

**GOVERNMENT OF KHYBER PAKHTUNKHWA
DIRECTORATE GENERAL SMALL DAMS
IRRIGATION DEPARTMENT**



BIDDING DOCUMENTS

**NAME OF WORK:- CONSTRUCTION OF SANAM,
PALAI AND KUNDAL
DAMS, PSDP NO: 1123 (2021-
22).**

**SUB WORK:- CONSTRUCTION OF SANAM
DAM PROJECT, DISTRICT DIR
LOWER**

Volume - I

APRIL 2022

STANDARD FORM OF BIDDING DOCUMENTS

FOR

PROCUREMENT OF WORKS

(CIVIL WORKS)

**(For Large Contracts)
Over Rs.45 Million**

(Harmonized with KPPRA & PEC Rules)

**KHYBER PAKHTUNKHWA PUBLIC PROCUREMENT
REGULATORY AUTHORITY (KPPRA)**

BIDDING DOCUMENTS

VOLUME - I

1. Invitation For Bids
2. Instructions to Bidders
3. Bidding Data
4. Forms of Bid and Appendices to Bid
5. Part – I General Conditions of Contract
6. Part – II Particular Conditions of Contract
7. Specifications – Special Provisions
8. Specifications – As Per MRS-2021/Technical Provisions

VOLUME - II

Bid Drawings

TABLE OF CONTENTS

INVITATION FOR BIDS

INSTRUCTIONS TO BIDDERS

A1.	TERMS & CONDITIONS	1
A.	GENERAL	4
B.	BIDDING DOCUMENTS	5
C.	PREPARATION OF BIDS	6
D.	SUBMISSION OF BIDS	11
E.	BID OPENING AND EVALUATION.....	13
F.	AWARD OF CONTRACT	16
	Instructions to Bidders	27
	Clause Reference.....	27
1.1	Name of the Project & Summary of the Works	27
8.1	Time Limit for Clarification	27
10.1	Bid language	27
11.1(b)	Prequalification Information to be updated	27
13.1	Bidders quote entirely in Pak Rupees	28
14.1	Period of Bid validity	28
15.1	Amount of Bid Security.....	28
17.2	Venue, Time and date of Pre Bid Meeting	28
18.4	Number of copies of the Bid to be completed and returned	28
19.2 (a)	Employer’s address for the purpose of Bid Submission	28
20.1	Deadline for submission of Bids:.....	28
23.1	Venue, Time and Date of Bid Opening	28
32.1	Standard form and amount of Performance Security acceptable to the Employer ...	28
	PRICE ADJUSTMENT UNDER CLAUSE 70 OF CONDITIONS OF CONTRACT	35
A.	Preamble.....	36
C.	Daywork Schedule.....	57

BIDDING DATA

BID AND APPENDICES TO BID

Appendix-A TO BID: Special Stipulations

Appendix-B TO BID: Foreign Currency Requirements

Appendix-C TO BID: Schedule of Basic Prices Specified Materials and Labour Wages

Appendix-D TO BID: Bill of Quantities

Appendix-E TO BID: Proposed Construction Schedule

Appendix-F TO BID: Method of Performing the Work

Appendix-G TO BID: List of Major Equipment – Related Items

Appendix-H TO BID: Construction Camp and Housing Facilities

Appendix-I TO BID: List of Subcontractors

Appendix-J TO BID: Estimated Progress Payments

Appendix-K TO BID: Organization Chart of the Supervisory Staff and Labour

Appendix-L TO BID: Integrity Pact

FORMS

BID SECURITY

PERFORMANCE SECURITY

CONTRACT AGREEMENT

MOBILIZATION ADVANCE GUARANTEE

PART-I: GENERAL CONDITIONS OF CONTRACT

PART-II: PARTICULAR CONDITIONS OF CONTRACT

INVITATION FOR BID

GOVERNMENT OF KHYBER PAKHTUNKHWA
DIRECTORATE GENERAL SMALL DAMS IRRIGATION DEPARTMENT

NOTICE INVITING E-BIDDING

Single Stage Single Envelope Procedure

Deputy Director (P&C) Small Dams Division Mardan invites electronic bids in accordance with KPPRA procurement Rules 2014 on Single Stage Single Envelope procedure for the below mentioned work, from eligible Firms/Contractors registered with PEC and Government of Khyber Pakhtunkhwa in required category.

S.No.	Name of Work	Required Category	PEC Code	Estimated Cost Rs: in Million	Earnest Money @ 2% (Rupees)
1.	CONSTRUCTION OF SANAM, PALAI AND KUNDAL DAMS, PSDP NO: 1123 (2021-22), Sub Work:- CONSTRUCTION OF SANAM DAM PROJECT, DISTRICT DIR LOWER.	C- 1 & above PK-3 & above	CE-04	1262.38	25247600.00

TERMS AND CONDITIONS

1. Bid Solicitation Documents including Instructions to Bidders can be downloaded from Irrigation website <http://www.irrigation.gkp.pk> as well as KPPRA website otherwise bids submitted without these documents (duly filled) will be considered non responsive.
2. Bid Solicitation Documents also contains eligibility and other important conditions for the intending bidders.
3. Electronic Bidding shall be carried out on "above / below system" on BOQ/Engineer estimate, based on MRS/NSI where applicable. Only two digits after the decimal point shall be considered for evaluation purpose.
4. If the successful bidder who has quoted a rate more than 15% below on the Engineer's Estimate shall be dealt with as per KPPRA Notification No. S.R.O. (13)/Vol: 1-21/2021-22 dated: 15/09/2021.
5. The bids will be valid for one hundred & twenty days (120) from the bids opening date.
6. All the bidders are required to be registered with the Khyber Pakhtunkhwa Revenue Authority, established under the Khyber Pakhtunkhwa Finance Act 2013(Khyber Pakhtunkhwa Act No.XXI of 2013) for works consulting and non-consulting services as listed in scheduled –II of the Act IBID
7. In case of equal financial bid of two or more respective bidders, the successful bidder will be decided through draw by the Procuring Committee.
8. The Bid Security shall be in favor of the Deputy Director (P&C) Small Dams Division Mardan and from account of the Bidder else not acceptable.

9. The Employer has the authority to reject any bid or all the bids assigning cogent reasons.
10. Bid security of the 1st, 2nd and 3rd lowest Electronic bidder for the specific work will be retained by the Department for one week after issuance of letter of acceptance to the successful bidder.
11. All the prevailing KPPRA Acts / Rules updated instruction/notifications and other Government Notifications issued from time to time will be applicable.
12. The interested firms/contractors may obtain clarification regarding bid solicitation documents during office hours on any working day from the office of the undersigned.
13. Pre Bid meeting will be held in the office of undersigned on **Wednesday, 09/05/2022** at 11:00 AM
14. The last date for bid submission is **Thursday, 19-05-2022** at 12:00 Noon which will be opened on the same day at 12:30 PM in the office of the undersigned by the Procuring Committee in presence of Contractors/their representative who wishes to attend.

**Deputy Director
(P&C) Small Dams Division,
Mardan**

**Address: Irrigation House, near PRC Chowk Mardan.
(Telephone No. 0937-9230800)
Email; smdivnmardan@gmail.com**

INSTRUCTIONS

TO

BIDDERS

INSTRUCTIONS TO BIDDERS

Note: (These Instructions to Bidders along with Bidding Data will not be part of the Contract and will cease to have effect once the contract is signed.)

A. GENERAL

IB.1 Scope of Bid

- 1.1 The Employer as defined in the Bidding Data hereinafter called “the Employer” wishes to receive bids for the construction and completion of works as described in these Bidding Documents, and summarized in the Bidding Data hereinafter referred to as the “Works”.
- 1.2 The successful bidder will be expected to complete the Works within the time specified in Appendix-A to Bid.
- 1.3 Throughout these bidding documents, the terms ‘bid’ and ‘tender’ and their derivatives (bidder / tenderer, bid / tender, bidding / tendering etc.) are synonymous.

IB.2 Source of Funds

- 2.1 Financed by Government of Pakistan PSDP No. 1123 (2021-22) & ADP No. 2121/80320 (2021-22)

IB.3 Eligible Bidders

- 3.1 This Invitation for Bids is open to all bidders meeting the following requirements:
 - a. Duly licensed by the Pakistan Engineering Council (PEC) in the required category as per NIT.
 - b. Duly registered with Khyber Pakhtunkhwa Revenue Authority for the purpose of sales tax on services. Referred reference: KPPRA Notification No. KPPRA / M&E / Esst: / 1-14 / 2017-18 dated June 27, 2018.
 - c. Registered with Provincial Works Department, Govt of KP in the required category as reflected in NIT.
 - d. Is neither associated, nor has been associated, directly or indirectly, with the Consultants or any other entity that has prepared the design, specifications and other documents for the Project or being proposed for any position in the Project Management.
- 3.2 A bidder having a conflict of interest will be declared as non-responsive if the bidder has a close business relationship with the Employer’s professional personnel, who directly or indirectly involved in any part of: (i) the preparation of the bidding documents for the Works, (ii) the Bid evaluation or (iii) the supervision of such Works

IB.4 One Bid per Bidder

- 4.1 Each bidder shall submit only one bid either by himself, or as a partner in a joint venture. A bidder who submits or participates in more than one bid (other than alternatives pursuant to Clause IB.16) will be disqualified.

IB.5 Cost of Bidding

- 5.1 The bidders shall bear all costs associated with the preparation and submission of their respective bids and the Employer will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

IB.6 Site Visit

- 6.1 The bidders are advised to visit and examine the Site of Works and its surroundings and obtain for themselves on their own responsibility all information that may be necessary for preparing the bid and entering into a contract for construction of the Works. All cost in this respect shall be at the bidder's own expense.
- 6.2 The bidders and any of their personnel or agents will be granted permission by the Employer to enter upon his premises and lands for the purpose of such inspection, but only upon the express condition that the bidders, their personnel and agents, will release and indemnify the Employer, his 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 such inspection.

B. BIDDING DOCUMENTS

IB.7 Contents of Bidding Documents

- 7.1 The Bidding Documents, in addition to invitation for bids, are those stated below and should be read in conjunction with any Addenda issued in accordance with Clause IB.9.
1. Instructions to Bidders.
 2. Bidding Data.
 3. Conditions of Contract, Part-I - General Conditions
 4. General Conditions of Contract, Part-I (GCC)
 5. Particular Conditions of Contract, Part-II (PCC)
 6. Specifications – As per MRS-2021/Special Provisions
 7. Specifications - Technical Provisions.
 8. Form of Bid & Appendices to Bid.
 9. Bill of Quantities (Appendix-D to Bid).
 10. Form of Bid Security.

11. Form of Contract Agreement.
 12. Forms of Performance Security and Mobilization Advance Guarantee/Bond.
 13. Drawings.
- 7.2 The bidders are expected to examine carefully the contents of all the above documents. Failure to comply with the requirements of bid submission will be at the Bidder's own risk. Pursuant to Clause IB.26, bids, which are not substantially responsive to the requirements of the Bidding Documents will be rejected.

IB.8 Clarification of Bidding Documents

- 8.1 The interested Firms/Contractors may obtain clarification regarding bid solicitation documents during office hours on any working day from the address indicated in the NIT.

IB.9 Amendment of Bidding Documents

- 9.1 At any time prior to the deadline for submission of bids, the Employer may, for any reason, whether at his own initiative or in response to a clarification requested by a prospective bidder, modify the Bidding Documents by issuing addendum.
- 9.2 Any addendum thus issued shall be part of the Bidding Documents pursuant to Sub-Clause 7.1 hereof and shall be communicated in writing to all purchasers of the Bidding Documents. Prospective bidders shall acknowledge receipt of each addendum in writing to the Employer.
- 9.3 To afford prospective bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer may extend the deadline for submission of bids in accordance with Clause IB.20

C. PREPARATION OF BIDS

IB.10 Language of Bid

- 10.1 The bid and all correspondence and documents related to the bid exchanged by a bidder and the Employer shall be in the bid language stipulated in the Bidding Data and Particular Conditions of Contract. Supporting documents and printed literature furnished by the bidders may be in any other language provided the same are accompanied by an accurate translation of the relevant parts in the bid language, in which case, for purposes of evaluation of the bid, the translation in bid language shall prevail.

IB.11 Documents Accompanying the Bid

- 11.1 Each bidder shall:
- (a) Submit a written power of attorney authorizing the signatory of

the bid to act for and on behalf of the bidder;

- (b) Update the information indicated and listed in the Bidding Data.
 - (i) Current litigation information; and
 - (ii) Availability of critical equipment.
- (c) Furnish a technical proposal taking into account the various Appendices to Bid specially the following:

Appendix-E to Bid	Proposed Construction Schedule
Appendix-F to Bid	Method of Performing the Work
Appendix-G to Bid	List of Major Equipment
Appendix-K to Bid	Organization Chart for Supervisory Staff and other pertinent information such as mobilization program etc.

11.2 Bids submitted by a joint venture of two (2) or more firms shall comply with the following requirements:

- (a) The bid and in case of a successful bid, the Form of Contract Agreement shall be signed so as to be legally binding on all partners;
- (b) One of the joint venture partners shall be nominated as being in charge; and this authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the joint venture partners;
- (c) The partner-in-charge shall always be duly authorized to deal with the Employer regarding all matters related with and/or incidental to the execution of Works as per the terms and Conditions of Contract and in this regard to incur any and all liabilities, receive instructions, give binding undertakings and receive payments on behalf of the joint venture;
- (d) All partners of the joint venture shall at all times and under all circumstances be liable jointly and severally for the execution of the Contract in accordance with the Contract terms and a statement to this effect shall be included in the authorization mentioned under Sub-Para (b) above as well as in the Form of Bid and in the Form of Contract Agreement (in case of a successful bid); and
- (e) A copy of the agreement entered into by the joint venture partners shall be submitted with the bid stating the conditions under which it will function, its period of duration, the persons authorized to represent and obligate it and which persons will be directly responsible for due performance of the Contract and can give valid receipts on behalf of the joint venture, the

proportionate participation of the several firms forming the joint venture, and any other information necessary to permit a full appraisal of its functioning. No amendments / modifications whatsoever in the joint venture agreement shall be agreed to between the joint venture partners without prior written consent of the Employer.

- 11.3 Bidders shall also submit proposals of work methods and schedule, in sufficient detail to demonstrate the adequacy of the Bidders' proposals to meet the technical specifications and the completion time referred to in Sub-Clause 1.2 hereof.

IB.12 Bid Prices

- 12.1 Unless stated otherwise in the Bidding Documents, the Contract shall be for the whole of the Works as described in Sub-Clause 1.1 hereof, based on the unit rates and / or prices submitted by the bidder.

- 12.2 The bidders shall quote their rates in percentage above/below on BOQ uploaded on Irrigation Website comprising of Schedule/Non Schedule Items. Any unforeseen schedule item(s) cropped up during execution shall be paid as per MRS-2021 with approved premium.

- 12.3 All duties, taxes and other levies payable by the Contractor under the Contract, or for any other cause, as on 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 a bidder.

Additional / reduced duties, taxes and levies due to subsequent additions or changes in legislation shall be reimbursed / deducted as per Sub-Clause 70.2 of the General Conditions of Contract Part-I.

- 12.4 The rates and prices quoted by the bidders are subject to adjustment during the performance of the Contract in accordance with the provisions of Clause 70 of the Conditions of Contract. The bidders shall furnish the prescribed information for the price adjustment formulae in Appendix-C to Bid, and shall submit with their bids such other supporting information as required under the said Clause.

IB.13 Currencies of Bid and Payment

- 13.1 The unit rates and the prices shall be quoted by the bidder entirely in Pak rupees.

IB.14 Bid Validity

- 14.1 Bids shall remain valid for the period stipulated in the Bidding Data after the Date of Bid Opening specified in Clause IB.23.

- 14.2 In exceptional circumstances, prior to expiry of the original bid validity period, the Employer may request that the bidders extend the period of validity for a specified additional period, which shall in no case be more than the original bid validity period. The request and the responses

thereto shall be made in writing. A bidder may refuse the request without forfeiting his Bid Security. A bidder agreeing to the request will not be required or permitted to modify his bid, but will be required to extend the validity of his Bid Security for the period of the extension, and in compliance with Clause IB.15 in all respects. The bidder shall bear all costs to be incurred on such extensions.

IB.15 Bid Security

- 15.1 Each bidder shall furnish, as part of his bid, a Bid Security in the amount stipulated in the Bidding Data in Pak Rupees or an equivalent amount in a freely convertible currency.
- 15.2 The Bid Security shall be, in the form of Deposit at Call issued by a Scheduled Bank in Pakistan or from a foreign bank duly counter guaranteed by a Scheduled Bank in Pakistan in favour of the Employer valid for a period 28 days beyond the Bid Validity date.
- 15.3 Any bid not accompanied by an acceptable/valid Bid Security shall be rejected by the Employer as non-responsive.
- 15.4 The bid securities of unsuccessful bidders will be returned as promptly as possible, but no later than 28 days after the expiration of the period of Bid Validity.
- 15.5 The Bid Security of the successful bidder will be returned when the bidder has furnished the required Performance Security and signed the Contract Agreement. The Bid Security may be adjusted by the Employer as part of the Performance Security.
- 15.6 The Bid Security may be forfeited:
- (a) If the bidder withdraws his bid during the period of bid validity except as provided in Sub-Clause 22.1;
 - (b) If the bidder does not accept the correction of his Bid Price pursuant to Sub-Clause 27.2 hereof; or
 - (c) In the case of successful bidder, if he fails within the specified time limit to:
 - (i) Furnish the required Performance Security; or
 - (ii) Sign the Contract Agreement.

IB.16 Alternate Proposals by Bidder

- 16.1 Should any bidder consider that he can offer any advantages to the Employer by a modification to the designs, specifications or other conditions, he may, in addition to his bid to be submitted in strict compliance with the Bidding Documents, submit any Alternate Proposal(s) containing (a) relevant design calculations; (b) technical specifications; (c) proposed construction methodology; and (d) any other relevant details / conditions, provided always that the total sum entered on the Form of Bid shall be that which represents complete compliance with the Bidding Documents.

- 16.2 Alternate Proposal(s), if any, of the lowest evaluated responsive bidder only may be considered by the Employer as the basis for the award of Contract to such bidder.

