it may have, refer the failure itself to arbitration under Sub-Clause 20.6 [Arbitration]. Sub-Clause 20.4 [Obtaining Dispute Board's Decision] and Sub-Clause 20.5 [Amicable Settlement] shall not apply to this reference.

20.8 Expiry of Dispute Board's Appointment

If a dispute arises between the Parties in connection with, or arising out of, the Contract or the execution of the Works and there is no DB in place, whether by reason of the expiry of the DB's appointment or otherwise:

- (a) Sub-Clause 20.4 [Obtaining Dispute Board's Decision] and Sub-Clause 20.5 [Amicable Settlement] shall not apply, and
- (b) the dispute may be referred directly to arbitration under Sub-

Clause 20.6 [Arbitration].

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APPENDIX

A General Conditions of Dispute Board Agreement

1. Definitions

Each "Dispute Board Agreement" is a tripartite agreement by and between:

- (a) the "Employer";
- (b) the "Contractor"; and
- (c) the "Member" who is defined in the Dispute Board Agreement as being:
 - (i) the sole member of the "DB" and, where this is the case, all references to the "Other Members" do not apply, or
 - (ii) one of the three persons who are jointly called the "DB" (or "Dispute Board") and, where this is the case, the other two persons are called the "Other Members".

The Employer and the Contractor have entered (or intend to enter) into a contract, which is called the "Contract" and is defined in the Dispute Board Agreement, which incorporates this Appendix. In the Dispute Board Agreement, words and expressions which are not otherwise defined shall have the meanings assigned to them in the Contract.

2. General Provisions

Unless otherwise stated in the Dispute Board Agreement, it shall take effect on the latest of the following dates:

- (a) the Commencement Date defined in the Contract,
- (b) when the Employer, the Contractor and the Member have each signed the Dispute Board Agreement, or
- (c) when the Employer, the Contractor and each of the Other Members (if any) have respectively each signed a dispute board agreement.

This employment of the Member is a personal appointment. At any time, the Member may give not less than 70 days' notice of resignation to the Employer and to the Contractor, and the Dispute Board Agreement shall terminate upon the expiry of this period.

3. Warranties

The Member warrants and agrees that he/she is and shall be impartial and independent of the Employer, the Contractor and the Engineer. The Member shall promptly disclose, to each of them and to the Other Members (if any), any fact or circumstance which might appear inconsistent with his/her warranty and agreement of impartiality and independence.

When appointing the Member, the Employer and the Contractor relied upon the Member's representations that he/she is:

- (a) experienced in the work which the Contractor is to carry out under the Contract,
- (b) experienced in the interpretation of contract documentation, and
- (c) fluent in the language for communications defined in the Contract.

4. General Obligations of the Member

The Member shall:

- (a) have no interest financial or otherwise in the Employer, the Contractor or Engineer, nor any financial interest in the Contract except for payment under the Dispute Board Agreement;
- (b) not previously have been employed as a consultant or otherwise by the Employer, the Contractor or the Engineer, except in such circumstances as were disclosed in writing to the Employer and the Contractor before they signed the Dispute Board Agreement;



- (c) have disclosed in writing to the Employer, the Contractor and the Other Members (if any), before entering into the Dispute Board Agreement and to his/her best knowledge and recollection, any professional or personal relationships with any director, officer or employee of the Employer, the Contractor or the Engineer, and any previous involvement in the overall project of which the Contract forms part;
- (d) not, for the duration of the Dispute Board Agreement, be employed as a consultant or otherwise by the Employer, the Contractor or the Engineer, except as may be agreed in writing by the Employer, the Contractor and the Other Members (if any);
- (e) comply with the annexed procedural rules and with Sub-Clause 20.4 of the Conditions of Contract;
- (f) not give advice to the Employer, the Contractor, the Employer's Personnel or the Contractor's Personnel concerning the conduct of the Contract, other than in accordance with the annexed procedural rules;
- (g) not while a Member enter into discussions or make any agreement with the Employer, the Contractor or the Engineer regarding employment by any of them, whether as a consultant or otherwise, after ceasing to act under the Dispute Board Agreement;
- (h) ensure his/her availability for all site visits and hearings as are necessary;
- (i) become conversant with the Contract and with the progress of the Works (and of any other parts of the project of which the Contract forms part) by studying all documents received which shall be maintained in a current working file;
- (j) treat the details of the Contract and all the DB's activities and hearings as private and confidential, and not publish or disclose them without the prior written consent of the Employer, the Contractor and the Other Members (if any); and
- (k) be available to give advice and opinions, on any matter relevant to the Contract when requested by both the Employer and the Contractor, subject to the agreement of the Other Members (if any).

5. General Obligations of the Employer and the Contractor

The Employer, the Contractor, the Employer's Personnel and the Contractor's Personnel shall not request advice from or consultation with the Member regarding the Contract, otherwise than in the normal course of the DB's activities under the Contract and the Dispute Board Agreement. The Employer and the Contractor shall be responsible for compliance with this provision, by the Employer's Personnel and the Contractor's Personnel respectively.

The Employer and the Contractor undertake to each other and to the Member that the Member shall not, except as otherwise agreed in writing by the Employer, the Contractor, the Member and the Other Members (if any):

- (a) be appointed as an arbitrator in any arbitration under the Contract;
- (b) be called as a witness to give evidence concerning any dispute before arbitrator(s) appointed for any arbitration under the Contract; or
- (c) be liable for any claims for anything done or omitted in the discharge or purported discharge of the Member's functions, unless the act or omission is shown to have been in bad faith.

The Employer and the Contractor hereby jointly and severally indemnify and hold the Member harmless against and from claims from which he is

relieved from liability under the preceding paragraph.

Whenever the Employer or the Contractor refers a dispute to the DB under Sub-Clause 20.4 of the Conditions of Contract, which will require the Member to make a site visit and attend a hearing, the Employer or the Contractor shall provide appropriate security for a sum equivalent to the reasonable expenses to be incurred by the Member. No account shall be taken of any other payments due or paid to the Member.

6. Payment

The Member shall be paid as follows, in the currency named in the Dispute Board Agreement:

- (a) a retainer fee per calendar month, which shall be considered as payment in full for:
 - (i) being available on 28 days' notice for all site visits and hearings;
 - (ii) becoming and remaining conversant with all project developments and maintaining relevant files;
 - (iii) all office and overhead expenses including secretarial services, photocopying and office supplies incurred in connection with his duties; and
 - (iv) all services performed hereunder except those referred to in sub-paragraphs (b) and (c) of this Clause.

The retainer fee shall be paid with effect from the last day of the calendar month in which the Dispute Board Agreement becomes effective; until the last day of the calendar month in which the Taking-Over Certificate is issued for the whole of the Works.

With effect from the first day of the calendar month following the month in which the Taking-Over Certificate is issued for the whole of the Works, the retainer fee shall be reduced by one third. This reduced fee shall be paid until the first day of the calendar month in which the Member resigns or the Dispute Board Agreement is otherwise terminated.

- (b) a daily fee which shall be considered as payment in full for:
 - (i) each day or part of a day up to a maximum of two days' travel time in each direction for the journey between the Member's home and the Site, or another location of a meeting with the Other Members (if any);
 - (ii) each working day on Site visits, hearings or preparing decisions; and
 - (iii) each day spent reading submissions in preparation for a hearing.
- (c) all reasonable expenses including necessary travel expenses (air fare in less than first class, hotel and subsistence and other direct travel expenses) incurred in connection with the Member's duties, as well as the cost of telephone calls, courier charges, faxes and telexes: a receipt shall be required for each item in excess of five percent of the daily fee referred to in sub-paragraph (b) of this Clause;
- (d) any taxes properly levied in the Country on payments made to the Member (unless a national or permanent resident of the Country) under this Clause 6.