IB.17 Pre-Bid Meeting

- 17.1 The Employer may, on his own motion or at the request of any prospective bidder(s), hold a pre-bid meeting to clarify issues and to answer any questions on matters related to the Bidding Documents. The date, time and venue of pre-bid meeting, if convened, is as stipulated in the Bidding Data. All prospective bidders or their authorized representatives shall be invited to attend such a pre-bid meeting.
- 17.2 The bidders are requested to submit questions, if any, in writing so as to reach the Employer not later than seven (7) days before the proposed pre-bid meeting.
- 17.3 Minutes of the pre-bid meeting, including the text of the questions raised and the replies given, will be transmitted immediately to all purchasers of the Bidding Documents. Any modification of the Bidding Documents listed in Sub-Clause 7.1 hereof which may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an Addendum pursuant to Clause IB.9 and not through the minutes of the pre-bid meeting.
- 17.4 Absence at the pre-bid meeting will not be a cause for disqualification of a bidder.

IB.18 Format and Signing of Bid

- 18.1 Bidders are particularly directed that the amount entered on the Form of Bid shall be for performing the Contract strictly in accordance with the Bidding Documents.
- 18.2 All appendices to Bid are to be properly completed and signed.
- 18.3 No alteration is to be made in the Form of Bid nor in the Appendices thereto except in filling up the blanks as directed. If any such alterations be made or if these instructions be not fully complied with, the bid may be rejected.
- 18.4 Each bidder shall quote electronically his rate in percentage above/below on the E-BOQ. The bidder may also prepare by filling out the forms completely and without alterations one (1) original and number of copies, specified in the Bidding Data, of the documents comprising the bid as described in Clause IB.7 and clearly mark them "ORIGINAL" and "COPY" as appropriate. In the event of discrepancy between them, the original shall prevail.
- 18.5 The original and all copies of the bid shall be typed or written in indelible ink (in the case of copies, Photostats are also acceptable) and shall be signed by a person or persons duly authorized to sign on behalf of the

bidder pursuant to Sub- Clause 11.1(a) hereof. All pages of the bid shall be initialed and stamped by the person or persons signing the bid.

- 18.6 The bid shall contain no alterations, omissions or additions, except to comply with instructions issued by the Employer, or as are necessary to correct errors made by the bidder, in which case such corrections shall be initialed by the person or persons signing the bid.
- 18.7 Bidders shall indicate in the space provided in the Form of Bid their full and proper addresses at which notices may be legally served on them and to which all correspondence in connection with their bids and the Contract is to be sent.
- 18.8 Bidders should retain a copy of the Bidding Documents as their file copy.

D. SUBMISSION OF BIDS

IB.19 Sealing and Marking of Bids

- 19.1 Each bidder shall electronically submit his bid on Irrigation website. In addition the bidder may also submit hard copies as under:
- (a) ORIGINAL Bid shall be put in envelope and marked as such.
 - (b) The envelope containing the ORIGINAL bid will be put in one sealed envelope and addressed / identified as given in Sub-Clause 19.2 hereof.
- 19.2 The inner and outer envelopes shall:
- (a) Be addressed to the Employer at the address provided in the Bidding Data;
 - (b) Bear the name and identification number of the contract as defined in the Bidding Data; and
 - (c) Provide a warning not to open before the time and date for bid opening, as specified in the Bidding Data.
- 19.3 In addition to the identification required in Sub- Clause 19.2 hereof, the inner envelope shall indicate the name and address of the bidder to enable the bid to be returned unopened in case it is declared "late" pursuant to Clause IB.21
- 19.4 If the outer envelope is not sealed and marked as above, the Employer will assume no responsibility for the misplacement or premature opening of the Bid.

IB.20 Deadline for Submission of Bids

- 20.1 (a) The Bidders must upload/quote his rate electronically on irrigation website not later than the time, date stipulated in the NIT. In the event of the specified date for the submission of bids declared a holiday,, the Bids will be received up to the

appointed time on the next working day.

- (b) Bids with charges payable will not be accepted, nor will arrangements be undertaken to collect the bids from any delivery point other than that specified above. Bidders shall bear all expenses incurred in the preparation and delivery of bids. No claims will be entertained for refund of such expenses.
- (c) Where delivery of a bid is by mail and the bidder wishes to receive an acknowledgment of receipt of such bid, he shall make a request for such acknowledgment in a separate letter attached to but not included in the sealed bid package.
- (d) Upon request, acknowledgment of receipt of bids will be provided to those making delivery in person or by messenger.

20.2 The Employer may, at his discretion, extend the deadline for submission of bids by issuing an amendment in accordance with Clause IB.9, in which case all rights and obligations of the Employer and the bidders previously subject to the original deadline will thereafter be subject to the deadline as extended.

IB.21 Late Bids

- 21.1 (a) Any bid received by the Employer after the deadline for submission of bids prescribed in Clause IB.20 will be returned unopened to such bidder.
- (b) Delays in the mail, delays of person in transit, or delivery of a bid to the wrong office shall not be accepted as an excuse for failure to deliver a bid at the proper place and time. It shall be the bidder's responsibility to determine the manner in which timely delivery of his bid will be accomplished either in person, by messenger or by mail.

IB.22 Modification and Withdrawal of Bids

- 22.1 Any bidder may modify, substitute or withdraw his bid after bid submission provided that the modification, substitution or written notice of withdrawal is received by the Employer prior to the deadline or the extended deadline pursuant to clause IB.20.2, for submission of bids.
- 22.2 The modification, substitution or notice for withdrawal of any bid shall be prepared, sealed, marked and delivered in accordance with the provisions of Clause IB.19 with the outer and inner envelopes additionally marked "MODIFICATION", "SUBSTITUTION" or "WITHDRAWAL" as appropriate..

- 22.3 No bid may be modified by a bidder after the deadline for submission of bids except in accordance with Sub-Clauses 22.1 and 27.2.
- 22.4 Withdrawal of a bid during the interval between the deadline for submission of bids and the expiration of the period of bid validity specified in the Form of Bid may result in forfeiture of the Bid Security in pursuance to Clause IB.15.

E. BID OPENING AND EVALUATION

IB.23 Bid Opening

- 23.1 The Employer will electronically open all the bids received (except those received late), including withdrawals, substitution and modifications made pursuant to Clause IB.22, in the presence of bidders' or their representatives who choose to attend, at the time, date and location stipulated in the Bidding Data/NIT. In the event of the specified date for the opening of bids being declared a holiday, the Bids will be opened at the appointed time and location on the next working day. The bidders' representatives who are present shall sign a register evidencing their attendance.

In addition to the clause IB.23, the following procedures shall be adopted for opening competitive bidding:

- a) Single stage – single Envelope bidding,
- i. Each bid shall comprise a single package with one envelope.
- 23.2 Envelopes marked "MODIFICATION", "SUBSTITUTION" or "WITHDRAWAL" shall be opened and read out first. Bids for which an acceptable notice of withdrawal has been submitted pursuant to Clause IB.22 shall not be opened.
- 23.3 The bidder's name, total Bid Price and price of any Alternate Proposal(s), any discounts, bid modifications, substitution and withdrawals, the presence or absence of Bid Security, and such other details as the Employer may consider appropriate, will be announced by the Employer at the opening of bids.
- 23.4 The Employer shall prepare minutes of the bid opening including the information disclosed to those present in accordance with the Sub-Clause 23.3.

IB.24 Process to be Confidential

- 24.1 Information relating to the examination, clarification, evaluation and comparison of bid and recommendations for the award of a contract shall not be disclosed to bidders or any other person not officially concerned with such process before the announcement of the final

result of the bid evaluation which shall be done at least ten (10) days prior to issue of Letter of Acceptance and place the same on its and Authority's Website (KPPRA Rule-45). The announcement to all Bidders will include table(s) comprising read out prices, discounted prices, price adjustments made, final evaluated prices and recommendations against all the bids evaluated. Any effort by a bidder to influence the Employer's processing of bids or award decisions may result in the rejection of such bidder's bid. Whereas any bidder feeling aggrieved may lodge a written complaint not later than fifteen (15) days after the announcement of the bid evaluation report; however mere fact of lodging a complaint shall not warrant suspension of the procurement process.

IB.25 Clarification of Bids

25.1 To assist in the examination, evaluation and comparison of bids, the Employer may, at his discretion, ask any bidder for clarification of his bid, including breakdowns of unit rates. The request for clarification and the response shall be in writing but no change in the price or substance of the bid shall be sought, offered or permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the bids in accordance with Clause IB.28.

IB.26 Examination of Bids and Determination of Responsiveness

26.1 Prior to the detailed evaluation of bids, the Employer will determine whether each bid is substantially responsive to the requirements of the Bidding Documents.

26.2 A substantially responsive bid is one which (i) meets the eligibility criteria; (ii) has been properly signed; (iii) is accompanied by the required Bid Security; and (iv) conforms to all the terms, conditions and specifications of the Bidding Documents, without material deviation or reservation. A material deviation or reservation is one (i) which affect in any substantial way the scope, quality or performance of the Works; (ii) which limits in any substantial way, inconsistent with the Bidding Documents, the Employer's rights or the bidder's obligations under the Contract; or (iii) adoption whereof would affect unfairly the competitive position of other bidders presenting substantially responsive bids.

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

IB.27 Correction of Errors

- 27.1 Bids determined to be substantially responsive will be checked by the Employer for any arithmetic errors. Errors will be corrected by the Employer as follows:
- (a) Where there is a discrepancy between the 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 line item total resulting from multiplying the unit rate by 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 rate, in which case the line item total as quoted will govern and the unit rate will be corrected.
- 27.2 The amount stated in the Form of Bid will be adjusted by the Employer in accordance with the above procedure for the correction of errors and with the concurrence of the bidder, shall be considered as binding upon the bidder. If the bidder does not accept the corrected Bid Price, his Bid will be rejected, and the Bid Security shall be forfeited in accordance with Sub- Clause 15.6(b) hereof.

IB.28 Evaluation and Comparison of Bids

- 28.1 The Employer will evaluate and compare only the Bids determined to be substantially responsive in accordance with Clause IB.26.
- 28.2 In evaluating the Bids, the Employer will determine for each Bid the evaluated Bid Price by adjusting the Bid Price as follows:
- (a) Making any correction for errors pursuant to Clause IB.27;
 - (b) Excluding Provisional Sums and the provision, if any, for contingencies in the Summary Bill of Quantities, but including competitively priced Day work; and
 - (c) Making an appropriate adjustment for any other acceptable variation or deviation, including discounts or other price modification in the bids
- 28.3 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.
- 28.4 If the Bid of the successful bidder is seriously unbalanced in relation to the Employer's estimate of the cost of work to be performed under the Contract, the Employer may require the bidder to produce detailed price analyses for any or all items of the Bill of Quantities to demonstrate the

internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, the Employer may require that the amount of the Performance Security set forth in Clause IB.32 be increased at the expense of the successful bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful bidder under the Contract.

F. AWARD OF CONTRACT

IB.29 Award

29.1 Subject to Clauses IB.30 and IB.34, the Employer will award the Contract to the bidder whose bid has been determined to be substantially responsive to the Bidding Documents and who has offered the lowest evaluated Bid Price, provided that such bidder has been determined to be eligible in accordance with the provisions of Clause IB.3 and qualify pursuant to Sub-Clause IB 29.2

29.2 The Employer, at any stage of the bid evaluation, having credible reasons for or *prima facie* evidence of any defect in supplier's or contractor's capacities, may require the suppliers or contractors to provide information concerning their professional, technical, financial, legal or managerial competence whether already pre-qualified or not:

Provided that such qualification shall only be laid down after recording reasons therefore in writing. They shall form part of the records of that bid evaluation report.

IB.30 Employer's Right to Accept any Bid and to Reject any or all Bids

30.1 Notwithstanding Clause IB.29, 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 award of Contract, without thereby incurring any liability to the affected bidders or any obligation except that the grounds for rejection of all bids shall upon request be communicated to any bidder who submitted a bid, without justification of grounds. Rejection of all bids shall be notified to all bidders promptly.

IB.31 Notification of Award

31.1 Prior to expiration of the period of bid validity prescribed by the Employer, the Employer will notify the successful bidder in writing ("Letter of Acceptance") that his Bid has been accepted. This letter shall name the sum which the Employer will pay the Contractor in consideration of the execution and completion of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Conditions of Contract called the "Contract Price").

- 31.2 No Negotiation with the bidder having evaluated as lowest responsive or any other bidder shall be permitted, however, Employer may have clarification meetings to get clarify any item in the bid evaluation report.
- 31.3 The notification of award and its acceptance by the bidder will constitute the formation of the Contract, binding the Employer and the bidder till signing of the formal Contract Agreement.
- 31.3 Upon furnishing by the successful bidder of a Performance Security, the Employer will promptly notify the other bidders that their Bids have been unsuccessful and return their bid securities.

IB.32 Performance Security

- 32.1 The successful bidder shall furnish to the Employer a Performance Security in the form and the amount stipulated in the Bidding Data and the Conditions of Contract plus additional security for unbalanced bids in accordance with Clause IB.28.4/NIT within a period of 28 days after the receipt of Letter of Acceptance.
- 32.2 Failure of the successful bidder to comply with the requirements of Sub-Clause IB.32.1 or Clauses IB.33 or IB.35 shall constitute sufficient grounds for the annulment of the award and forfeiture of the Bid Security.

IB.33 Signing of Contract Agreement

- 33.1 Within 14 days from the date of furnishing of acceptable Performance Security under the Conditions of Contract, the Employer will send the successful bidder the Contract Agreement in the form provided in the Bidding Documents, incorporating all agreements between the parties.
- 33.2 The formal Agreement between the Employer and the successful bidder shall be executed within 14 days of the receipt of the Contract Agreement by the successful bidder from the Employer.

IB.34 General Performance of the Bidders

The Employer reserves the right to obtain information regarding performance of the bidders on their previously awarded contracts/works. The Employer may in case of consistent poor performance of any Bidder as reported by the employers of the previously awarded contracts, inter alia, reject his bid and/or refer the case to the Pakistan Engineering Council (PEC) and KPPRA. Upon such reference, PEC/KPPRA in accordance with its rules, procedures and relevant laws of the land take such action as may be deemed appropriate under the circumstances of the case including black listing of such Bidder and debarring him from participation in future bidding for similar works.

IB.35 Integrity Pact

The Bidder shall sign and stamp the Integrity Pact provided at Appendix-L to Bid in the Bidding Documents for all Federal Government procurement contracts exceeding Rupees ten million. Failure to provide such Integrity Pact shall make the bidder non-responsive.

IB.36 Instructions not Part of Contract

Bids shall be prepared and submitted in accordance with these Instructions which are provided to assist bidders in preparing their bids, and do not constitute part of the Bid or the Contract Documents.

IB.37 Guidelines for submission of Technical Proposals

N/A

(A) EXPERIENCE AND PAST PERFORMANCE IN EXECUTION OF SIMILAR NATURE AND CIVIL WORKS

(Maximum Point = 35) NOT APPLICABLE

Table I

i	Dam Project completed (Single Dam Project) During last 10 years costing 100 million or more than 100 million	Maximum Points =10 (7 for 1, 8.5 for 2 and 10 for 3 and more)
	Agency/Department with designation of officer duly stamped & signed the attached documents with full address, office Phone and Fax NO.	Date of Award Value of Contract Completion Cost
1		
2		
3		

Table II

ii- (a)	Dam Project in hand costing Rs.250 million or more than Rs.250 million	Maximum Points =10 (7 for 1, 8.5 for 2 and 10 for 3 and more)
	Or Completed similar nature projects like Barrage, Embankment, Dykes, Flood Protection Bund, Spur & Irrigation Canal costing 250 million during last 10 years	
ii-(b)	Name of Work	
	Agency/Department with designation of officer duly stamped & signed the attached documents with full address, office Phone and Fax NO.	Date of Award Value of Contract Completion Cost
1		
2		
3		

Table III

iii	Any Civil Works other than those mentioned at Serial No. I & ii above completed during last 10 years costing 250 million or more than 250 millions Name of Work	Maximum Points =10 (3.5 for 1,7 for 2, for 3 up to 6 add 0.75 for each up to a max of 10)
	Agency/Department with designation of officer duly stamped & signed the attached documents with full address, office Phone and Fax NO.	Date of Award
		Value of Contract
		Completion Cost
1		
2		
3		
4		
5		
6		

Table IV

iv	Enlistment with Govt: Organization and other agencies (Enlistment with Irr: Deptt: in relevant category is mandatory)	Maximum Points =5 (1 marks for each enlistments up to a max of 5)
	Department	Category
1		
2		
3		
4		
5		

Note :

- 1 Grouping and Merging of projects will not be considered.
- 2 Each completed work in all categories must be supported by completion certificate duly signed & stamped by the issuing authority. Substantial completion certificated will not be considered as completion certificate for that particular project. In other words in progress work shall not be considered even if it is above the threshold amount.
3. Each running/in hand dam project must be supported by tender Letter of Acceptance, Letter of Commencement and work order with full details of the issuing agency including official designation, office address, signed by the official, phone and Fax Nos. In case of Photocopy, the document must be attested by the concerned issuing authority.

(B) PERSONNEL CAPABILITIES: (Max Marks =15)

Table V

i	Graduate Civil Engineer registered with PEC Name of Engineer	Maximum Points =10 (10 marks for not less than 2 engineers having experience of 10 years)			Contact No
		University Studied	PEC Registration No.	Duration of Employment with Firm	
1					
2					

Table VI

ii	Diploma / Associate Engineer Name of Engineer	Maximum Points =3.33 (marks for not less than 4 DAE having exp of 5 yrs)			Contact No
		Technical College/ Institute studied	Board of Technical Education Registration No.	Duration of Employment with Firm	
1					
2					
3					
4					

Table VII

ii	Diploma / Associate Engineer Name of Engineer	Maximum Points =0.833 DAE Quantity Surveyors (0.833 marks for not less than 1 DAE having exp. of 5 yrs)			Contact No
		Technical College/ Institute studied	Board of Technical Education Registration No.	Duration of Employment with Firm	
1					
2					
3					
4					

Table VIII

ii	Diploma / Associate Engineer Name of Engineer	Maximum Points =0.833 DAE Lab Technician (0.833 marks for not less than 1 DAE having exp of 5 yrs)			Contact No
		Technical College/ Institute studied	Board of Technical Education Registration No.	Duration of Employment with Firm	

	Institute studied	Education Registration No.	Firm
1			
2			
3			
4			

Note:

1. In Support of graduate Engineer, the firm must provide Photo Copy of Degree and Valid PEC Registration certificate and appointment order. Confirmation of engineer with the firm must be registered with PEC as employed engineer by the firm. A letter from PEC in this regard is required on the PEC letter with office address, phone and Fax No or any other confirmation from PEC to ascertain the fact that the engineer is employed with the firm.
2. In support of Associate Engineer, photo copy of the Diploma and appointment order.
3. In case of Photo Copies, it must be signed, attested by the concerned issuing authorities. This note applies to all photocopies submission in the Bidding Documents including Technical Proposal.

(C) EQUIPMENT CAPABILITIES: (Max Marks =20)

Table IX

I	Description & Number of Machinery required	Quantity Required	Maximum points = 20 (25 % marks for rented machinery and 100% marks for owned machinery)			Total
			Registration No./other Detail	Owned	Rented	
1	Batching Plant	1				
2	Concrete Pump	1				
3	Crane Mobile	1				
4	Water Tanker	2				
5	Dumper Truck	12				
6	Showel/ Loader	4				
7	Drilling/ Grouting Machine	1				
8	Concrete Transit Mixer	3				
9	Sheep Foot Roller	1				
10	Plain Roller	1				
11	Excavator	2				
12	Dozer	1				
13	Screening Plant	1				

Note :

1.Machinery list should be provided on stamp paper, verified and stamped by Notary public and /or Oath Commissioner.

2.Photocopies of Ownership documents of owned Machinery must also be attached and attested.

(D) FINANCIAL SOUNDNESS: (Max Marks =30)

Table X

Financial Status- Bank Credit Line (5 Marks for Bank Credit not less than 250 Mill)

S.NO	Name of Bank	Credit (Mill)
Total		

Note:

Bank Account statements are not required. Only Bank credit certificate from schedule banks must be attached with full details of the bank information including official signature, designation, address, phone and Fax No. In case of photocopy, the bank certificate must be verified, attested and signed by a registered Chartered Accountant with full address and details of business, phone and Fax NO.

Table XI

Financial Status- Working Capital (5 marks for Bank credit not less than 500 mill/year)

1 st Year	2 nd Year	3 rd Year	Average
----------------------	----------------------	----------------------	---------

Note:

Bank Accounts are not required. Only schedule banks or bank certificate regarding Financial Working capital for the last three years must be attached, with full information of the bank including official signature, designation, address, phone and Fax No. In case of photocopy, the bank certificate must be verified, attested and signed by a registered Chartered Accountant with full address and details of business, phone and Fax NO.

Table XII

- | | |
|-----|--|
| I | Registration with Income Tax Deptt (NTN NO, & Certificate will be required for marking). Certificate from chartered accountant that the firm is as filler is required. |
| li | Affidavit for No Litigation (Affidavit on Judicial Stamp paper of no litigation with Govt:Deptt:/agency |
| lii | Affidavit for No Blacklisting (Affidavit on judicial stamp paper) |
| lv | Number of Valid licence for other related items of work (CE-04 compulsory for Technical qualification, 1 additional mark will be awarded for other speciality/ code = |

Note:

Income Tax documents shall be supported by a certificate from chartered accountants on their business and including full information of the Chartered Accountant official signature, designation, and phone and Fax No.

Special Note: All documents submitted must provide official sign, designation, address, phone and Fax No of the issuing agency. In case of photocopies, it must be attested by the concerned issuing agency.

All tables indicated above i-e Table I to table x must be completed by the bidders and duly stamped and signed by them.

BIDDING DATA

BIDDING DATA

The following specific data for the Works to be bided shall complement, amend, or supplement the provisions in the Instructions to Bidders. Wherever there is a conflict, the provisions herein shall prevail over those in the Instructions to Bidders.

INSTRUCTIONS TO BIDDERS

CLAUSE REFERENCE

1.1 NAME OF THE PROJECT & SUMMARY OF THE WORKS

NAME OF WORK:- CONSTRUCTION OF SANAM, PALAI AND KUNDAL DAMS, PSDP NO: 1123 (2021-22).

SUB WORK:-CONSTRUCTION OF SANAM DAM PROJECT, DISTRICT DIR LOWER

Contract No. _____

The Project designated as construction of Sanam Dam project consists of an Earth Core Rock fill Dam (ECRD) with un-gated ogee crest Concrete(composite) Spillway, intake / outlet Structure, Relocation of Road, construction of Inspection hut.

1.2 NAME AND ADDRESS OF THE EMPLOYER

Directorate General Small Dams,
Irrigation Department

Plot No. 27, Street No. 12, Sector E-8, Phase-VII, Hayatabad Peshawar.

2.1 Name of Funding Agency

Ministry of water resources, Government of Islamic Republic of Pakistan.

2.2 Type of Financing

Jointly funded by Federal and Provincial Governments.

8.1 TIME LIMIT FOR CLARIFICATION

Any working day within official timings until the date fixed for pre-bid meeting.

10.1 BID LANGUAGE

English

11.1(B) PREQUALIFICATION INFORMATION TO BE UPDATED

- a) Letter of Price Bid.
- b) 2% Bid Security of the estimated Cost.
- c) Additional Security if required as per Terms & Conditions of NIT.
- d) Pakistan Engineering Council Registration for the Year 2021-22.
- e) Registration with Khyber Pakhtunkhwa Revenue Authority.
- f) CNIC
- g) Ownership Documents
- h) Income Tax/NTN Certificate

11.1(C) FURNISH TECHNICAL PROPOSAL

N/A.

13.1 BIDDERS QUOTE ENTIRELY IN PAK RUPEES

Payments shall be made in Pak Rupees only and no foreign currency payment is admissible.

14.1 PERIOD OF BID VALIDITY

120 days

15.1 AMOUNT OF BID SECURITY

At the Rate of 2% of the Bid Cost with additional bid security as per KPPRA Notification dated 15/09/2021, if the bidder offer bid further lower than 15% below .

17.2 VENUE, TIME AND DATE OF PRE BID MEETING

Venue, Time and Date : As Per NIT.

18.4 NUMBER OF COPIES OF THE BID TO BE COMPLETED AND RETURNED

One (1) original

19.2 (A) EMPLOYER'S ADDRESS FOR THE PURPOSE OF BID SUBMISSION

Office of the Deputy Director (P&C) Small Dams Division, Irrigation House near PRC Chowk Mardan.

19.2 (B) NAME OF THE CONTRACT

Construction of Sanam Dam Project District Dir (Lower).

20.1 DEADLINE FOR SUBMISSION OF BIDS:

As Per NIT.

23.1 VENUE, TIME AND DATE OF BID OPENING

As Per NIT.

32.1 STANDARD FORM AND AMOUNT OF PERFORMANCE SECURITY ACCEPTABLE TO THE EMPLOYER

For an amount equal to 10% of the Contract Price stated in the Letter of Acceptance.

FORMS OF BID

AND

APPENDICES TO BID

FORM OF BID

Bid Reference No. _____

(Name of Contract/Works)

To:

Gentleman,

1. Having examined the Bidding Documents including Instructions to Bidders, Bidding Data, Conditions of Contract. Specifications, Drawings and Bill of Quantities and Addenda Nos. _____ for the execution of the above-named Works, we, the undersigned, offer to execute and complete such Works and remedy any defects therein in conformity with the Conditions of Contract. Specifications, Drawings, Bill of Quantities and Addenda for the sum of Rs. _____ (Rupees _____) or such other sum as may be ascertained in accordance with the said conditions.
2. We understand that all the Appendices attached hereto form part of this Bid.
3. As security for due performance of the undertakings and obligations of this Bid, we submit herewith a Bid Security in the amount of.
(Rs. _____) drawn in your favour or made payable to you and valid for a period of _____ days beginning from the date Bids are opened.
4. We undertake, if our Bid is accepted, to commence the Works and to complete the whole of the Works comprised in the Contract within the time stated in Appendix-A to Bid.
5. We agree to abide by this Bid for the period of _____ days from the date fixed for receiving the same and it shall remain binding upon us and may be accepted at any time before the expiration of that period.
6. Unless and until a formal Agreement is prepared and executed, this Bid, together with your written acceptance thereof, shall constitute a binding contract between us.
7. We do hereby declare that the Bid is made without any collusion, comparison of figures or arrangement with any other bidder for the Works.

8. We understand that you are not bound to accept the lowest or any Bid you may receive.

Dated this _____ day of 20_____

Signature: _____

in the capacity of _____duly authorized to sign Bids for and on behalf of

(Name of Bidder in Block Capitals)

(Seal)

Address: _____

Witness:

Signature: _____

Name: _____

Address: _____

Occupation: _____

SPECIAL STIPULATIONS**CLAUSE****CONDITIONS OF CONTRACT**

1.	Engineer's Authority to issue Variation in emergency	2.1	2% of the Contract Price as stated in the Letter of Acceptance.
2.	Amount of Performance Security	10.1	10% of Contract Price as stated in the Letter of Acceptance.
3.	Time for Furnishing Programme	14.1	Within 42 days from the date of receipt of Letter of Acceptance.
4.	Minimum amount of Third Party Insurance	23.2	Rs 2648226 per occurrence with number of occurrences unlimited.
5.	Time for Commencement	41.1	Within 14 days from the date of receipt of Engineer's Notice to Commence which shall be issued within fourteen (14) days after signing of Contract Agreement.
6.	Time for Completion	43.1, 48.2	730 days from the date of receipt of Engineer's Notice to Commence.
7.	Amount of Liquidated Damages	47.3	Upto 0.05% of the contract price for each day of delay in completion of the Works subject to a maximum of 10% of Contract Price stated in the Letter of Acceptance.
8.	Defects Liability Period	49.1	365 days from the effective date of Taking Over Certificate.
9.	Percentage of Retention Money	60.2	10% of the amount of Interim Payment Certificate.
10	Limit of Retention Money	60.2	5% of the Contract Price as stated in the Letter of Acceptance.
11	Minimum amount of Interim Payment Certificates (Running Bills)	60.2	Rs. 5,000,000. (Five Million)
12	Time of Payment from delivery of Engineer's Interim Payment Certificate to the Employer.	60.10	28 days from the date of receipt of Interim Payment Certificate by the Engineer, subject to availability of funds or any other unavoidable hindrance.
13	Mobilization Advance (Interest Free)	60.12	10% of Contract Price as stated in the Letter of Acceptance.

BB-1

Appendix-B to Bid

FOREIGN CURRENCY REQUIREMENTS

**NOT
APPLICABLE**

BC-1

Appendix-C to Bid

PRICE ADJUSTMENT UNDER CLAUSE 70 OF CONDITIONS OF CONTRACT

The source of indices and the weightages or coefficients for use in the adjustment formula under Clause 70 shall be as follows:

Cost Element	Description	Weightages	Applicable index
1	2	3	4
(i)	Fixed Portion	0.350	
(ii)	Local Labour Unskilled Skilled	0.15 0.10	Government of Pakistan (GP) Federal Bureau of Statistics (FBS) Monthly Statistical Bulletin.
(iii)	Cement – in bags	0.07	“ “ “
(iv)	Reinforcing Steel	0.08	“ “ “
(v)	High Speed Diesel (HSD)	0.08	Fixed by OGRA
(vi)	Provision and Maintenance of Contractor's Plant & Equipment	0.17	
Total		1.000	

Notes:

- 1) Indices for “(ii)” to “(iv)” are taken from the Government of Pakistan Federal Bureau of Statistics, Monthly Statistical Bulletin. The base cost indices or prices shall be those prevailing for the month falling on the date 28 days prior to the latest date for submission of the Bid. Current indices or prices shall be for the month falling on the date 28 days prior to the last day of the billing period.
- 2) For cost element v, index shall be cost of HSD as fixed by OGRA
- 3) For cost elements vi, the applicable index shall be combined Consumer Price Index Numbers (General) by Commodity Group of FBS of G.O.P.
- 4) Any fluctuation in the indices or prices of materials other than those given above shall not subject to adjustment of the Contract Price.
- 5) Fixed portion shown here is for typical road project, the Employer may determine the weightage of Fixed Portion considering only those cost elements having cost impact of seven (7) percent or more on his specific project.

BILL OF QUANTITIES

A. PREAMBLE

1. The Bill of Quantities shall be read in conjunction with the 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 executed and measured by the Contractor and verified by the Engineer and valued at the rates and prices entered in the priced Bill of Quantities, where applicable, and otherwise at such rates and prices as the Engineer may fix as per the Contract.
3. The rates and prices entered in the priced Bill of Quantities shall, except insofar as it is otherwise provided under the Contract include all costs of Contractor's plant, labour, supervision, materials, execution, insurance, profit, taxes and duties, together with all general risks, liabilities and obligations set out or implied in the Contract. Furthermore all duties, taxes and other levies payable by the Contractor under the Contract, or for any other cause, as on the date 28 days prior to deadline for submission of Bids, shall be included in the rates and prices and the total Bid Price submitted by the Bidder.
4. The bidder shall quote rate in %age above/below premium on MRS 2021 for schedule and Non-schedule items on E-Bidding system of Irrigation Website <http://www.irrigation.gkp.pk> of <http://www.irrigation.gkp.pk/tenders.php>. the procuring entity shall not be liable for errors/malfunctions of the E-bidding system, loss or non-provision of e-Bidding login & password.
5. 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 58.2 of Part I, General Conditions of Contract.

BD-02

Appendix –D to Bid

SUMMARY OF COST WORKS**SANAM DAM PROJECT
DISTRICT DIR LOWER**

Sr. No.	Description	Component Cost MRS-2021, (in Million)
1	2	3
A.	WORKS	
i	Dam Embankment	405.40
ii	Spillway	553.80
iii	Intake & Outlet Structure	7.39
iv	Irrigation System and Canal Affiliated Structures	268.30
v	Relocation of Road	22.53
vi	Chowkidar Hut	4.96
	Total Cost including Area Factor @ 1.08	1262.38

Contractor Rate _____ % Above / Below

Tender Price in Words _____
_____**Note:** Any other items cropped up during execution will be paid on MRS 2021, including contractor Premium

Signature of Contractor

BILL OF QUANTITY

Name of Work:- CONSTRUCTION OF SANAM, PALAI AND KUNDAL DAMS, PSDP NO: 1123 (2021-22).
Sub Work:- CONSTRUCTION OF SANAM DAM PROJECT, DISTRICT DIR LOWER.

S.No	Item Code	Description	Unit	Quantity	Rate (Rs)	Amount (Rs)
1	2	3	4	5	6	7
Bill No. 1: DAM EMBANKMENT						
1.1	16-74-a	Bailing out standing water by Mechanical mean	M ³	10000.00	38.45	384,500
1.2	03-62	Clearing and Grubbing by mechanical means	M ²	16612.43	16.54	274,770
1.3	03-78-a	Excavation for core trench of Dam Embankment/Spillway/Intake & Outlet Structure and Irrigation System upto a minimum depth of 35 ft in shingle gravel including removing of excavated material by machinery in 1.5 KM radius	M ³	62425.44	238.48	14,887,219
1.4	03-78-c	Excavation for core trench of Dam Embankment/Spillway/Intake & Outlet Structure and Irrigation System upto design depth in Medium Hard Rock requiring 50% blasting i/c removing of material from outside of the structure area lead upto 1.5 KM	M ³	20808.48	776.30	16,153,623
1.5	03-74	Provide , Place & compact shoulder material (sandy / silty gravel) in Dam Embankment, of specified grading, leveling / dressing i/c haulage for obtaining of 95% modified ASHTO dry density .	M ³	294340.80	337.13	99,231,114
1.6	03-28-a	Mixing & moistening of earthwork to OMC in layers for compaction etc complete	M ³	35398.90	26.75	946,921
1.7	03-29-a	Compaction of earth with power road roller 95% to 100% max. mod. AASHTO dry density	M ³	35398.90	274.49	9,716,644
1.8	03-21-c	Dressing & levelling earth to designed section Gravel work or soft rock not requiring blasting upto cut or fill 6 inches	M ³	35398.90	42.87	1,517,551
1.9	03-73+03-20-c	Provide, place and compact impervious clay core in dam embankment of specified grading, permeability i/c leveling dressing and haulage obtaining 95% modified AASHTO dry density i/c 1.5 KM, i/c extra Lead upto 8 km	M ³	67613.89	754.92	51,043,078
1.2	03-75+03-20-c,d	Provide , Place & compact Fine Filter in chimney drain vertical / horizontal on downstream of clay core i/c Lead upto 15 km	M ³	17717.19	2083.36	36,911,285

1.21	03-76	Provide , Place & compact Coarse Filter (well graded gravel) in chimney drain vertical / horizontal on downstream of fine filter i/c leveling, moistening etc	M ³	25911.85	1054.61	27,326,896
1.22	28-05	Supply & fix boundry pillars in position, including digging pits	Nos.	150.00	592.05	88,808
1.23	28-17-b	Providing and Fixing barbed wire fencing with 4 horizontal & 2 cross wires : With PCC 1:4:8 base 12"x12"x21	M	696.00	1846.48	1,285,150
1.24	19-28-a	Providing and Laying stone pitching for top layer only : On slop (Upstream Slope)	M ³	9410.87	4132.93	38,894,467
1.25	15-40-a-01	Supply and Fixing GI tubular street light pole, 8' of 5" dia, 7' 4" dia, 5' of 3" dia, Single arm of 5' of 1.5" dia	Nos	12.00	20175.75	242,109
1.26	15-35-b	Supply and Erection pole mounted street light complete for fitting 125/250 W mercury lamp	Nos	15.00	4485.60	67,284
1.27	15-47-b	Wiring of main & sub-main in 2 single core PVC insulated & sheathed cable : 7/0.029"	M	150.00	449.18	67,377
1.28	15-47-d	Wiring of main & sub-main in 2 single core PVC insulated & sheathed cable : 7/0.064"	M	150.00	1843.48	276,522
1.29	15-47-c	Wiring of main & sub-main in 2 single core PVC insulated & sheathed cable : 7/0.044"	M	350.00	683.00	239,050
1.30	15-75-a	Supply and Erection cubical type factory fabricated floor/wall mounting steel main board comp. : On surface	M ²	1.00	2843.59	2,844
1.31	15-42-a	Supply and Erection 2'x2'x1/8" copper plate including riveting to copper tape & placing in mixture of salt and charcoal etc	Nos	12.00	9883.80	118,606
1.32	15-02-a-07	Supply and Erection PVC pipe for wiring purpose complete On surface including clamps etc: 3" i/d	M	350.00	224.12	78,442
1.33	General Provision for Treatment of weak zone (to be executed as per instructions of the Engineer)					