The retainer and daily fees shall be as specified in the Dispute Board Agreement. Unless it specifies otherwise, these fees shall remain fixed for the first 24 calendar months, and shall thereafter be adjusted by agreement between the Employer, the Contractor and the Member, at each anniversary of the date on which the Dispute Board Agreement

became effective.

If the parties fail to agree on the retainer fee or the daily fee, the appointing entity or official named in the Contract Data shall determine the amount of the fees to be used.

The Member shall submit invoices for payment of the monthly retainer and air fares quarterly in advance. Invoices for other expenses and for daily fees shall be submitted following the conclusion of a Site visit or hearing. All invoices shall be accompanied by a brief description of activities performed during the relevant period and shall be addressed to the Contractor.

The Contractor shall pay each of the Member's invoices in full within 56 calendar days after receiving each invoice and shall apply to the Employer (in the Statements under the Contract) for reimbursement of one-half of the amounts of these invoices. The Employer shall then pay the Contractor in accordance with the Contract.

If the Contractor fails to pay to the Member the amount to which he/she is entitled under the Dispute Board Agreement, the Employer shall pay the amount due to the Member and any other amount which may be required to maintain the operation of the DB; and without prejudice to the Employer's rights or remedies. In addition to all other rights arising from this default, the Employer shall be entitled to reimbursement of all sums paid in excess of one-half of these payments, plus all costs of recovering these sums and financing charges calculated at the rate specified in Sub-Clause 14.8 of the Conditions of Contract.

If the Member does not receive payment of the amount due within 70 days after submitting a valid invoice, the Member may (i) suspend his/her services (without notice) until the payment is received, and/or (ii) resign his/her appointment by giving notice under Clause 7.

7. Termination

At any time: (i) the Employer and the Contractor may jointly terminate the Dispute Board Agreement by giving 42 days' notice to the Member; or (ii) the Member may resign as provided for in Clause 2.

If the Member fails to comply with the Dispute Board Agreement, the Employer and the Contractor may, without prejudice to their other rights, terminate it by notice to the Member. The notice shall take effect when received by the Member.

If the Employer or the Contractor fails to comply with the Dispute Board Agreement, the Member may, without prejudice to his other rights, terminate it by notice to the Employer and the Contractor. The notice shall take effect when received by them both.

Any such notice, resignation and termination shall be final and binding on the Employer, the Contractor and the Member. However, a notice by the Employer or the Contractor, but not by both, shall be of no effect.

8. Default of the Member

If the Member fails to comply with any of his obligations under Clause 4 (a) - (d) above, he shall not be entitled to any fees or expenses hereunder and shall, without prejudice to their other rights, reimburse each of the Employer and the Contractor for any fees and expenses received by the Member and the Other Members (if any), for proceedings or decisions (if any) of the DB which are rendered void or ineffective by the said failure to comply.

If the Member fails to comply with any of his obligations under Clause 4 (e) - (k) above, he shall not be entitled to any fees or expenses hereunder from the date and to the extent of the non-compliance and shall, without prejudice to their other rights, reimburse each of the Employer and the Contractor for any fees and expenses already received by the Member, for proceedings or decisions (if any) of the DB which are rendered void or ineffective by the said failure to comply.



9. Disputes

Any dispute or claim arising out of or in connection with this Dispute Board Agreement, or the breach, termination or invalidity thereof, shall be finally settled by institutional arbitration. If no other arbitration institute is agreed, the arbitration shall be conducted under the Rules of Arbitration of the International Chamber of Commerce by one arbitrator appointed in accordance with these Rules of Arbitration.



PROCEDURAL RULES

Unless otherwise agreed by the Employer and the Contractor, the DB shall visit the Site at intervals of not more than 140 days, including times of critical construction events, at the request of either the Employer or the Contractor. Unless otherwise agreed by the Employer, the Contractor and the DB, the period between consecutive visits shall not be less than 70 days, except as required to convene a hearing as described below.