1.33 (a)	03-78-a	Excavation for core trench of Dam Embankment/Spillway/Intake & Outlet Structure and Irrigation System upto a minimum depth of 35 ft in shingle gravel including removing of excavated material by machinery in 1.5 KM radius	M ³	4536.65	238.48	1,081,900
1.33(b)	06-05-f	Plain Cement Concrete including placing, compacting, finishing & curing (Ratio 1:2:4)	M ³	5211.29	8587.41	44,751,484
		Total Cost (S.I)				345,587,642
		Add Cost Factor for Dir Lower @ 1.08 (S.I)				27,647,011
		Total Cost (S.I)				373,234,653
1.34	NSI	Drilling of 4" Dia bore hole for Grout Curtain.	RM	1472.40	4500.0	6,625,800
1.35	NSI	Providing And Filling Cement Slurry / Bentonite grout curtain through bore hole including pressure test.	Bag	2696.00	1500.0	4,044,000
1.36	NSI	Connection with the existing 415-220 V wapda supply system testing and commission of lighting system complete	Job	1.00	37500.0	37,500
1.37	NSI	Provide install make necessary connection and carryout testing transformer 1KVA 0.415KVA and 0.5 KVA pole fitted with fuse link ,platform pole outgoing HCCBTP100 AMP at a location near dam site.	Nos	1.00	375000.0	375,000
1.38	NSI	Vibrating wire piezometers	Nos	21.00	176000.0	3,696,000
1.39	NSI	2 Twisted pairs cable	Nos	4000.00	320.0	1,280,000
1.40	NSI	Splicing / jointing kits	Nos	25.00	23200.0	580,000
1.41	NSI	Casagrande Tip	Nos	15.00	25600.0	384,000
1.42	NSI	Read out unit	Nos	3.00	512000.0	1,536,000
1.43	NSI	Dip meter with 200 meter cable	Nos	1.00	240000.0	240,000
1.44	NSI	Complete system of inclinometer with software etc	Nos	1.00	3520000.0	3,520,000

1.45	NSI	V- Notches SS	Nos	6.00	72000.0	432,000
1.46	NSI	Surface moment marker	Nos	35.00	64800.0	2,268,000
1.47	NSI	ABS inclinometer casing	Ft.	900.00	2400.0	2,160,000
1.48	NSI	Bottom and top casing covers	Nos	1.00	12000.0	12,000
1.49	NSI	Data logger 16 channels	Nos	2.00	736000.0	1,472,000
1.50	NSI	Multiplexer 16 channels	Nos	2.00	318400.0	636,800
1.51	NSI	Terminal box 16 channels	Nos	2.00	400000.0	800,000
1.52	NSI	Moment pins	Nos	70.00	3200.0	224,000
1.53	NSI	Standpipe 25mm	Ft.	3000.00	320.0	960,000
1.54	NSI	Bi Axial Tarpedo with reading cable 150 feet	Nos	1.00	880000.0	880,000
Total Cost (N.S.I)						32,163,100
Total Cost (S.I) and (N.S.I)						405397753.11
S.No	Item Code	Description	Unit			
				Quantity	Rate (Rs)	Amount (Rs)
1	2	3	4	5	6	7
Bill No. 2: SPILLWAY						
2.1	03-78-a	Excavation for core trench of Dam Embankment/Spillway/Intake & Outlet Structure and Irrigation System upto a minimum depth of 35 ft in shingle gravel including removing of excavated material by machinery in 1.5 KM radius	M ³	14737.60	238.48	3,514,623
2.2	03-78-b	Excavation for core trench of Dam Embankment/Spillway/Intake & Outlet Structure and Irrigation System upto design depth in Soft Rock/Shale requiring 20% blasting i/c removing of material from outside of the structure area lead upto 1.5 KM	M ³	18422.00	488.71	9,003,016

2.3	03-78-c	Excavation for core trench of Dam Embankment/Spillway/Intake & Outlet Structure and Irrigation System upto design depth in Medium Hard Rock requiring 50% blasting i/c removing of material from outside of the structure area lead upto 1.5 KM	M ³	22106.40	776.30	17,161,198
2.4	03-78-d	Excavation for core trench of Dam Embankment/Spillway/Intake & Outlet Structure and Irrigation System upto design depth in Hard Rock requiring 75% blasting i/c removing of material from outside of the structure area lead upto 1.5 KM	M ³	18422.00	1185.53	21,839,834
2.5	06-05-f	Plain Cement Concrete including placing, compacting, finishing & curing (Ratio 1:2:4)	M ³	24379.14	8587.41	209,353,671
2.6	06-07-d-03	Reinforced cement concrete work as in dams, spillways, weirs, barrages, cross drainage works and other hydraulic structures using crushed stone aggregate(screening & washing) and coarse sand i/c costof all labour and material and all kinds of form works, moulds, shuttering lifting/pumping, curing, rendering and finishing the exposed surface, cast in situ/precast excluding the cost of steel reinforcement and labour for bending binding also excludig cost of additives which have to be paid separately. (1:2:4)	M ³	2797.46	9826.98	27,490,583
2.7	06-07-d-02	Reinforced cement concrete work as in dams, spillways, weirs, barrages, cross drainage works and other hydraulic structures using crushed stone aggregate(screening & washing) and coarse sand i/c costof all labour and material and all kinds of form works, moulds, shuttering lifting/pumping, curing, rendering and finishing the exposed surface, cast in situ/precast excluding the cost of steel reinforcement and labour for bending binding also excludig cost of additives which have to be paid separately. (1:1.5:3)	M3	6980.16	11061.58	77,211,598

2.8	06-08-b	Supply & fabricate M.S. reinforcement for cement concrete (Hot rolled deformed bars Grade 60)	Tonne	568.41	205215.09	116,646,309
2.9	06-05-i	Plain Cement Concrete including placing, compacting, finishing & curing (Ratio 1:4:8)	M3	806.68	6498.08	5,241,871
2.10	24-40	Supplying and Fixing PVC Water Stopper 8" wide 3/8" thick. Providing and fixing PVC water stopper 8" wide 3/8" thick in verticle (Wall/Column) or horizontal (Floor/Slab) expansion joint including cutting and jointing complete in all respects.	M	1310.00	556.83	729,447
2.11	16-63	Providing and Laying 3" thick (consolidated) asphalt macadam with liquid asphalt(cut backs) of approved grade with precoated bajri seal coat as specified.	M2	486.00	1359.05	660,498
2.12	19-26	Supplying stone and stone filling in GI wire crate and its sewing, excluding cost of crates	M3	25.00	2553.78	63,845
2.13	19-13-b-03	Provide & weave GI wire netting for wire crates 6"x6" mesh : 8 SWG wire	M2	100.00	610.74	61,074
2.14	14-144-a	Supplying and Fixing UPVC soil waste and vent pipe class B : 6" dia	M	969.22	3282.85	3,181,804
Total Cost (S.I)						492,159,371
Add Cost Factor for Dir Lower @ 1.08 (S.I)						39,372,750
Total Cost (S.I)						531,532,121
2.15	NSI	Drilling of 4" Dia bore hole for Consolidation and Grout Curtain.	RM	3073.17	4500.00	13,829,265
2.16	NSI	Providing And Filling Cement Slurry / Bentonite grout cutain through bore hore including presure test.	Bag	5627.00	1500.00	8,440,500
Total Cost (N.S.I)						22,269,765
Total Cost (S.I) and (N.S.I)						553801885.96

S.No	Item Code	Description	Unit			
				Quantity	Rate (Rs)	Amount (Rs)
1	2	3	4	5	6	7
Bill No. 3: INTAKE / OUTLET STRUCTURES						
3.1	03-78-a	Excavation for core trench of Dam Embankment/Spillway/Intake & Outlet Structure and Irrigation System upto a minimum depth of 35 ft in shingle gravel including removing of excavated material by machinery in 1.5 KM radius	M ³	749.60	238.48	178,765
3.2	03-78-d	Excavation for core trench of Dam Embankment/Spillway/Intake & Outlet Structure and Irrigation System upto design depth in Hard Rock requiring 75% blasting i/c removing of material from outside of the structure area lead upto 1.5 KM	M ³	7.00	1185.53	8,299
3.3	06-07-d-03	Reinforced cement concrete work as in dams, spillways, weirs, barrages, cross drainage works and other hydraulic structures using crushed stone aggregate(screening & washing) and coarse sand i/c costof all labour and material and all kinds of form works, moulds, shuttering lifting/pumping, curing, rendering and finishing the exposed surface, cast in situ/precast excluding the cost of steel reinforcement and labour for bending binding also excludig cost of additives which have to be paid separately. (1:2:4)	M ³	170.00	9826.98	1,670,587
3.4	06-08-b	Supply & fabricate M.S. reinforcement for cement concrete (Hot rolled deformed bars Grade 60)	Tonne	10.00	205215.09	2,052,151
3.5	06-05-i	Plain Cement Concrete including placing, compacting,finishing & curing (Ratio 1:4:8)	M ³	18.32	6498.08	119,045
3.6	06-05-f	Plain Cement Concrete including placing, compacting, finishing & curing (Ratio 1:2:4)	M ³	23.00	8587.41	197,510
3.7	03-67-c	Structural backfill using Common Material available at site.	M3	148.00	328.90	48,677
Total Cost (S.I)						4,275,033

Add Cost Factor for Dir Lower @ 1.08 (S.I)						342,003
Total Cost (S.I)						4,617,036
3.8	NSI	Providing lowering & laying into trenches and jointing cement concrete reinforced pressure pipe to correct alignment & grade including cutting of pipes where necessary cost of joining material & testing.	m	100.00	6400.00	640,000
3.9	NSI	Supply and Fix steel trash rack and Stop logs.	Sqm	3.00	50050.00	150,150
3.10	NSI	Providing and Placing Gate valve at outlet of conduit with all accessories.	Nos	1.00	632450.00	632,450
3.11	NSI	Providing and Placing 2 ft Dia Butterfly valve with all accessories.	Nos	1.00	650000.00	650,000
3.12	NSI	Providing and Placing 4 x 4 ft Control gate with all accessories.	Nos	1.00	400000.0	400,000
3.13	NSI	Steel Stairs	M2	1.00	300000.0	300,000
Total Cost (N.S.I)						2,772,600
Total Cost (S.I) and (N.S.I)						7389635.94
S.No	Item Code	Description	Unit			
				Quantity	Rate (Rs)	Amount (Rs)
1	2	3	4	5	6	7
Bill No. 4: IRRIGATION SYSTEM						
4: Main Channel and Distributary						
4.1	03-72-a	Earthwork by mechanical means in drains and irrigation channels in DRY soil dressed to designed section, grades profile/with excavated material, disposed off within 50 feet (15.2 m) lead and dressed as directed	M ³	20,964.00	52.67	1,104,173.88
4.2	03-78-a	Excavation for core trench of Dam Embankment/Spillway/Intake & Outlet Structure and Irrigation System upto a minimum depth of 35 ft in shingle gravel including removing of excavated material by machinery in 1.5 KM radius	M ³	83,852.00	238.48	19,997,024.96

4.3	06-05-f	Plain Cement Concrete including placing, compacting, finishing & curing (Ratio 1:2:4)	M ³	1,367.00	8,587.41	11,738,989.47
4.4	07-07-a-05	1st class brick work other than building upto 10 ft. height : Cement, sand mortar 1:6	M ³	7,102.10	9,491.24	67,407,735.60
4.5	11-09-a	Cement plaster 1:4 upto 20' height 3/8" thick	M ²	24,855.80	291.77	7,252,176.77
4.6	06-05-i	Plain Cement Concrete including placing, compacting, finishing & curing (Ratio 1:4:8)	M ³	2,927.95	6,498.08	19,026,053.34
4.7	03-67-c	Structural backfilling using common material available at site	M ³	29,053.20	328.90	9,555,597.48
4.8	06-07-d-03	Reinforced cement concrete work as in dams, spillways, weirs, barrages, cross drainage works and other hydraulic structures using crushed stone aggregate(screening & washing) and coarse sand i/c costof all labour and material and all kinds of form works, moulds, shuttering lifting/pumping, curing, rendering and finishing the exposed surface, cast in situ/precast excluding the cost of steel reinforcement and labour for bending binding also excludig cost of additives which have to be paid separately. (1:2:4)	m ³	362.70	9,826.98	3,564,245.65
4.9	06-08-c	Supply & fabricate M.S. reinforcement for cement concrete (Hot rolled deformed bars Grade 40)	Tonne	43.447	200,355.09	8,704,727.42
			Total (S.I)	Total		148350724.56
			Add Cost Factor for Dir Lower @ 1.08 (S.I)			11,868,057.96
			Grand Total			160218782.52
S.No	Item Code	Description	Unit			
				Quantity	Rate (Rs)	Amount (Rs)
1	2	3	4	5	6	7
Bill No. 4.1: IRRIGATION SYSTEM (Distribution Boxes - 14 Nos.)						

4.1.1	03-72-a	Earthwork by mechanical means in drains and irrigation channels in DRY soil dressed to designed section, grades profile/with excavated material, disposed off within 50 feet (15.2 m) lead and dressed as directed	m3	336.60	52.67	17,728.72
4.1.2	03-78-a	Excavation for core trench of Dam Embankment/Spillway/Intake & Outlet Structure and Irrigation System upto a minimum depth of 35 ft in shingle gravel including removing of excavated material by machinery in 1.5 KM radius	m3	1,326.60	238.48	316,367.57
4.1.3	03-67-c	Structural backfill using Common Material available at site.	m3	202.95	328.90	66,750.26
4.1.4	06-05-i	Plain Cement Concrete including placing, compacting, finishing & curing (Ratio 1:4:8)	m3	39.60	6,498.08	257,323.97
4.1.5	06-05-f	Plain Cement Concrete including placing, compacting, finishing & curing (Ratio 1:2:4)	m3	27.72	8,587.41	238,043.01
4.1.6	07-07-a-05	1st class brick work other than building upto 10 ft. height : Cement, sand mortar 1:6	m3	180.18	9,491.24	1,710,131.62
4.1.7	11-09-a	Cement plaster 1:4 upto 20' height 3/8" thick	m2	311.85	291.77	90,988.47
			Total (S.I)	Total		2697333.62
			Add Cost Factor for Dir Lower @ 1.08 (S.I)			215,786.69
			Grand Total			2913120.31
S.No	Item Code	Description	Unit			
				Quantity	Rate (Rs)	Amount (Rs)
1	2	3	4	5	6	7
Bill No. 4.2: IRRIGATION SYSTEM (Fall Structures 46 Nos.)						
4.2.1	03-72-a	Earthwork by mechanical means in drains and irrigation channels in DRY soil dressed to designed section, grades profile/with excavated material, disposed off within 50 feet (15.2 m) lead and dressed as directed	m ³	1,232.00	52.67	64,889.44

4.2.2	03-78-a	Excavation for core trench of Dam Embankment/Spillway/Intake & Outlet Structure and Irrigation System upto a minimum depth of 35 ft in shingle gravel including removing of excavated material by machinery in 1.5 KM radius	m ³	4,866.40	238.48	1,160,539.07
4.2.3	03-67-c	Structural backfill using Common Material available at site.	m ³	1,817.20	328.90	597,677.08
4.2.4	06-05-i	Plain Cement Concrete including placing, compacting, finishing & curing (Ratio 1:4:8)	m ³	215.60	6,498.08	1,400,986.05
4.2.5	06-05-f	Plain Cement Concrete including placing, compacting, finishing & curing (Ratio 1:2:4)	m ³	169.40	8,587.41	1,454,707.25
4.2.6	07-07-a-05	1st class brick work other than building upto 10 ft. height : Cement, sand mortar 1:6	m ³	1,894.20	9,491.24	17,978,306.81
4.2.7	11-09-a	Cement plaster 1:4 upto 20' height 3/8" thick	m ²	1,324.40	291.77	386,420.19
			Total (S.I)	Total		23043525.89
			Add Cost Factor for Dir Lower @ 1.08 (S.I)			1,843,482.07
			Total Cost (S.I)			24,887,007.96
S.No	Item Code	Description	Unit			
				Quantity	Rate (Rs)	Amount (Rs)
1	2	3	4	5	6	7
Bill No. 4.3 IRRIGATION SYSTEM (Chute Structures 10 Nos.)						
4.3.1	03-72-a	Earthwork by mechanical means in drains and irrigation channels in DRY soil dressed to designed section, grades profile/with excavated material, disposed off within 50 feet (15.2 m) lead and dressed as directed	M ³	79.20	52.67	4,171.46
4.3.2	03-78-a	Excavation for core trench of Dam Embankment/Spillway/Intake & Outlet Structure and Irrigation System upto a minimum depth of 35 ft in shingle gravel including removing of excavated material by machinery in 1.5 KM radius	M ³	316.80	238.48	75,550.46
4.3.3	06-05-f	Plain Cement Concrete including placing, compacting, finishing & curing (Ratio 1:2:4)	M ³	19.80	8,587.10	170,024.58

4.3.4	06-05-i	Plain Cement Concrete including placing, compacting, finishing & curing (Ratio 1:4:8)	M ³	26.40	6,498.08	171,549.31
4.3.5	07-07-a-05	1st class brick work other than building upto 10 ft. height : Cement, sand mortar 1:6	M ³	118.80	9,491.24	1,127,559.31
4.3.6	11-09-a	Cement plaster 1:4 upto 20' height 3/8" thick	M ²	158.40	291.77	46,216.37
4.3.7	03-67-c	Structural backfill using Common Material available at site.	M ³	118.80	328.90	39,073.32
			Total (S.I)	Total		1634144.82
			Add Cost Factor for Dir Lower @ 1.08 (S.I)			130,731.59
			Grand Total			1764876.41
S.No	Item Code	Description	Unit			
				Quantity	Rate (Rs)	Amount (Rs)
1	2	3	4	5	6	7
Bill No. 4.4: IRRIGATION SYSTEM (Aqueduct Structures 08 Nos.)						
4.4.1	03-78-a	Excavation for core trench of Dam Embankment/Spillway/Intake & Outlet Structure and Irrigation System upto a minimum depth of 35 ft in shingle gravel including removing of excavated material by machinery in 1.5 KM radius	M ³	13,200.00	238.48	3,147,936.00
4.4.2	06-05-i	Plain Cement Concrete including placing, compacting, finishing & curing (Ratio 1:4:8)	M ³	39.60	6,498.08	257,323.97
4.4.3	06-07-d-03	Reinforced cement concrete work as in dams, spillways, weirs, barrages, cross drainage works and other hydraulic structures using crushed stone aggregate(screening & washing) and coarse sand i/c costof all labour and material and all kinds of form works, moulds, shuttering lifting/pumping, curing, rendering and finishing the exposed surface, cast in situ/precast excluding the cost of steel reinforcement and labour for bending binding also excludig cost of additives which have to be paid separately. (1:2:4)	M ³	809.60	9,826.98	7,955,923.01
4.4.4	06-08-c	Supply & fabricate M.S. reinforcement for cement concrete (Hot rolled deformed bars Grade 40)	Tonne	108.636	200,355.09	21,765,775.56
4.4.5	03-67-c	Structural Backfilling using Common Material	M ³	576.00	328.90	189,446.40