The timing of and agenda for each Site visit shall be as agreed jointly by the DB, the Employer and the Contractor, or in the absence of agreement, shall be decided by the DB. The purpose of Site visits is to enable the DB to become and remain acquainted with the progress of the Works and of any actual or potential problems or claims, and, as far as reasonable, to endeavour to prevent potential problems or claims from becoming disputes.

Site visits shall be attended by the Employer, the Contractor and the Engineer and shall be co-ordinated by the Employer in co-operation with the Contractor. The Employer shall ensure the provision of appropriate conference facilities and secretarial and copying services. At the conclusion of each Site visit and before leaving the site, the DB shall prepare a report on its activities during the visit and shall send copies to the Employer and the Contractor.

The Employer and the Contractor shall furnish to the DB one copy of all documents which the DB may request, including Contract documents, progress reports, variation instructions, certificates and other documents pertinent to the performance of the Contract. All communications between the DB and the Employer or the Contractor shall be copied to the other Party. If the DB comprises three persons, the Employer and the Contractor shall send copies of these requested documents and these communications to each of these persons.

If any dispute is referred to the DB in accordance with Sub-Clause 20.4 of the Conditions of Contract, the DB shall proceed in accordance with Sub-Clause 20.4 and these Rules. Subject to the time allowed to give notice of a decision and other relevant factors, the DB shall:

- (a) act fairly and impartially as between the Employer and the Contractor, giving each of them a reasonable opportunity of putting his case and responding to the other's case, and
- (b) adopt procedures suitable to the dispute, avoiding unnecessary delay or expense.

The DB may conduct a hearing on the dispute, in which event it will decide on the date and place for the hearing and may request that written documentation and arguments from the Employer and the Contractor be presented to it prior to or at the hearing.

Except as otherwise agreed in writing by the Employer and the Contractor, the DB shall have power to adopt an inquisitorial procedure, to refuse admission to hearings or audience at hearings to any persons other than representatives of the Employer, the Contractor and the Engineer, and to proceed in the absence of any party who the DB is satisfied received notice of the hearing; but shall have discretion to decide whether and to what extent this power may be exercised.

The Employer and the Contractor empower the DB, among other things, to:

- (a) establish the procedure to be applied in deciding a dispute,
- (b) decide upon the DB's own jurisdiction, and as to the scope of any dispute referred to it,
- (c) conduct any hearing as it thinks fit, not being bound by any rules or procedures other than those contained in the Contract and these Rules,
- (d) take the initiative in ascertaining the facts and matters required for a decision,
- (e) make use of its own specialist knowledge, if any,
- (f) decide upon the payment of financing charges in accordance with the Contract,
- (g) decide upon any provisional relief such as interim or conservatory measures, and
- (h) open up, review and revise any certificate, decision, determination, instruction, opinion or valuation of the Engineer, relevant to the dispute.

The DB shall not express any opinions during any hearing concerning the merits of any arguments advanced by the Parties. Thereafter, the DB shall make and give its decision in accordance with Sub-Clause 20.4, or as otherwise agreed by the Employer and the Contractor in writing. If the DB comprises three persons:

- (a) it shall convene in private after a hearing, in order to have discussions and prepare its decision;

- (b) it shall endeavour to reach a unanimous decision: if this proves impossible the applicable decision shall be made by a majority of the Members, who may require the minority Member to prepare a written report for submission to the Employer and the Contractor; and
- (c) if a Member fails to attend a meeting or hearing, or to fulfil any required function, the other two Members may nevertheless proceed to make a decision, unless:
 - (i) either the Employer or the Contractor does not agree that they do so, or
 - (ii) the absent Member is the chairman and he/she instructs the other Members not to make a decision.



Section IX-Particular Conditions (PC)

The following Particular Conditions shall supplement the GC. Whenever there is a conflict, the provisions herein shall prevail over those in the GC.