4.4.6	24-40	Supplying and Fixing PVC Water Stopper 8" wide 3/8" thick. Providing and fixing PVC water stopper 8" wide 3/8" thick in verticle (Wall/Column) or horizontal (Floor/Slab) expansion joint including cutting and jointing complete in all respects.	M	862.40	556.83	480,210.19
4.4.7	19-27	Providing and Laying stone pitching with hammer dressed stones on surface, laid in courses	M ³	2,393.60	3,561.36	8,524,471.30
4.4.8	19-31-a	Grouting stone pitching or apron etc, in :Cement, sand mortar(1:3)	M ²	3,924.80	886.69	3,480,080.91
4.4.9	19-29-a	Providing and Laying stone or spawl filling : On slope	M ³	1,196.80	2,172.74	2,600,335.23
4.4.10	19-26	Supplying stone and stone filling in GI wire crate, its sewing and laying, excluding cost of crates	M ³	2,692.80	2,553.78	6,876,818.78
4.4.11	19-13-c-03	Providing & weaving GI wire netting for wire crates 4"x4" mesh : 8 SWG wire	M ²	13,244.00	694.12	9,192,925.28
			Total			64471246.63
			Add Cost Factor for Dir Lower @ 1.08 (S.I)			5,157,699.73
			Total Cost (S.I)			69,628,946.36
4.4.12	NSI	Polythine sheet 0.2 mm thick laid over two coats of bitumen using 1.66 kg. bitumen hot per sqm	M ²	190.080	445.84	84,745.27
			Total Cost (N.S.I)			84745.2672
			Grand Total Cost (S.I) and (N.S.I)			69713691.63
S.No	Item Code	Description	Unit			
				Quantity	Rate (Rs)	Amount (Rs)
1	2	3	4	5	6	7
Bill No. 4.5: IRRIGATION SYSTEM (Syphon Structures 02 Nos.)						
4.5.1	03-78-a	Excavation for core trench of Dam Embankment/Spillway/Intake & Outlet Structure and Irrigation System upto a minimum depth of 35 ft in shingle gravel including removing of excavated material by machinery in 1.5 KM radius	M ³	1,738.20	238.48	414,525.94

4.5.2	06-05-i	Plain Cement Concrete including placing, compacting, finishing & curing (Ratio 1:4:8)	M ³	60.50	6,498.08	393,133.84
4.5.3	06-05-f	Plain Cement Concrete including placing, compacting, finishing & curing (Ratio 1:2:4)	M ³	3.30	8,587.41	28,338.45
4.5.4	07-07-a-05	1st class brick work other than building upto 10 ft. height : Cement, sand mortar 1:6	M ³	28.60	9,491.24	271,449.46
4.5.5	11-09-a	Cement plaster 1:4 upto 20' height 3/8" thick	M ²	36.52	291.77	10,655.44
4.5.6	03-67-c	Structural Backfilling using common material available at site.	M ³	174.00	328.90	57,228.60
4.5.7	19-27	Providing and Laying stone pitching with hammer dressed stones on surface, laid in courses	M ³	1,045.00	3,561.36	3,721,621.20
4.5.8	19-31-a	Grouting stone pitching or apron etc, in : Cement, sand mortar(1:3)	M ²	1,210.00	886.69	1,072,894.90
Total Cost (S.I)						5,969,847.83
Add Cost Factor for Dir Lower @ 1.08 (S.I)						477,587.83
Total Cost (S.I)						6,447,435.66
4.5.9	NSI	Providing lowering & laying into trenches and jointing cement concrete reinforced pressure pipe in syphon tube to correct alignment & grade including cutting of pipes where necessary cost of joining material & testing.	M	374.00	6,295.52	2,354,524.48
Total Cost (N.S.I)						2354524.48
Grand Total Cost (S.I) and (N.S.I)						8801960.14
S.No	Item Code	Description	Unit			
				Quantity	Rate (Rs)	Amount (Rs)
1	2	3	4	5	6	7
Bill No. 5: BUILDING / CHOWKIDAR HUT						
5.1	03-25-d	Excavation in foundation of building, bridges etc complete : in shingle/gravel	M ³	141.58	340.56	48216.48
5.2	06-03-a	Cement Concrete (brick/stone ballast, 1.5" to 2"/nullah shingle well graded and cleaned) in foundation & plinth (Ratio 1:3:6)	M ³	14.51	6577.73	95442.86
5.3	07-04-a-03	1st class brick work in foundation and plinth in Cement, sand mortar 1:4	M ³	22.21	9392.75	208612.98

5.4	06-26-a-02	Damp proof course of cem. conc. 1:2:4 including bitumen coat, 1 layer polythene & 1 coat bitumen (2" thick)	M ²	19.55	950.25	18577.39
5.5	07-05-a-03	1st class brick work in ground floor Cement, sand mortar 1:4.	M ³	64.59	10101.12	652431.34
5.6	06-07-a-03	RCC in roof slab, beam, column & other structural members, insitu or precast. (1:2:4)	M ³	36.26	10134.75	367486.04
5.7	06-08-c	Supply & fabricate M.S. reinforcement for cement concrete (Hot rolled deformed bars Grade 40)	Tonne	6.00	200355.09	1202130.54
5.8	12-08-b	First class deodar wood wrought joinery in doors and windows etc. complete : 1-3/4" thick	M ²	11.61	17191.38	199591.92
5.9	10-15-h	Provide & lay topping of concrete 1:2:4, including surface finishing & dividing in panels : 3" thick	M ²	73.76	1177.09	86822.16
5.10	11-12-b	Cement plaster 1:6, upto 20' height 1/2" thick	M ²	292.64	291.78	85386.50
5.11	13-05-a	French polishing complete: On new work	M ²	16.49	959.96	15829.74
5.12	11-21-a-03	Distempering New surface : Three coats	M ²	205.92	106.89	22010.79
5.13	03-18-d	Filling, watering and ramming earth under floor with earth excavated from outside lead upto 30m	M ³	20.40	85.74	1749.10
5.14	11.-36	P/F Ceramic Exterior Finish Tiles over 1/2" cement sand mortar 1:1 including curing complete	M ²	26.01	2368.32	61600.00
5.15	25-45-a	Supplying and Fixing 18 SWG MS Sheet Door with angle iron frame (1.5"x1.5"x1/8"), bolt, hinges, paint etc complete	M ²	1.49	8280.25	12337.57
5.16	09-01	First class tile roofing including earth, mud plaster, gobri leeping, cement plaster etc complete	M ²	53.88	2393.98	128987.64
5.17	12-65-d-02	Supply and Fixing aluminium door/window, Sliding Door Economy model (1.20 mm gauge) 4" section	M ²	13.38	8335.55	111529.66
5.18	14-03-a	Providing and fitting glazed earthenware water closet (WC), squatter type (orisa pattern) combined with foot rest. complete in all respects : White	No	2.00	2200.70	4401.40
S.No	Item Code	Description	Unit			
				Quantity	Rate (Rs)	Amount (Rs)
1	2	3	4	5	6	7

5.19	14-05-a-01	Providing and Fixing glazed earthen ware wash hand basin (WHB) complete size 56x40 cm (22"x16"), including bracket set, waste coupling, complete in all respects: White with pedestal (Best Quality)	No	2.00	9091.80	18183.60
5.20	14-18-a	Providing and fixing best quality 5mm glass shelf (60 x 13) cm 24"x5" complete: With chromium plated brackets & railing	No	2.00	1184.03	2368.06
5.21	14-17-a	Providing and fixing best quality looking glass 5 mm thick neatly fitted on masonry wall etc. as per instruction of Engineer In-charge complete. Mirror 60 x 45 cm (24"x18") size	No	2.00	2521.71	5043.42
5.22	14-16-a	Providing and Fixing chromium plated (CP) towel rail complete: 60 cm (24") long and 2 cm (3/4") dia	No	2.00	1025.19	2050.38
5.23	14-15	Providing and Fixing CP (chromium plated) toilet paper holder complete	No	2.00	802.84	1605.68
5.24	14-13	Providing and Fixing glazed earthenware soap dish complete: White	No	2.00	829.33	1658.66
5.25	14-10-a	Providing and Fixing glazed earthen ware low down flushing cistern 3 gallons (13.63 Liters) capacity including bracket set, copper connection, etc. complete in all respects: White	No	2.00	3256.98	6513.96
5.26	14-06-a	Providing and Fixing stainless steel sink with drain board size (120 x 60 cm) 48"x24", including set of brackets, waste pipe etc - (Best Quality)	No	1.00	6463.22	6463.22
5.27	14-27-a	Providing and fixing chorimum plated (CP) mixing valve for wash hand basin (WHB), sink or shower of approved (Best) quality	No	2.00	2716.83	5433.66
5.28	14-26-b	Providing and fixing chorimum plated (CP) shower rose : Size 3/4"x6" (20mm x 150 mm) (Best Quality)	No	2.00	2690.10	5380.20
5.29	14-32-b	Providing and Fixing 'P' trap of approved quality including GI grating & PCC chamber 4" (100 mm) glazed	No	5.00	442.70	2213.50
5.30	14-55-d	Providing and Fixing GI pipe & including specials complete 1" dia (light)	Rm	13.71	581.93	7978.26
5.31	14-55-e	Providing and Fixing GI pipe & including specials complete: 3/4" dia (light)	Rm	27.89	461.09	12859.80

5.32	14-55-f	Providing and Fixing GI pipe & including specials complete: 1/2" dia (light)	Rm	27.89	350.56	9777.12
5.33	14-61-d	Providing and Fixing approved best quality cooking range with 3 burners, oven, hot case & roastery	No	1.00	24871.68	24871.68
5.34	14-69-a-01	Providing and fixing Fibre Glass , corrosion resistant, UV stablized WaterTank : 300 gallons	No	1.00	12546.23	12546.23
5.35	23-10	Septic Tank (int.Size: 7'x2'x5') complete.	No	1.00	20972.52	20972.52
5.36	23-11	Soakage Pit (6'dia x 15' deep) complete	No	1.00	18380.59	18380.59
5.37	23-01-a	Providing and laying R.C.C. pipe, moulded with cement concrete 1:1-1/2:3, with spigot, socket or collar joint, etc. including cost of reinforcement, conforming to B.S. 5911: Part-I, 1981 Class "L" including carriage, lowering in trenches to correct alignment and grade, jointing, cutting pipe where necessary, finishing and testing, etc. complete:- 4" dia:	Rm	0.305	747.68	228.04
5.38	14-37-a	Supply and Fixing cast iron (CI) manhole cover with frame etc (Heavy Type) of approved quality complete: 12" (300 mm) dia	No	5.00	1926.63	9633.15
						174168.73
S.No	Item Code	Description	Unit			
				Quantity	Rate (Rs)	Amount (Rs)
1	2	3	4	5	6	7
5.39	14-28-a	Providing and fixing gun metal peet / gate valve (screwed) 32 mm(1-1/4") dia of approved quality.	No	5.00	1888.20	9441.00
5.40	14-39-a	Providing and Fixing brass stop/bib cock of approved quality: 1/2" (13 mm) dia	No	5.00	595.20	2976.00
Bill No. 5: BUILDING / CHOWKIDAR HUT						
Electrification						
5.41	15-02-a-03	Supply and Erection PVC pipe for wiring purpose complete On surface including clamps etc: 1" i/d	Rm	30.48	122.16	3723.44
5.42	15-50	Wiring of light/fan/call-bell point in 3/0.029" PVC insulated bare cable in PVC pipe recessed	No	20.00	1379.79	27595.80

5.43	15-51	Wiring of 2/3-pin 5-Amp. plug point in 3/0.029" PVC insulated bare cable in PVC pipe recessed	No	10.00	570.25	5702.50
5.44	15-69-a	Supply and Erection best quality exhaust fan complete with shutter & regulator : 12"sweep	No	3.00	2457.90	7373.70
5.45	15-68-c	Supply and Erection best quality AC ceiling fan complete with GI rod, canopy, blades & regulator : 56" sweep	No	3.00	4439.25	13317.75
5.46	15-75-b	Supply and Erection cubical type factory fabricated floor/wall mounting steel main board comp. : Recessed	No	1.00	2843.59	2843.59
5.47	15-64-b	Supply and Erection garden-light fitting with holder and 160 Wmercury blended lamp & choke : 19" dia	No	5.00	810.90	4054.50
5.48	15-24-b	Supply and Erection tube light, including rod, choke etc completeSingle rod (40 watts) with 1 choke & 1 starter	No	10.00	1497.15	14971.50
5.49	15-47-c	Wiring of main & sub-main in 2 single core PVC insulated & sheathed cable : 7/0.044"	Rm	76.20	683.00	52044.60
5.50	14-80-a	Supply and fixing of 2.0 HP Monoblock water pump 1.5"x1.25" 3 stage model DE-S3 (Deen Pump) single phase for 150 ft head with all accessories	No	1.00	27886.41	27886.41
5.51	08-03-d-03	Random rubble masonry in ground floor in cement,sand mortar : Ratio 1:6	Cum	124.31	7418.19	922155.20
Total						4591391.83
Add Cost Factor for Dir Lower @ 1.08 (S.I)						367,311.35
Total Cost (S.I)						4,958,703.17
Total Cost (N.S.I)						0.00
Grand Total						4958703.17
S.No	Item Code	Description	Unit			
				Quantity	Rate (Rs)	Amount (Rs)
1	2	3	4	5	6	7
Bill No. 6: COST ESTIMATE OF ROAD STRUCTURE						
6.1	03-78-b	Excavation for core trench of Dam Embankment/Spillway/Intake & Outlet Structure and Irrigation System upto design depth in Soft Rock/Shale requiring 20% blasting i/c removing of material from outside of the structure area lead upto 1.5 KM	M ³	3755.75	488.71	1,835,473
6.2	16-04-a	Granular Sub Base Course using Pit Run Gravel	M ³	1274.27	1488.77	1,897,088

6.3	07-04-a-05	1st class brick work in foundation and plinth in Cement, sand mortar 1:6	M ³	82.60	9038.75	746,601
6.4	06-07-d-03	Reinforced cement concrete work as in dams, spillways, weirs, barrages, cross drainage works and other hydraulic structures using crushed stone aggregate(screening & washing) and coarse sand i/c costof all labour and material and all kinds of form works, moulds, shuttering lifting/pumping, curing, rendering and finishing the exposed surface, cast in situ/precast excluding the cost of steel reinforcement and labour for bending binding also excludig cost of additives which have to be paid separately. (1:2:4)	M ³	27.68	9826.98	272,011
6.5	06-05-f	Plain Cement Concrete including placing, compacting, finishing & curing (Ratio 1:2:4)	M ³	32.68	8587.41	280,594
6.6	06-08-c	Supply & fabricate M.S. reinforcement for cement concrete (Hot rolled deformed bars Grade 40)	Tonne	1.25	200355.09	250,444
6.7	03 -70-b	Formation of Embankment from Roadway Excavation in Rock Material requiring blasting and compaction Modified AASHTO 95% of embankment by power roller.	m ³	6371.33	915.87	5,835,305
6.8	03-70-c	Formation of Embankment from Borrow Excavation in Common Material including compaction Modified AASHTO 90% by power roller.	m ³	3822.80	628.40	2,402,244
6.9	16-67	Formation of shoulder with permeable material Passing less than 7 % from 200 seive and P.I less than 4 as specified.	m ³	424.76	982.55	417,343
6.10	16-05-a	Aggregate base course	m ³	849.51	2837.05	2,410,102
6.11	16-09-a	Bitumenous prime coat	m ²	849.51	195.29	165,901
6.12	16-14-b	Asphaltic Wearing Course (Asphalt Batch Plant Hot Mixed) i/c Transportation and Finishing complete	m ³	212.38	19306.18	4,100,247
6.13	16-25-c-03	Supply & Fixing of high Quality) 360 d Glass Road studs (4" Dia) Including fixing at site in all respect	each	240.00	629.30	151,032
6.14	16-75-a	Pavement marking in reflective thermoplast paint with glass beads for line 15 cm width.	m	925.00	105.29	97,393
			Total		Total	20861776.87

Add Cost Factor for Dir Lower @ 1.08 (S.I)			1,668,942.15
Total Cost (S.I)			22,530,719.02
Total Cost (N.S.I)			0.00
Grand Total			22530719.02

BD-08

Appendix-D to Bid

BILL OF QUANTITIES

C. DAYWORK SCHEDULE

General

- Reference is made to Sub-Clause 52.4 of the General Conditions of Contract Part-I. Work shall not be executed on a day work 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 to the Bid Price.

Daywork Labour

- In calculating payments due to the Contractor for the execution of Daywork, the actual time of classes of labour directly doing the Daywork ordered by the Engineer and for which they are competent to perform will be measured excluding meal breaks and rest periods. The time of gangers (charge hands) actually doing work with the gang will also be measured but not the time of foreman or other supervisory personnel.
- The Contractor shall be entitled to payment in respect of the total time that labour is employed on Daywork, calculated at the basic rates entered by him in the Schedule of Daywork Rates for labour together with an additional percentage, payment on basic rates representing the Contractor's profit, overheads, etc., as described below:
 - the basic rates for labour shall cover all direct 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 Pakistan law. The basic rates will be payable in local currency only; and
 - the additional percentage payment to be quoted by the Bidder and applied to costs incurred under (a) above shall be deemed to cover 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; the use and repair of stagings , scaffolding, workshops and stores, portable power tools, manual plant and tools; supervision by the Contractor's staff, foremen and other supervisory personnel; and charges incidental to the foregoing.

SCHEDULE OF DAYWORK RATES**I. Labour**

Item No.	Description	Unit	Nominal Quantity	Rate (Rs) in Figure	Rate (Rs) in Words	Extended Amount (Rs.)
1	2	3	4	5	6	7
D101	Ganger	Hr	500			
D102	Labourer	Hr	5,000			
D103	Brick layer	Hr	500			
D104	Mason	Hr	500			
D105	Carpenter	Hr	500			
D106	Steel work Erector	Hr	500			
	-----etc-----	Hr	500			
D113	Driver for vehicle up to 10 tons	Hr	1,000			
D114	Operator for excavator, dragline, shovel or crane	Hr	500			
D115	Operator for tractor, (tracked) with dozer blade or ripper	Hr	500			
D122	Sub Total					
	Allow _____ percent of subtotal for Contractor's overhead, profit, etc, in accordance with Paragraph 3(b) of Daywork Schedule _____					
	Total for Daywork: Labour : _____					
	(Carried forward to Daywork Summary)					

BD-10

Appendix-D to Bid**Daywork Material**

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 percentage addition to labour costs as detailed heretofore), at the basic rates entered by him in the Schedule of Daywork Rates for 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 Sub-Para(a) above; and
 - c) the cost of hauling materials used 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 Constructional Plant in this Schedule.