Part A - Contract Data



Conditions	Sub-Clause	Data
Employer's name and address	1.1.2.2 & 1.3	Bangladesh Water Development Board (BWDB), WAPDA Building, Motijheel C/A, Dhaka-1000, represented by the: Project Director, CEIP-1, BWDB.
Engineer's name and address	1.1.2.4 & 1.3	The Supervision Consultant of the Project (CEIP-I). The name will be entered either during Contract Signing or intimated afterwards through letter.
Bank's name	1.1.2.11	International Development Association (IDA) [World Bank]
Borrower's name	1.1.2.12	The People's Republic of Bangladesh
Time for Completion	1.1.3.3	Estimated Completion Time of whole works is 36 Months with following sectional completion time. Polder No.32 : 30 Months Polder No.33 : 36 Months Polder No.35/1 : 36 Months Polder No.35/3 : 30 Months
Defects Notification Period	1.1.3.7	365 (three hundred sixty-five) days after completion of work/ section under the contract.
Sections	1.1.5.6	Section-1 ; Polder No.32 Section-2; Polder No.35/3 Section-3; Polder No.33 Section-4; Polder No.35/1
Electronic transmission systems	1.3	Email or fax or any other agreed system of electronic transmission.
Governing Law	1.4	The Law of the People's Republic of Bangladesh
Ruling language	1.4	English
Language for communications	1.4	English
Time for the Parties entering into a Contract Agreement	1.6	Within 28 days after the contractor receives the Letter of Acceptance.
Inspections and Audit by the Bank	1.15	The following paragraph substitute the Clause 1.15 The Contractor shall permit, and shall cause its suppliers, contractors, and their sub-contractors, agents, personnel, consultants, service providers, or suppliers, to permit, the Bank and/or persons appointed by the Bank to inspect the Site and all accounts and records 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 Subcontractors' and sub consultants' attention is drawn to Sub- Clause 15.6 [Corrupt or Fraudulent Practices] 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 1.15 constitute a prohibited practice subject

Conditions	Sub-Clause	Data
		to contract termination (as well as to a determination of ineligibility pursuant to the Bank's prevailing sanctions procedures
Time for access to the Site	2.1	No later than the Date of Commencement.
Engineer's Duties and Authority	3.1 (d)(b)(ii)	Variations resulting in an increase of the Accepted Contract Amount in excess of 1% (one percent) shall require approval of the Employer.
Performance Security	4.2	The Performance Security shall be in the form of an unconditional Bank Guarantee in the amount(s) of 10% (ten percent) of the Accepted Contract Amount from a reputable Bank from an eligible country. If the unconditional Bank Guarantee is issued by a Bank located outside the Employer's Country, the corresponding bank to endorse it with the undertaking that it will be responsible for enforcing, if required. If case of a seriously unbalanced or front loaded contract as determined by the Evaluation Committee, the Contractor shall furnish an additional performance security in form of unconditional bank guarantee in the amount of up to 20% (twenty percent) of the Contract Price. The additional performance security will be released at the stage or stages when in the opinion of the Engineer the work has progressed sufficient enough that there will be no possibility of any financial loss to the Employer in case of default of the contractor.
Normal working hours	6.5	9.00 a.m. to 5.00 p.m.
Delay damages for the Works	8.7 & 14.15(b)	Table: Summary of Sections is referred to.
Maximum amount of delay damages	8.7	10 % (ten percent) of the final Contract Price.
Provisional Sums	13.5.(b)(ii)	2.5% (two point five percent)
Adjustments for Changes in Cost	13.8	Period "n" applicable to the adjustment multiplier "Pn" is three (3) month
Total advance payment	14.2	10% (ten percent) of the Accepted Contract Amount payable (excluding Provisional Sum) in the currencies and proportions in which the Accepted Contract Amount is payable against an advance payment security, equivalent to same amount as advance payment. Advance payment shall be made in 2 installments as follows. First installment of 5% advance payment will be made after the Contractor fulfilled following conditions: ☐ Mobilized Project Manager, survey and subsoil investigation team to the site