SCHEDULE OF DAYWORK RATES**II. Materials**

Item No.	Description	Unit	Nominal Quantity	Rate (Rs) in Figure	Rate (Rs) in Words	Extended Amount (Rs.)
1	2	3	4	5	6	7
D201	Cement, ordinary Portland or equivalent in bags	M.Ton	200			
D202	Mild Steel reinforcing bar up to 16mm diameter to BS 4449 or equivalent	M.Ton	100			
D203	Fine aggregate for concrete as specified in Clause 5.5.1 of Technical Specification	Cu.M	1,000			
D222	Coarse aggregate for concrete as specified in Clause 5.5.2 of Technical Specification	Cu.M	1,000			
	Sub Total					
	Allow _____ percent of subtotal for Contractor's overhead, profit, etc., in accordance with Paragraph 4(b) of Daywork Schedule _____					
	Total for Daywork: Materials _____					
	(Carried forward to Daywork Summary)					

Daywork Constructional Plant

5. The Contractor shall be entitled to payments in respect of constructional plant already on Site and employed on Daywork at the basic rental rates entered by him in the Schedule of Daywork Rates for constructional plant. The said rates shall be deemed to include complete allowance for depreciation, interest, indemnity and insurance, repairs, maintenance, supplies, fuel, lubricants, and other consumables, and all overhead, profit and administrative costs related to the use of such equipment. The cost of drivers, operators and assistants will be paid for separately as described under the section on Daywork Labour.
6. In calculating the payment due to the Contractor for constructional plant 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 constructional plant was located when ordered by the Engineer to be employed on Daywork and the time for return journey thereto shall be included for payment.
7. The basic rental rates for constructional plant employed on Daywork shall be stated in Pakistani Rupees.

SCHEDULE OF DAYWORK RATES**III. Constructional Plant**

Item No.	Description	Unit	Nominal Quantity	Rate (Rs.) in Figure	Rate (Rs.) in Words	Extended Amount (Rs.)
1	2	3	4		5	6
D301	Excavator ,face shovel or dragline: 1. Up-to and including 1 Cu.M. 2. Over 1 Cu.M to 2 Cu. M. 3. Over 2 Cu. M	Hr Hr Hr	500 400 100			
D302	Tractor (tracked) including bull or angle dozer: 1. Up-to and including 150 HP 2. Over 150 to 200 HP 3. Over 200 to 250 HP	Hr Hr Hr	500 400 200			
D303	Tractor with ripper: 1. Up-to and including 200 HP 2. Over 200 to 250 HP	Hr Hr	400 200			
	Total for Daywork: Constructional Plant _____ (Carried forward to Daywork Summary)					

DAYWORK**Summary (Daywork)**

		Amount (Rs.)
(I)	Total for Daywork: Labour	_____
(II)	Total for Daywork : Materials	_____
(III)	Total for Daywork: Constructional Plant	_____
Total for Daywork		_____
(Carried forward to Summary Page of Bill of Quantities)		

BE-1

Appendix-E to Bid

PROPOSED CONSTRUCTION SCHEDULE

Pursuant to Sub-Clause 43.1 of the General Conditions of Contract, the Works shall be completed on or before the date stated in Appendix-A to Bid. The Bidder shall provide as Appendix-E to Bid, the Construction Schedule in the bar chart (CPM, PERT or any other to be specified herein) showing the sequence of work items and the period of time during which he proposes to complete each work item in such a manner that his proposed programme for completion of the whole of the Works and parts of the Works may meet Employer's completion targets in days noted below and counted from the date of receipt of Engineer's Notice to Commence (Attach sheets as required for the specified form of Construction Schedule):

Description	Time for Completion
a) Dam Embankment	_____ days
b) Spillway & Spill Channel	_____ days
c) Intake & Outlet Works	_____ days
d) Irrigation System & appurtenant structures	_____ days
e) Access Road	_____ days
f) Building / Chowkidar Hut	_____ days
g) Diversion Bund & Diversion Channel	_____ days

BF-1

Appendix-F to Bid

METHOD OF PERFORMING THE WORK

[The Bidder is required to submit a narrative outlining the method of performing the Work. The narrative should indicate in detail and include but not be limited to:

1. Organization Chart indicating head office and field office personnel involved in management and supervision, engineering, equipment maintenance and purchasing.
2. Mobilization in Pakistan, the type of facilities including personnel accommodation, office accommodation, provision for maintenance and for storage, communications, security and other services to be used.
3. The method of executing the Works, the procedures for installation of equipment and machinery and transportation of equipment and materials to the site.]

BG-1

Appendix-G to Bid

LIST OF MAJOR EQUIPMENT – RELATED ITEMS

[The Bidder will provide on Sheet 2 of this Appendix a list of all major equipment and related items, under separate heading for items owned, to be purchased or to be arranged on lease by him to carry out the Works. The information shall include make, type, capacity, and anticipated period of utilization for all equipment which shall be in sufficient detail to demonstrate fully that the equipment will meet all requirements of the Specifications.]

LIST OF MAJOR EQUIPMENT

Owned Purchased or Leased	Description of Unit (Make, Model, Year)	Capacity HP Rating	Condition	Present Location or Source	Date of Delivery at Site	Period of Work on Project
1	2	3	4	5	6	7
a. Owned						
b. To be Purchased						
c. To be arranged on Lease						

BH-1

Appendix-H to Bid

CONSTRUCTION CAMP AND HOUSING FACILITIES

The Contractor in accordance with Clause 34 of the Conditions of Contract shall provide description of his construction camp's facilities and staff housing requirements.

The Contractor shall be responsible for pumps, electrical power, water and electrical distribution systems, and sewerage system including all fittings, pipes and other items necessary for servicing the Contractor's construction camp.

The Bidder shall list or explain his plans for providing these facilities for the service of the Contract as follows:

1. Site Preparation (clearing, land preparation, etc.).
2. Provision of Services.
 - a) Power (expected power load, etc.).
 - b) Water (required amount and system proposed).
 - c) Sanitation (sewage disposal system, etc.).
3. Construction of Facilities
 - a) Contractor's Office. Workshop and Work Areas (areas required and proposed layout, type of construction of buildings, etc.).
 - b) Warehouses and Storage Areas (area required, type of construction and layout).
 - c) Housing and Staff Facilities (Plans for housing for proposed staff, layout, type of construction, etc.).
4. Construction Equipment Assembly and Preparation (detailed plans for carrying out this activity).
5. Other Items Proposed (Security services, etc.).

BI-1

Appendix-I to Bid

LIST OF SUBCONTRACTORS

I/We intend to subcontract the following parts of the Work to subcontractors. In my/our opinion, the subcontractors named hereunder are reliable and competent to perform that part of the work for which each is listed.

Enclosed are documentation outlining experience of subcontractors, the curriculum vitae and experience of their key personnel who will be assigned to the Contract, equipment to be supplied by them, size, location and type of contracts carried out in the past.

Part of Works (Give Details)	Subcontractor (With Complete Address)
1	2

BJ-1

Appendix-J to Bid

ESTIMATED PROGRESS PAYMENTS

Bidder's estimate of the value of work which would be executed by him during each of the periods stated below, based on his Programme of the Works and the Rates in the Bill of Quantities, expressed in thousands of Pakistani Rupees:

Quarter/ Year/ Period	Amounts (1,000 Rs.)
1 st Quarter	
2 nd Quarter	
3 rd Quarter	
4 th Quarter	
5 th Quarter	
6 th Quarter	
7 th Quarter	
8 th Quarter	
Bid Price	

BK-1

Appendix-K to Bid

ORGANIZATION CHART

FOR THE

SUPERVISORY STAFF AND LABOUR

(INTEGRITY PACT)

**DECLARATION OF FEES, COMMISSION AND BROKERAGE ETC.
PAYABLE BY THE SUPPLIERS OF GOODS, SERVICES & WORKS IN
CONTRACTS WORTH RS. 10.00 MILLION OR MORE**

Contract No. _____ Dated _____

Contract Value: _____

Contract Title: _____

..... [name of Supplier] hereby declares that it has not obtained or induced the procurement of any contract, right, interest, privilege or other obligation or benefit from Government of Pakistan (GoP) or any administrative subdivision or agency thereof or any other entity owned or controlled by GoP through any corrupt business practice.

Without limiting the generality of the foregoing, [name of Supplier] represents and warrants that it has fully declared the brokerage, commission, fees etc. paid or payable to anyone and not given or agreed to give and shall not give or agree to give to anyone within or outside Pakistan either directly or indirectly through any natural or juridical person, including its affiliate, agent, associate, broker, consultant, director, promoter, shareholder, sponsor or subsidiary, any commission, gratification, bribe, finder’s fee or kickback, whether described as consultation fee or otherwise, with the object of obtaining or inducing the procurement of a contract, right, interest, privilege or other obligation or benefit in whatsoever form from GoP, except that which has been expressly declared pursuant hereto.

[name of Supplier] certifies that it has made and will make full disclosure of all agreements and arrangements with all persons in respect of or related to the transaction with GoP and has not taken any action or will not take any action to circumvent the above declaration, representation or warranty.

[name of Supplier] accepts full responsibility and strict liability for making any false declaration, not making full disclosure, misrepresenting facts or taking any action likely to defeat the purpose of this declaration, representation and warranty. It agrees that any contract, right, interest, privilege or other obligation or benefit obtained or procured as aforesaid shall, without prejudice to any other rights and remedies available to GoP under any law, contract or other instrument, be voidable at the option of GoP.

Notwithstanding any rights and remedies exercised by GoP in this regard, [name of Supplier] agrees to indemnify GoP for any loss or damage incurred by it on account of its corrupt business practices and further pay compensation to GoP in an amount equivalent to ten time the sum of any commission, gratification, bribe, finder's fee or kickback given by [name of Supplier] as aforesaid for the purpose of obtaining or inducing the procurement of any contract, right, interest, privilege or other obligation or benefit in whatsoever form from GoP.

Name of Employer:

Name of Contractor/Supplier:

Signature:

Signature:

[Seal]

[Seal]

FORMS

BID SECURITY

PERFORMANCE SECURITY

CONTRACT AGREEMENT

MOBILIZATION ADVANCE

GUARANTEE/BOND

BID SECURITY
(BANK GUARANTEE)

Security Executed on _____

(Date)

Name of Surety (Bank) with Address: _____

(Scheduled Bank in Pakistan)

Name of Principal (Bidder) with Address _____

Penal Sum of Security Rupees _____ (Rs. _____)

Bid Reference No. _____

KNOW ALL MEN BY THESE PRESENTS, that in pursuance of the terms of the Bid and at the request of the said Principal (Bidder) we, the Surety above named, are held and firmly bound unto _____.

(hereinafter called the 'Employer') in the sum stated above for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Bidder has submitted the accompanying Bid dated _____ for Bid No. _____ for _____ (Particulars of Bid) to the said Employer; and

WHEREAS, the Employer has required as a condition for considering said Bid that the Bidder furnishes a Bid Security in the above said sum from a Scheduled Bank in Pakistan or from a foreign bank duly counter-guaranteed by a Scheduled Bank in Pakistan, to the Employer, conditioned as under:

- (1) that the Bid Security shall remain in force up to and including the date 28 days after the deadline for validity of bids as stated in the Instructions to Bidders or as it may be extended by the Employer, notice of which extension(s) to the Surety is hereby waived;
- (2) that the Bid Security of unsuccessful Bidders will be returned by the Employer after expiry of its validity or upon signing of the Contract Agreement; and
- (3) that in the event of failure of the successful Bidder to execute the proposed Contract Agreement for such work and furnish the required Performance Security, the entire said sum be paid immediately to the said Employer pursuant to Clause 15.6 of the Instruction to Bidders for the successful Bidder's failure to perform.

NOW THEREFORE, if the successful Bidder shall, within the period specified therefor, on the prescribed form presented to him for signature enter into a formal Contract with the said Employer in accordance with his Bid as accepted and furnish within twenty eight (28) days of his being requested to do so, a Performance Security with good and sufficient surety, as may be required, upon the form prescribed by the said Employer for the faithful performance and proper fulfilment of the said Contract or in the event of non-withdrawal of the said Bid within the time specified for its validity then this obligation shall be void and of no effect, but otherwise to remain in full force and effect.

PROVIDED THAT the Surety shall forthwith pay the Employer the said sum upon first written demand of the Employer (without cavil or argument) and without requiring the Employer to prove or to show grounds or reasons for such demand, notice of which shall be sent by the Employer by registered post duly addressed to the Surety at its address given above.

PROVIDED ALSO THAT the Employer shall be the sole and final judge for deciding whether the Principal (Bidder) has duly performed his obligations to sign the Contract Agreement and to furnish the requisite Performance Security within the time stated above, or has defaulted in fulfilling said requirements and the Surety shall pay without objection the said sum upon demand from the Employer forthwith and without any reference to the Principal (Bidder) or any other person.

IN WITNESS WHEREOF, the above bounden Surety has executed the instrument under its seal on the date indicated above, the name and seal of the Surety being hereto affixed and these presents duly signed by its undersigned representative pursuant to authority of its governing body.

	SURETY (Bank)
WITNESS:	Signature
1.	Name
	Title
Corporate Secretary (Seal)	Corporate Guarantor (Seal)
2.	

Name, Title & Address	

**FORM OF PERFORMANCE SECURITY
(BANK GUARANTEE)**

Guarantee No. _____

Executed on _____

Expiry date _____

[Letter by the Guarantor to the Employer]

Name of Guarantor (Bank) with address: _____

(Scheduled Bank in Pakistan)

Name of Principal (Contractor) with address: _____

Penal Sum of Security (express in words and figures) _____

Letter of Acceptance No. _____ Dated _____

KNOW ALL MEN BY THESE PRESENTS, that in pursuance of the terms of the Bidding Documents and above said Letter of Acceptance (hereinafter called the Documents) and at the request of the said Principal we, the Guarantor above named, are held and firmly bound unto the _____ (hereinafter called the Employer) in the penal sum of the amount stated above for the payment of which sum well and truly to be made to the said Employer, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has accepted the Employer's above said Letter of Acceptance for _____ (Name of Contract) for the _____ (Name of Project).

NOW THEREFORE, if the Principal (Contractor) shall well and truly perform and fulfil all the undertakings, covenants, terms and conditions of the said Documents during the original terms of the said Documents and any extensions thereof that may be granted by the Employer, with or without notice to the Guarantor, which notice is, hereby, waived and shall also well and truly perform and fulfil all the undertakings, covenants terms and conditions of the Contract and of any and all modifications of said Documents that may hereafter be made, notice of which modifications to the Guarantor being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue till all requirements of Clause 49, Defects Liability, of Conditions of Contract are fulfilled.

Our total liability under this Guarantee is limited to the sum stated above and it is a condition of any liability attaching to us under this Guarantee that the claim for payment in writing shall be received by us within the validity period of this Guarantee, failing which we shall be discharged of our liability, if any, under this Guarantee.

We, _____ (the Guarantor), waiving all objections and defences under the Contract, do hereby irrevocably and independently guarantee to pay to the Employer without delay upon the Employer's first written demand without cavil or arguments and without requiring the Employer to

prove or to show grounds or reasons for such demand any sum or sums up to the amount stated above, against the Employer's written declaration that the Principal has refused or failed to perform the obligations under the Contract which payment will be effected by the Guarantor to Employer's designated Bank & Account Number.

PROVIDED ALSO THAT the Employer shall be the sole and final judge for deciding whether the Principal (Contractor) has duly performed his obligations under the Contract or has defaulted in fulfilling said obligations and the Guarantor shall pay without objection any sum or sums up to the amount stated above upon first written demand from the Employer forthwith and without any reference to the Principal or any other person.

IN WITNESS WHEREOF, the above-bounden Guarantor has executed this Instrument under its seal on the date indicated above, the name and corporate seal of the Guarantor being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Guarantor (Bank)

1. _____

Signature _____

Corporate Secretary (Seal)

Name _____

2. _____

Title _____

Name, Title & Address

Corporate Guarantor (Seal)

FORM OF CONTRACT AGREEMENT

THIS CONTRACT AGREEMENT (hereinafter called the "Agreement") made on the ____/____/2016 between Directorate General Small Dams (hereafter called the "Employer") of the one part and _____ (hereafter called the "Contractor") of the other part.

WHEREAS the Employer is desirous that certain Works, viz _____ should be executed by the Contractor and has accepted a Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein.

NOW this Agreement witness as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.
2. The following documents after incorporating addenda, if any, except those parts relating to Instructions to Bidders shall be deemed to form and be read and construed as part of this Agreement, viz:
 - (a) The Contract Agreement;
 - (b) The Letter of Acceptance;
 - (c) The completed Form of Bid;
 - (d) Special Stipulations (Appendix-A to Bid);
 - (e) The Particular Conditions of Contract – Part II;
 - (f) The General Conditions – Part I;
 - (g) The priced Bill of Quantities (Appendix-D to Bid);
 - (h) The completed Appendices to Bid (B, C, E to L);
 - (i) The Drawings;
 - (j) The Specifications.
 - (k) _____ (any other)
3. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy defects therein-in conformity and 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 as per provisions of the Contract, 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 on the day, month and year first before written in accordance with their respective laws.

Signature of the Contactor

Signature of Employer

(Seal)

(Seal)

Signed, Sealed and Delivered in the presence of:

Witness:

Witness:

(Name, Title and Address)

(Name, Title and Address)

MOBILIZATION ADVANCE GUARANTEE/BOND

Guarantee No. _____ Date _____

WHEREAS _____(hereinafter called the 'Employer') has entered into a Contract for

(Particulars of Contract)

with _____ (hereinafter called the "Contractor").

AND WHEREAS, the Employer has agreed to advance to the Contractor, at the Contractor's request, an amount of Rupees _____ (Rs _____) which amount shall be advanced to the Contractor as per provisions of the Contract.

AND WHEREAS, the Employer has asked the Contractor to furnish Guarantee to secure the mobilization advance for the performance of his obligations under the said Contract.

AND WHEREAS, _____
(Scheduled Bank in Pakistan)

(hereinafter called the "Guarantor") at the request of the Contractor and in consideration of the Employer agreeing to make the above advance to the Contractor, has agreed to furnish the said Guarantee.

NOW, THEREFORE, the Guarantor hereby guarantees that the Contractor shall use the advance for the purpose of above mentioned Contract and if he fails and commits default in fulfilment of any of his obligations for which the advance payment is made, the Guarantor shall be liable to the Employer for payment not exceeding the aforementioned amount.