Conditions	Sub-Clause	Data
		☐☐ Submitted to the Engineer for approval:- ➤ List of proposed sub-contractors and their respective agreements ➤ Proposed construction programme in accordance to GCC Clause No.8.3, ➤ Mobilization / deployment schedule, ➤ contractors key personnel, machinery, equipment required for executing the works, ➤ Procurement schedule for major materials, ➤ Cash flow forecast statement. After the first installment payment has been utilized as per approved programme (substantiated by relevant documents) contractor can apply for Second installment. Second installment of balance 5% advance payment will be made after the Contractor fulfilled following conditions. ☐☐ Deployment of personnel, machinery, equipment as per approved deployment schedule. ☐☐ Place confirm orders for supply of major materials as per approved Procurement Schedule.
Repayment amortization rate of advance payment	14.2(b)	20% (twenty percent) of each interim payment. Repayment will begin when amount of work certified by the Engineer attains 30% of the Contract Price
Percentage of Retention	14.3	6% (six) of each Interim Payment Invoice.
Limit of Retention Money	14.3	5% (Five percent) of the Accepted Contract Amount
Plant and Materials	14.5(b)(i)	Not Applicable
	14.5(c)(i)	Not Applicable
Minimum Amount of Interim Payment Certificates	14.6	1.5% (one point five percent) of the Accepted Contract Amount.
Publishing source of commercial interest rates for financial charges in case of delayed payment	14.8	Sonali Bank, Bangladesh
Maximum total liability of the Contractor to the Employer	17.6	Accepted Contract Amount.
Periods for submission of insurance:	18.1	

Conditions	Sub-Clause	Data
a. evidence of insurance. b. relevant policies		14 days of Commencement of Work 28 days of Commencement of Work
Maximum amount of deductibles for insurance of the Employer's risks	18.2(d)	BDT 0.20 million per occurrence
Minimum amount of third party insurance	18.3	BDT 10 million only per occurrence with the number of occurrences unlimited.
Date by which the DB shall be appointed	20.2	28 days after the Commencement date
The DB shall be comprised of	20.2	Three Members
List of potential DB sole members	20.2	NA
Appointment (if not agreed) to be made by	20.3	President, Institution of Engineers, Bangladesh
Rules of arbitration	20.6(a)	The rules of procedure for arbitration proceedings shall be as follows: (i) In the case of a dispute between the Employer and the foreign Contractor, the dispute shall be settled through International Arbitration in accordance with the arbitration rules of the United Nations Commission on International Trade Law (UNCITRAL) as in force on the date of this contract. (iii) In the case of a dispute between the Employer and the national Contractor, in particular, the arbitration shall be conducted in accordance with the Arbitration Act (Act No 1 of 2001) of Bangladesh as at present in force and in the place Dhaka.



Table: Summary of Sections

Section Name/Description (Sub-Clause 1.1.5.6)	Time for Completion (Sub-Clause 1.1.3.3)	Damages for Delay (Sub-Clause 8.7)
Section-1 ; Polder No.32	30 months	BDT 0.94* million per day, in the currencies and proportion in which the contract price is payable.
Section-2; Polder No.35/3	30 months	BDT 0.94* million per day, in the currencies and proportion in which the contract price is payable.
Section-3; Polder No.33	36 months	BDT 1.12* million per day, in the currencies and proportion in which the contract price is payable.
Section-4; Polder No.35/1	36 months	BDT 1.12* million per day, in the currencies and proportion in which the contract price is payable.