Notice in writing of any default, of which the Employer shall be the sole and final judge, on the part of the Contractor, shall be given by the Employer to the Guarantor, and on such first written demand, payment shall be made by the Guarantor of all sums then due under this Guarantee without any reference to the Contractor and without any objection.

This Guarantee shall remain in force until the advance is fully adjusted against payments from the Interim Payment Certificates of the Contractor or until _____ whichever is earlier.

(Date)

The Guarantor's liability under this Guarantee shall not in any case exceed the sum of Rupees _____(Rs _____).

This Guarantee shall remain valid up to the aforesaid date and shall be null and void after the aforesaid date or earlier if the advance made to the Contractor is fully adjusted against payments from Interim Payment Certificates of the Contractor provided that the Guarantor agrees that the aforesaid period of validity shall be deemed to be extended if on the above mentioned date the advance payment is not fully adjusted.

GUARANTOR

1. Signature _____
2. Name _____
3. Title _____

WITNESS

1. _____

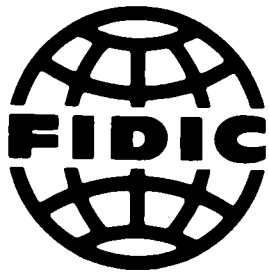
Corporate Secretary (Seal)

2. _____
(Name Title & Address)

- _____
- Corporate Guarantor (Seal)

CONDITIONS OF CONTRACT
FOR WORKS OF CIVIL
ENGINEERING CONSTRUCTION

PART I – GENERAL CONDITIONS
WITH FORMS OF BID AND AGREEMENT



FEDERATION INTERNATIONALE DES INGENIEURS-CONSEILS

CONDITIONS OF CONTRACT

FOR WORKS OF CIVIL

ENGINEERING CONSTRUCTION

PART I GENERAL CONDITIONS
WITH FORMS OF TENDER AND AGREEMENT

FOURTH EDITION 1987
Reprinted 1988 with editorial amendments
Reprinted 1992 with further amendments

FOREWORD

The terms of the Fourth Edition of the Conditions of Contract for Works of Civil Engineering Construction have been prepared by the Fédération Internationale des Ingénieurs Conseils (FIDIC) and are recommended for general use for the purpose of construction of such works where tenders are invited on an international basis. The Conditions, subject to minor modifications, are also suitable for use on domestic contracts.

The version in English of the Conditions is considered by FIDIC as the official and authentic text for the purpose of translation.

In the preparation of the Conditions it was recognised that while there are numerous Clauses which will be generally applicable there are some Clauses which must necessarily vary to take account of the circumstances and locality of the Works. The Clauses of general application have been grouped together in this document and are referred to as Part I – General Conditions. They have been printed in a form which will facilitate their inclusion as printed in the contract documents normally prepared.

The General Conditions are linked with the Conditions of Particular Application, referred to as Part II, by the corresponding numbering of the Clauses, so that Parts I and II together comprise the Conditions governing the rights and obligations of the parties.

Part II must be specially drafted to suit each individual Contract.

When dredging and certain types of reclamation work are involved special consideration must be given to Part II.

To assist in the preparation of Part II explanatory material and example clauses are published with the Conditions in a separately bound document entitled “Conditions of Contract for Works of Civil Engineering Construction, Part II – Conditions of Particular Application, with Guidelines for preparation of Part II Clauses, Fourth Edition”.

FIDIC has published a “Guide to the Use of FIDIC Conditions of Contract for Works of Civil Engineering Construction” which includes comments on the provisions of the Fourth Edition of the Conditions. Users of the Fourth Edition may find it helpful to refer to this Guide.

It may also be helpful for users to refer to other FIDIC publications, such as:

Tendering Procedure (First Edition 1982)
Construction, Insurance and Law (1986)

FIDIC gratefully acknowledges the suggestions and comments it has received during the preparation of this edition from European International Contractors (EIC) as mandatory of Confederation of International Contractors Associations (CICA) with participation of Associated General Contractors of America (AGC).

CONTENTS

PART I: GENERAL CONDITIONS

Definitions and Interpretation

1.1	Definitions	1
1.2	Headings and Marginal Notes	2
1.3	Interpretation	2
1.4	Singular and Plural	2
1.5	Notices, Consents, Approvals, Certificates and Determinations	3

Engineer and Engineer's Representative

2.1	Engineer's Duties and Authority	3
2.2	Engineer's Representative	3
2.3	Engineer's Authority to Delegate	3
2.4	Appointment of Assistants	3
2.5	Instructions in Writing	3
2.6	Engineer to Act Impartially	4

Assignment and Subcontracting

3.1	Assignment of Contract	4
4.1	Subcontracting	4
4.2	Assignment of Subcontractors' Obligations	4

Contract Documents

5.1	Language/s and Law	4
5.2	Priority of Contract Documents	5
6.1	Custody and Supply of Drawings and Documents	5
6.2	One Copy of Drawings to be Kept on Site	5
6.3	Disruption of Progress	5
6.4	Delays and Cost of Delay of Drawings	5
6.5	Failure by Contractor to Submit Drawings	5
7.1	Supplementary Drawings and Instructions	6
7.2	Permanent Works Designed by Contractor	6
7.3	Responsibility Unaffected by Approval	6

General Obligations

8.1	Contractor's General Responsibilities	6
8.2	Site Operations and Methods of Construction	6
9.1	Contract Agreement	6
10.1	Performance Security	6
10.2	Period of Validity of Performance Security	7
10.3	Claims under Performance Security	7
11.1	Inspection of Site	7
12.1	Sufficiency of Tender	7
12.2	Not Foreseeable Physical Obstructions or Conditions	7
13.1	Work to be in Accordance with Contract	8
14.1	Programme to be Submitted	8
14.2	Revised Programme	8
14.3	Cash Flow Estimate to be Submitted	8
14.4	Contractor not Relieved of Duties or Responsibilities	8
15.1	Contractor's Superintendence	8

16.1	Contractor's Employees	8
16.2	Engineer at Liberty to Object	8
17.1	Setting-out	9
18.1	Boreholes and Exploratory Excavation	9
19.1	Safety, Security and Protection of the Environment	9
19.2	Employer's Responsibilities	9
20.1	Care of Works	9
20.2	Responsibility to Rectify Loss or Damage	10
20.3	Loss or Damage Due to Employer's Risks	10
20.4	Employer's Risks	10
21.1	Insurance of Works and Contractor's Equipment	10
21.2	Scope of Cover	11
21.3	Responsibility for Amounts not Recovered	11
21.4	Exclusions	11
22.1	Damage to Persons and Property	11
22.2	Exceptions	11
22.3	Indemnity by Employer	12
23.1	Third Party Insurance (including Employer's Property)	12
23.2	Minimum Amount of Insurance	12
23.3	Cross Liabilities	12
24.1	Accident or Injury to Workmen	12
24.2	Insurance Against Accident to Workmen	12
25.1	Evidence and Terms of Insurances	12
25.2	Adequacy of Insurances	12
25.3	Remedy on Contractor's Failure to Insure	12
25.4	Compliance with Policy Conditions	12
26.1	Compliance with Statutes, Regulations	13
27.1	Fossils	13
28.1	Patent Rights	13
28.2	Royalties	13
29.1	Interference with Traffic and Adjoining Properties	13
30.1	Avoidance of Damage to Roads	14
30.2	Transport of Contractor's Equipment or Temporary Works	14
30.3	Transport of Materials or Plant	14
30.4	Waterborne Traffic	14
31.1	Opportunities for Other Contractors	14
31.2	Facilities for Other Contractors	14
32.1	Contractor to Keep Site Clear	15
33.1	Clearance of Site on Completion	15
 Labour		
34.1	Engagement of Staff and Labour	15
35.1	Returns of Labour and Contractor's Equipment	15
 Materials, Plant and Workmanship		
36.1	Quality of Materials, Plant and Workmanship	15
36.2	Cost of Samples	15
36.3	Cost of Tests	15
36.4	Cost of Tests not Provided for	16
36.5	Engineer's Determination where Tests not Provided for	16
37.1	Inspection of Operations	16
37.2	Inspection and Testing	16
37.3	Dates for Inspection and Testing	16
37.4	Rejection	16
37.5	Independent Inspection	17
38.1	Examination of Work before Covering up	17

38.2	Uncovering and Making Openings	17
39.1	Removal of Improper Work, Materials or Plant	17
39.2	Default of Contractor in Compliance	17

Suspension

40.1	Suspension of Work	17
40.2	Engineer's Determination following Suspension	18
40.3	Suspension lasting more than 84 Days	18

Commencement and Delays

41.1	Commencement of Works	18
42.1	Possession of Site and Access Thereto	18
42.2	Failure to Give Possession	19
42.3	Rights of Way and Facilities	19
43.1	Time for Completion	19
44.1	Extension of Time for Completion	19
44.2	Contractor to Provide Notification and Detailed Particulars	19
44.3	Interim Determination of Extension	19
45.1	Restriction on Working Hours	20
46.1	Rate of Progress	20
47.1	Liquidated Damages for Delay	20
47.2	Reduction of Liquidated Damages	20
48.1	Taking-Over Certificate	21
48.2	Taking-Over of Sections or Parts	21
48.3	Substantial Completion of Parts	21
48.4	Surfaces Requiring Reinstatement	21

Defects Liability

49.1	Defects Liability Period	21
49.2	Completion of Outstanding Work and Remedying Defects	22
49.3	Cost of Remedying Defects	22
49.4	Contractor's Failure to Carry Out Instructions	22
50.1	Contractor to Search	22

Alterations, Additions and Omissions

51.1	Variations	22
51.2	Instructions for Variations	23
52.1	Valuation of Variations	23
52.2	Power of Engineer to Fix Rates	23
52.3	Variations Exceeding 15 percent	23
52.4	Daywork	24

Procedure for Claims

53.1	Notice of Claims	24
53.2	Contemporary Records	24
53.3	Substantiation of Claims	25
53.4	Failure to Comply	25
53.5	Payment of Claims	25

Contractor's Equipment, Temporary Works and Materials

54.1	Contractor's Equipment, Temporary Works and Materials; Exclusive Use for the Works	25
54.2	Employer not Liable for Damage	25
54.3	Customs Clearance	25

54.4	Re-export of Contractor's Equipment	25
54.5	Conditions of Hire of Contractor's Equipment	26
54.6	Costs for the Purpose of Clause 63	26
54.7	Incorporation of Clause in Subcontracts	26
54.8	Approval of Materials not Implied	26
Measurement		
55.1	Quantities	26
56.1	Works to be Measured	26
57.1	Method of Measurement	27
57.2	Breakdown of Lump Sum Items	27
Provisional Sums		
58.1	Definition of "Provisional Sum"	27
58.2	Use of Provisional Sums	27
58.3	Production of Vouchers	27
Nominated Subcontractors		
59.1	Definition of "Nominated Subcontractors"	27
59.2	Nominated Subcontractors; Objection to Nomination	27
59.3	Design Requirements to be Expressly Stated	28
59.4	Payments to Nominated Subcontractors	28
59.5	Certification of Payments to Nominated Subcontractors	28
Certificates and Payment		
60.1	Monthly Statements	29
60.2	Monthly Payments	29
60.3	Payment of Retention Money	29
60.4	Correction of Certificates	29
60.5	Statement at Completion	30
60.6	Final Statement	30
60.7	Discharge	30
60.8	Final Payment Certificate	30
60.9	Cessation of Employer's Liability	30
60.10	Time for Payment	31
61.1	Approval only by Defects Liability Certificate	31
62.1	Defects Liability Certificate	31
62.2	Unfulfilled Obligations	31
Remedies		
63.1	Default of Contractor	31
63.2	Valuation at Date of Termination	32
63.3	Payment after Termination	32
63.4	Assignment of Benefit of Agreement	32
64.1	Urgent Remedial Work	32
Special Risks		
65.1	No Liability for Special Risks	33
65.2	Special Risks	33
65.3	Damage to Works by Special Risks	33
65.4	Projectile, Missile	33
65.5	Increased Costs arising from Special Risks	33
65.6	Outbreak of War	33
65.7	Removal of Contractor's Equipment on Termination	34
65.8	Payment if Contract Terminated	34

	Release from Performance	
66.1	Payment in Event of Release from Performance	35
	Settlement of Disputes	
67.1	Engineer's Decision	35
67.2	Amicable Settlement	35
67.3	Arbitration	36
67.4	Failure to Comply with Engineer's Decision	36
	Notices	
68.1	Notice to Contractor	36
68.2	Notice to Employer and Engineer	36
68.3	Change of Address	36
	Default of Employer	
69.1	Default of Employer	36
69.2	Removal of Contractor's Equipment	37
69.3	Payment on Termination	37
69.4	Contractor's Entitlement to Suspend Work	37
69.5	Resumption of Work	37
	Changes in Cost and Legislation	
70.1	Increase or Decrease of Cost	37
70.2	Subsequent Legislation	37
	Currency and Rates of Exchange	
71.1	Currency Restrictions	38
72.1	Rates of Exchange	38
72.2	Currency Proportions	38
72.3	Currencies of Payment for Provisional Sums	38

REFERENCE TO PART II
INDEX
TENDER
AGREEMENT
EDITORIAL AMENDMENTS IN 1988
FURTHER AMENDMENTS IN 1992

PART I - GENERAL CONDITIONS

Definitions and Interpretation

Definitions

- 1.1** In the Contract (as hereinafter defined) the following words and expressions shall have the meanings hereby assigned to them, except where the context otherwise requires:
- (a) (i) “Employer” means the person named as such in Part II of these Conditions and the legal successors in title to such person, but not (except with the consent of the Contractor) any assignee of such person.
 - (ii) “Contractor” means the person whose tender has been accepted by the Employer and the legal successors in title to such person, but not (except with the consent of the Employer) any assignee of such person.
 - (iii) “Subcontractor” means any person named in the Contract as a Subcontractor for a part of the Works or any person to whom a part of the Works has been subcontracted with the consent of the Engineer and the legal successors in title to such person, but not any assignee of any such person.
 - (iv) “Engineer” means the person appointed by the Employer to act as Engineer for the purposes of the Contract and named as such in Part II of these Conditions.
 - (v) “Engineer’s Representative” means a person appointed from time to time by the Engineer under Sub-Clause 2.2.
 - (b) (i) “Contract” means these Conditions (Parts I and II), the Specification, the Drawings, the Bill of Quantities, the Tender, the Letter of Acceptance, the Contract Agreement (if completed) and such further documents as may be expressly incorporated in the Letter of Acceptance or Contract Agreement (if completed).
 - (ii) “Specification” means the specification of the Works included in the Contract and any modification thereof or addition thereto made under Clause 51 or submitted by the Contractor and approved by the Engineer.
 - (iii) “Drawings” means all drawings, calculations and technical information of a like nature provided by the Engineer to the Contractor under the Contract and all drawings, calculations, samples, patterns, models, operation and maintenance manuals and other technical information of a like nature submitted by the Contractor and approved by the Engineer.
 - (iv) “Bill of Quantities” means the priced and completed bill of quantities forming part of the Tender.
 - (v) “Tender” means the Contractor’s priced offer to the Employer for the execution and completion of the Works and the remedying of any defects therein in accordance with the provisions of the Contract, as accepted by the Letter of Acceptance.
 - (vi) “Letter of Acceptance” means the formal acceptance by the Employer of the Tender.
 - (vii) “Contract Agreement” means the contract agreement (if any) referred to in Sub-Clause 9.1.
 - (viii) “Appendix to Tender” means the appendix comprised in the form of Tender annexed to these Conditions.
 - (c) (i) “Commencement Date” means the date upon which the Contractor receives the notice to commence issued by the Engineer pursuant to Clause 41.
 - (ii) “Time for Completion” means the time for completing the execution of and passing the Tests on Completion of the Works or any Section or part thereof as stated in the Contract (or as extended under Clause 44) calculated from the Commencement Date.

- (d) (i) “Tests on Completion” means the tests specified in the Contract or otherwise agreed by the Engineer and the Contractor which are to be made by the Contractor before the Works or any Section or part thereof are taken over by the Employer.
- (ii) “Taking-Over Certificate” means a certificate issued pursuant to Clause 48.
- (e) (i) “Contract Price” means the sum stated in the Letter of Acceptance as payable to the Contractor for the execution and completion of the Works and the remedying of any defects therein in accordance with the provisions of the Contract.
- (ii) “Retention Money” means the aggregate of all monies retained by the Employer pursuant to Sub-Clause 60.2(a).
- (iii) “Interim Payment Certificate” means any certificate of payment issued by the Engineer other than the Final Payment Certificate.
- (iv) “Final Payment Certificate” means the certificate of payment issued by the Engineer pursuant to Sub-Clause 60.8.
- (f) (i) “Works” means the Permanent Works and the Temporary Works or either of them as appropriate.
- (ii) “Permanent Works” means the permanent works to be executed (including Plant) in accordance with the Contract.
- (iii) “Temporary Works” means all temporary works of every kind (other than Contractor’s Equipment) required in or about the execution and completion of the Works and the remedying of any defects therein.
- (iv) “Plant” means machinery, apparatus and the like intended to form or forming part of the Permanent Works.
- (v) “Contractor’s Equipment” means all appliances and things of whatsoever nature (other than Temporary Works) required for the execution and completion of the Works and the remedying of any defects therein, but does not include Plant, materials or other things intended to form or forming part of the Permanent Works.
- (vi) “Section” means a part of the Works specifically identified in the Contract as a Section.
- (vii) “Site” means the places provided by the Employer where the Works are to be executed and any other places as may be specifically designated in the Contract as forming part of the Site.
- (g) (i) “cost” means all expenditure properly incurred or to be incurred, whether on or off the Site, including overhead and other charges properly allocable thereto but does not include any allowance for profit.
- (ii) “day” means calendar day.
- (iii) “foreign currency” means a currency of a country other than that in which the Works are to be located.
- (iv) “writing” means any hand-written, type-written, or printed communication, including telex, cable and facsimile transmission.

Headings and Marginal Notes

1.2 The headings and marginal notes in these Conditions shall not be deemed part thereof or be taken into consideration in the interpretation or construction thereof or of the Contract.

Interpretation

1.3 Words importing persons or parties shall include firms and corporations and any organisation having legal capacity.

Singular and Plural

1.4 Words importing the singular only also include the plural and vice versa where the context requires.

**Notices,
Consents,
Approvals,
Certificates and
Determinations**

- 1.5** Wherever in the Contract provision is made for the giving or issue of any notice, consent, approval, certificate or determination by any person, unless otherwise specified such notice, consent, approval, certificate or determination shall be in writing and the words “notify”, “certify” or “determine” shall be construed accordingly. Any such consent, approval, certificate or determination shall not unreasonably be withheld or delayed.