Part B - Specific Provisions**Sub-Clause 14.1****The Contract
Price**

Paragraph (e) is amended as follows:

Notwithstanding the provisions of subparagraph (b), Contractor's Equipment, including essential spare parts therefore, imported by the Contractor for the sole purpose of executing the Contract shall be temporarily exempt from the payment of import duties and taxes upon initial importation, provided the Contractor shall post with the customs authorities at the port of entry an approved export bond or bank guarantee, valid until the Time for Completion plus six months, in an amount equal to the full import duties and taxes which would be payable on the assessed imported value of such Contractor's Equipment and spare parts, and callable in the event the Contractor's Equipment is not exported from the Country on completion of the Contract. A copy of the bond or bank guarantee endorsed by the customs authorities shall be provided by the Contractor to the Employer upon the importation of individual items of Contractor's Equipment and spare parts. Upon export of individual items of Contractor's Equipment or spare parts, or upon the completion of the Contract, the Contractor shall prepare, for approval by the customs authorities, an assessment of the residual value of the Contractor's Equipment and spare part to be exported, based on the depreciation scale(s) and other criteria used by the customs authorities for such purposes under the provisions of the applicable Laws. Import duties and taxes shall be due and payable to the customs authorities by the Contractor on (a) the difference between the initial imported value and the residual value of the Contractor's Equipment and spare parts to be exported; and (b) on the initial imported value that Contractor's Equipment and spare parts remaining in the Country after completion of the Contract. Upon payment of such dues within 28 days of being invoiced, the bond or bank guarantee shall be reduced or released accordingly; otherwise the security shall be called in the full amount remaining.



Section X - Contract Forms

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Notification of Award

LETTER OF ACCEPTANCE*[letterhead paper of the Employer]**[date]*To: *[name and address of the Contractor]*

This is to notify you that your Bid dated [date] for execution of the [name of the Contract and identification number, as given in the Contract Data] for the Accepted Contract Amount of the equivalent of [amount in numbers and words] [name of currency], as corrected and modified in accordance with the Instructions to Bidders, is hereby accepted by our Agency.

You are requested to furnish the Performance Security within 28 days in accordance with the Conditions of Contract, using for that purpose one of the Performance Security Forms included in Section X, Contract Forms, of the Bidding Documents

Authorized Signature: _____

Name and Title of Signatory: _____

Name of Agency: _____

Attachment: Contract Agreement

Contract Agreement

THIS AGREEMENT made the _____ day of _____, _____, between _____ of _____ (hereinafter "the Employer"), of the one part, and _____ of _____ (hereinafter "the Contractor"), of the other part:

WHEREAS the Employer desires that the Works known as _____ should be executed by the Contractor, and has accepted a Bid by the Contractor for the execution and completion of these Works and the remedying of any defects therein,

The Employer and the Contractor agree as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Contract documents referred to.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement. This Agreement shall prevail over all other Contract documents.
 - (i) the Letter of Acceptance
 - (ii) the Letter of Bid
 - (iii) the addenda Nos _____ (if any)
 - (iv) the Particular Conditions
 - (v) the General Conditions;
 - (vi) the Specification
 - (vii) the Drawings; and
 - (viii) the completed Schedules and any other documents forming part of the contract,
3. In consideration of the payments to be made by the Employer to the Contractor as specified in this Agreement, the Contractor hereby covenants with the Employer to execute the Works and to remedy defects therein in conformity in all respects with the provisions of the Contract.
4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein, 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.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of _____ on the day, month and year specified above.

Signed by _____ (for the Employer)

Signed by _____ (for the Contractor)

Performance Security

(Demand Guarantee)

Beneficiary: _____**Date:** _____**PERFORMANCE GUARANTEE No.:** _____**Guarantor:** _____

We have been informed that _____ (hereinafter called "the Applicant") has entered into Contract No. _____ dated _____ with the Beneficiary, for the execution of _____ (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Applicant, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of _____ (_____),¹ such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating that the Applicant is in breach of its obligation(s) under the Contract, without the Beneficiary needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire, no later than the Day of, ...², and any demand for payment under it must be received by us at this office indicated above on or before that date.

The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed one (1) year, in response to the Beneficiary's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

[signature(s)]

Note: *All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.*

¹ The Guarantor shall insert an amount representing the percentage of the Accepted Contract Amount specified in the Letter of Acceptance, less provisional sums, if any, and denominated either in the currency(cies) of the Contract or a freely convertible currency acceptable to the Beneficiary.

² Insert the date twenty-eight days after the expected completion date as described in GC Clause 11.9.

Advance Payment Security
(Demand Guarantee)

Beneficiary: _____

Date: _____

ADVANCE PAYMENT GUARANTEE No.: _____

Guarantor: _____

We have been informed that _____ (hereinafter called "the Applicant") has entered into Contract No. _____ dated _____ with the Beneficiary, for the execution of _____ (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, an advance payment in the sum _____ (_____) is to be made against an advance payment guarantee.

At the request of the Applicant, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of _____ (_____) ¹ upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating either that the Applicant:

(a) has used the advance payment for purposes other than the costs of mobilization in respect of the Works; or

(b) has failed to repay the advance payment in accordance with the Contract conditions, specifying the amount which the Applicant has failed to repay.

A demand under this guarantee may be presented as from the presentation to the Guarantor of a certificate from the Beneficiary's bank stating that the advance payment referred to above has been credited to the Applicant on its account number _____ at _____..

The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Applicant as specified in copies of interim statements or payment certificates which shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of a copy of the interim payment certificate indicating that ninety (90) percent of the Accepted Contract Amount, less provisional sums, has been certified for payment, or on the ____ day of _____, _____,² whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date..

The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed one (1) year in response to the Beneficiary's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

[signature(s)]

Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.

¹ The Guarantor shall insert an amount representing the amount of the advance payment and denominated either in the currency(ies) of the advance payment as specified in the Contract, or in a freely convertible currency acceptable to the Employer.

² Insert the expected expiration date of the Time for Completion.

Retention Money Security
(Demand Guarantee)

_____ [Guarantor letterhead or SWIFT identifier code]

Beneficiary: _____ [Insert name and Address of Employer]

Date: _____ [Insert date of issue]

RETENTION MONEY GUARANTEE No.: _____ [Insert guarantee reference number]

Guarantor: [Insert name and address of place of issue, unless indicated in the letterhead]

We have been informed that _____ [insert name of Contractor, which in the case of a joint venture shall be the name of the joint venture] (hereinafter called "the Applicant") has entered into Contract No. _____ [insert reference number of the contract] dated _____ with the Beneficiary, for the execution of _____ [insert name of contract and brief description of Works] (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, the Beneficiary retains moneys up to the limit set forth in the Contract ("the Retention Money"), and that when the Taking-Over Certificate has been issued under the Contract and the first half of the Retention Money has been certified for payment, payment of [insert the second half of the Retention Money or if the amount guaranteed under the Performance Guarantee when the Taking-Over Certificate is issued is less than half of the Retention Money, the difference between half of the Retention Money and the amount guaranteed under the Performance Security] is to be made against a Retention Money guarantee.

At the request of the Applicant, we, as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of _____ [insert amount in figures] (_____) [amount in words]¹ upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating that the Applicant is in breach of its obligation(s) under the Contract, without your needing to prove or show grounds for your demand or the sum specified therein.

A demand under this guarantee may be presented as from the presentation to the Guarantor of a certificate from the Beneficiary's bank stating that the second half of the Retention Money as referred to above has been credited to the Applicant on its account number _____ at _____ [insert name and address of Applicant's bank].

This guarantee shall expire no later than the day of, 2...², and any demand for payment under it must be received by us at the office indicated above on or before that date.

The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [six months][one year], in response to the Beneficiary's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

[signature(s)]

Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.

¹ The Guarantor shall insert an amount representing the amount of the second half of the Retention Money or or if the amount guaranteed under the Performance Guarantee when the Taking-Over Certificate is issued is less than half of the Retention Money, the difference between half of the Retention Money and the amount guaranteed under the Performance Security and denominated either in the currency(ies) of the second half of the Retention Money as specified in the Contract, or in a freely convertible currency acceptable to the Beneficiary.

² Insert the same expiry date as set forth in the performance security, representing the date twenty-eight days after the completion date described in GC Clause 11.9.