Engineer and Engineer’s Representative

**Engineer’s
Duties and
Authority**

- 2.1** (a) The Engineer shall carry out the duties specified in the Contract.
- (b) The Engineer may exercise the authority specified in or necessarily to be implied from the Contract, provided, however, that if the Engineer is required, under the terms of his appointment by the Employer, to obtain the specific approval of the Employer before exercising any such authority, particulars of such requirements shall be set out in Part II of these Conditions. Provided further that any requisite approval shall be deemed to have been given by the Employer for any such authority exercised by the Engineer.
- (c) Except as expressly stated in the Contract, the Engineer shall have no authority to relieve the Contractor of any of his obligations under the Contract.

**Engineer’s
Representative**

- 2.2** The Engineer’s Representative shall be appointed by and be responsible to the Engineer and shall carry out such duties and exercise such authority as may be delegated to him by the Engineer under Sub-Clause 2.3.

**Engineer’s
Authority to
Delegate**

- 2.3** The Engineer may from time to time delegate to the Engineer’s Representative any of the duties and authorities vested in the Engineer and he may at any time revoke such delegation. Any such delegation or revocation shall be in writing and shall not take effect until a copy thereof has been delivered to the Employer and the Contractor.

Any communication given by the Engineer’s Representative to the Contractor in accordance with such delegation shall have the same effect as though it had been given by the Engineer. Provided that:

- (a) any failure of the Engineer’s Representative to disapprove any work, materials or Plant shall not prejudice the authority of the Engineer to disapprove such work, materials or Plant and to give instructions for the rectification thereof; and
- (b) if the Contractor questions any communication of the Engineer’s Representative he may refer the matter to the Engineer who shall confirm, reverse or vary the contents of such communication.

**Appointment
of Assistants**

- 2.4** The Engineer or the Engineer’s Representative may appoint any number of persons to assist the Engineer’s Representative in the carrying out of his duties under Sub-Clause 2.2. He shall notify to the Contractor the names, duties and scope of authority of such persons. Such assistants shall have no authority to issue any instructions to the Contractor save in so far as such instructions may be necessary to enable them to carry out their duties and to secure their acceptance of materials, Plant or workmanship as being in accordance with the Contract, and any instructions given by any of them for those purposes shall be deemed to have been given by the Engineer’s Representative.

**Instructions
in Writing**

- 2.5** Instructions given by the Engineer shall be in writing, provided that if for any reason the Engineer considers it necessary to give any such instruction orally, the Contractor shall comply with such instruction. Confirmation in writing of such oral instruction given by the Engineer, whether before or after the carrying out of the instruction, shall be deemed to be an instruction within the meaning of this Sub-Clause. Provided further that if the Contractor, within 7 days, confirms in writing to the Engineer any oral instruction of the Engineer and such confirmation is not contradicted in writing within 7 days by the Engineer, it shall be deemed to be an instruction of the Engineer.

The provisions of this Sub-Clause shall equally apply to instructions given by the Engineer's Representative and any assistants of the Engineer or the Engineer's Representative appointed pursuant to Sub-Clause 2.4.

Engineer to Act Impartially

- 2.6** Wherever, under the Contract, the Engineer is required to exercise his discretion by:
- (a) giving his decision, opinion or consent,
 - (b) expressing his satisfaction or approval,
 - (c) determining value, or
 - (d) otherwise taking action which may affect the rights and obligations of the Employer or the Contractor

he shall exercise such discretion impartially within the terms of the Contract and having regard to all the circumstances. Any such decision, opinion, consent, expression of satisfaction, or approval, determination of value or action may be opened up, reviewed or revised as provided in Clause 67.

Assignment and Subcontracting

Assignment of Contract

- 3.1** The Contractor shall not, without the prior consent of the Employer (which consent, notwithstanding the provisions of Sub-Clause 1.5, shall be at the sole discretion of the Employer), assign the Contract or any part thereof, or any benefit or interest therein or thereunder, otherwise than by:

- (a) a charge in favour of the Contractor's bankers of any monies due or to become due under the Contract, or
- (b) assignment to the Contractor's insurers (in cases where the insurers have discharged the Contractor's loss or liability) of the Contractor's right to obtain relief against any other party liable.

Subcontracting

- 4.1** The Contractor shall not subcontract the whole of the Works. Except where otherwise provided by the Contract, the Contractor shall not subcontract any part of the Works without the prior consent of the Engineer. Any such consent shall not relieve the Contractor from any liability or obligation under the Contract and he shall be responsible for the acts, defaults and neglects of any Subcontractor, his agents, servants or workmen as fully as if they were the acts, defaults or neglects of the Contractor, his agents, servants or workmen.

Provided that the Contractor shall not be required to obtain such consent for:

- (a) the provision of labour,
- (b) the purchase of materials which are in accordance with the standards specified in the Contract, or
- (c) the subcontracting of any part of the Works for which the Subcontractor is named in the Contract.

Assignment of Subcontractors' Obligations

- 4.2** In the event of a Subcontractor having undertaken towards the Contractor in respect of the work executed, or the goods, materials, Plant or services supplied by such Subcontractor, any continuing obligation extending for a period exceeding that of the Defects Liability Period under the Contract, the Contractor shall at any time, after the expiration of such Period, assign to the Employer, at the Employer's request and cost, the benefit of such obligation for the unexpired duration thereof.

Contract Documents

Language/s and Law

- 5.1** There is stated in Part II of these Conditions:
- (a) the language or languages in which the Contract documents shall be drawn up, and
 - (b) the country or state the law of which shall apply to the Contract and according to which the Contract shall be construed.

If the said documents are written in more than one language, the language according to which the Contract shall be construed and interpreted is also stated in Part II of these Conditions, being therein designated the "Ruling Language".

- | | | |
|---|------------|---|
| Priority of Contract Documents | 5.2 | The several documents forming the Contract are to be taken as mutually explanatory of one another, but in case of ambiguities or discrepancies the same shall be explained and adjusted by the Engineer who shall thereupon issue to the Contractor instructions thereon and in such event, unless otherwise provided in the Contract, the priority of the documents forming the Contract shall be as follows:

(1) The Contract Agreement (if completed);
(2) The Letter of Acceptance;
(3) The Tender;
(4) Part II of these Conditions;
(5) Part I of these Conditions; and
(6) Any other document forming part of the Contract. |
| Custody and Supply of Drawings and Documents | 6.1 | The Drawings shall remain in the sole custody of the Engineer, but two copies thereof shall be provided to the Contractor free of charge. The Contractor shall make at his own cost any further copies required by him. Unless it is strictly necessary for the purposes of the Contract, the Drawings, Specification and other documents provided by the Employer or the Engineer shall not, without the consent of the Engineer, be used or communicated to a third party by the Contractor. Upon issue of the Defects Liability Certificate, the Contractor shall return to the Engineer all Drawings, Specification and other documents provided under the Contract.

The Contractor shall supply to the Engineer four copies of all Drawings, Specification and other documents submitted by the Contractor and approved by the Engineer in accordance with Clause 7, together with a reproducible copy of any material which cannot be reproduced to an equal standard by photocopying. In addition the Contractor shall supply such further copies of such Drawings, Specification and other documents as the Engineer may request in writing for the use of the Employer, who shall pay the cost thereof. |
| One Copy of Drawings to be Kept on Site | 6.2 | One copy of the Drawings, provided to or supplied by the Contractor as aforesaid, shall be kept by the Contractor on the Site and the same shall at all reasonable times be available for inspection and use by the Engineer and by any other person authorised by the Engineer in writing. |
| Disruption of Progress | 6.3 | The Contractor shall give notice to the Engineer, with a copy to the Employer, whenever planning or execution of the Works is likely to be delayed or disrupted unless any further drawing or instruction is issued by the Engineer within a reasonable time. The notice shall include details of the drawing or instruction required and of why and by when it is required and of any delay or disruption likely to be suffered if it is late. |
| Delays and Cost of Delay of Drawings | 6.4 | If, by reason of any failure or inability of the Engineer to issue, within a time reasonable in all the circumstances, any drawing or instruction for which notice has been given by the Contractor in accordance with Sub-Clause 6.3, the Contractor suffers delay and/or incurs costs then the Engineer shall, after due consultation with the Employer and the Contractor, determine:

(a) any extension of time to which the Contractor is entitled under Clause 44, and
(b) the amount of such costs, which shall be added to the Contract Price, and shall notify the Contractor accordingly, with a copy to the Employer. |
| Failure by Contractor to Submit Drawings | 6.5 | If the failure or inability of the Engineer to issue any drawings or instructions is caused in whole or in part by the failure of the Contractor to submit Drawings, Specification or other documents which he is required to submit under the Contract, the Engineer shall take such failure by the Contractor into account when making his determination pursuant to Sub-Clause 6.4. |

- | | |
|--|--|
| Supplementary Drawings and Instructions | 7.1 The Engineer shall have authority to issue to the Contractor, from time to time, such supplementary Drawings and instructions as shall be necessary for the purpose of the proper and adequate execution and completion of the Works and the remedying of any defects therein. The Contractor shall carry out and be bound by the same. |
| Permanent Works Designed by Contractor | 7.2 Where the Contract expressly provides that part of the Permanent Works shall be designed by the Contractor, he shall submit to the Engineer, for approval: <ul style="list-style-type: none"> (a) such drawings, specifications, calculations and other information as shall be necessary to satisfy the Engineer as to the suitability and adequacy of that design, and (b) operation and maintenance manuals together with drawings of the Permanent Works as completed, in sufficient detail to enable the Employer to operate, maintain, dismantle, reassemble and adjust the Permanent Works incorporating that design. The Works shall not be considered to be completed for the purposes of taking over in accordance with Clause 48 until such operation and maintenance manuals, together with drawings on completion, have been submitted to and approved by the Engineer. |
| Responsibility Unaffected by Approval | 7.3 Approval by the Engineer, in accordance with Sub-Clause 7.2, shall not relieve the Contractor of any of his responsibilities under the Contract. |

General Obligations

- | | |
|--|---|
| Contractor's General Responsibilities | 8.1 The Contractor shall, with due care and diligence, design (to the extent provided for by the Contract), execute and complete the Works and remedy any defects therein in accordance with the provisions of the Contract. The Contractor shall provide all superintendence, labour, materials, Plant, Contractor's Equipment and all other things, whether of a temporary or permanent nature, required in and for such design, execution, completion and remedying of any defects, so far as the necessity for providing the same is specified in or is reasonably to be inferred from the Contract. <p style="margin-left: 20px;">The Contractor shall give prompt notice to the Engineer, with a copy to the Employer, of any error, omission, fault or other defect in the design of or Specification for the Works which he discovers when reviewing the Contract or executing the Works.</p> |
| Site Operations and Methods of Construction | 8.2 The Contractor shall take full responsibility for the adequacy, stability and safety of all Site operations and methods of construction. Provided that the Contractor shall not be responsible (except as stated hereunder or as may be otherwise agreed) for the design or specification of Permanent Works, or for the design or specification of any Temporary Works not prepared by the Contractor. Where the Contract expressly provides that part of the Permanent Works shall be designed by the Contractor, he shall be fully responsible for that part of such Works, notwithstanding any approval by the Engineer. |
| Contract Agreement | 9.1 The Contractor shall, if called upon so to do, enter into and execute the Contract Agreement, to be prepared and completed at the cost of the Employer, in the form annexed to these Conditions with such modification as may be necessary. |
| Performance Security | 10.1 If the Contract requires the Contractor to obtain security for his proper performance of the Contract, he shall obtain and provide to the Employer such security within 28 days after the receipt of the Letter of Acceptance, in the sum stated in the Appendix to Tender. When providing such security to the Employer, the Contractor shall notify the Engineer of so doing. Such security shall be in the form annexed to these Conditions or in such other form as may be agreed between the Employer and the Contractor. The institution providing such security shall be subject to the approval of the Employer. The cost of complying with the requirements of this Clause shall be borne by the Contractor, unless the Contract otherwise provides. |

Period of Validity of Performance Security	10.2	The performance security shall be valid until the Contractor has executed and completed the Works and remedied any defects therein in accordance with the Contract. No claim shall be made against such security after the issue of the Defects Liability Certificate in accordance with Sub-Clause 62.1 and such security shall be returned to the Contractor within 14 days of the issue of the said Defects Liability Certificate.
Claims under Performance Security	10.3	Prior to making a claim under the performance security the Employer shall, in every case, notify the Contractor stating the nature of the default in respect of which the claim is to be made.
Inspection of Site	11.1	<p>The Employer shall have made available to the Contractor, before the submission by the Contractor of the Tender, such data on hydrological and sub-surface conditions as have been obtained by or on behalf of the Employer from investigations undertaken relevant to the Works but the Contractor shall be responsible for his own interpretation thereof.</p> <p>The Contractor shall be deemed to have inspected and examined the Site and its surroundings and information available in connection therewith and to have satisfied himself (so far as is practicable, having regard to considerations of cost and time) before submitting his Tender, as to:</p> <ul style="list-style-type: none"> (a) the form and nature thereof, including the sub-surface conditions, (b) the hydrological and climatic conditions, (c) the extent and nature of work and materials necessary for the execution and completion of the Works and the remedying of any defects therein, and (d) the means of access to the Site and the accommodation he may require, <p>and, in general, shall be deemed to have obtained all necessary information, subject as above mentioned, as to risks, contingencies and all other circumstances which may influence or affect his Tender.</p> <p>The Contractor shall be deemed to have based his Tender on the data made available by the Employer and on his own inspection and examination, all as aforementioned.</p>
Sufficiency of Tender	12.1	The Contractor shall be deemed to have satisfied himself as to the correctness and sufficiency of the Tender and of the rates and prices stated in the Bill of Quantities, all of which shall, except insofar as it is otherwise provided in the Contract, cover all his obligations under the Contract (including those in respect of the supply of goods, materials, Plant or services or of contingencies for which there is a Provisional Sum) and all matters and things necessary for the proper execution and completion of the Works and the remedying of any defects therein.
Not Foreseeable Physical Obstructions or Conditions	12.2	<p>If, however, during the execution of the Works the Contractor encounters physical obstructions or physical conditions, other than climatic conditions on the Site, which obstructions or conditions were, in his opinion, not foreseeable by an experienced contractor, the Contractor shall forthwith give notice thereof to the Engineer, with a copy to the Employer. On receipt of such notice, the Engineer shall, if in his opinion such obstructions or conditions could not have been reasonably foreseen by an experienced contractor, after due consultation with the Employer and the Contractor, determine:</p> <ul style="list-style-type: none"> (a) any extension of time to which the Contractor is entitled under Clause 44, and (b) the amount of any costs which may have been incurred by the Contractor by reason of such obstructions or conditions having been encountered, which shall be added to the Contract Price, <p>and shall notify the Contractor accordingly, with a copy to the Employer. Such determination shall take account of any instruction which the Engineer may issue to the Contractor in connection therewith, and any proper and reasonable measures acceptable to the Engineer which the Contractor may take in the absence of specific instructions from the Engineer.</p>

Work to be in Accordance with Contract	13.1	Unless it is legally or physically impossible, the Contractor shall execute and complete the Works and remedy any defects therein in strict accordance with the Contract to the satisfaction of the Engineer. The Contractor shall comply with and adhere strictly to the Engineer's instructions on any matter, whether mentioned in the Contract or not, touching or concerning the Works. The Contractor shall take instructions only from the Engineer (or his delegate).
Programme to be Submitted	14.1	The Contractor shall, within the time stated in Part II of these Conditions after the date of the Letter of Acceptance, submit to the Engineer for his consent a programme, in such form and detail as the Engineer shall reasonably prescribe, for the execution of the Works. The Contractor shall, whenever required by the Engineer, also provide in writing for his information a general description of the arrangements and methods which the Contractor proposes to adopt for the execution of the Works.
Revised Programme	14.2	If at any time it should appear to the Engineer that the actual progress of the Works does not conform to the programme to which consent has been given under Sub-Clause 14.1, the Contractor shall produce, at the request of the Engineer, a revised programme showing the modifications to such programme necessary to ensure completion of the Works within the Time for Completion.
Cash Flow Estimate to be Submitted	14.3	The Contractor shall, within the time stated in Part II of these Conditions after the date of the Letter of Acceptance, provide to the Engineer for his information a detailed cash flow estimate, in quarterly periods, of all payments to which the Contractor will be entitled under the Contract and the Contractor shall subsequently supply revised cash flow estimates at quarterly intervals, if required to do so by the Engineer.
Contractor not Relieved of Duties or Responsibilities	14.4	The submission to and consent by the Engineer of such programmes or the provision of such general descriptions or cash flow estimates shall not relieve the Contractor of any of his duties or responsibilities under the Contract.
Contractor's Superintendence	15.1	The Contractor shall provide all necessary superintendence during the execution of the Works and as long thereafter as the Engineer may consider necessary for the proper fulfilling of the Contractor's obligations under the Contract. The Contractor, or a competent and authorised representative approved of by the Engineer, which approval may at any time be withdrawn, shall give his whole time to the superintendence of the Works. Such authorised representative shall receive, on behalf of the Contractor, instructions from the Engineer. If approval of the representative is withdrawn by the Engineer, the Contractor shall, as soon as is practicable, having regard to the requirement of replacing him as hereinafter mentioned, after receiving notice of such withdrawal, remove the representative from the Works and shall not thereafter employ him again on the Works in any capacity and shall replace him by another representative approved by the Engineer.
Contractor's Employees	16.1	The Contractor shall provide on the Site in connection with the execution and completion of the Works and the remedying of any defects therein: (a) only such technical assistants as are skilled and experienced in their respective callings and such foremen and leading hands as are competent to give proper superintendence of the Works, and (b) such skilled, semi-skilled and unskilled labour as is necessary for the proper and timely fulfilling of the Contractor's obligations under the Contract.
Engineer at Liberty to Object	16.2	The Engineer shall be at liberty to object to and require the Contractor to remove forthwith from the Works any person provided by the Contractor who, in the opinion of the Engineer, misconducts himself, or is incompetent or negligent in the proper performance of his duties, or whose presence on Site is otherwise considered by the Engineer to be undesirable, and such person shall not be again allowed upon the Works without the consent of the Engineer. Any person so removed from the Works shall be replaced as soon as possible.

- Setting-out** 17.1 The Contractor shall be responsible for:
- (a) the accurate setting-out of the Works in relation to original points, lines and levels of reference given by the Engineer in writing,
 - (b) the correctness, subject as above mentioned, of the position, levels, dimensions and alignment of all parts of the Works, and
 - (c) the provision of all necessary instruments, appliances and labour in connection with the foregoing responsibilities.
- If, at any time during the execution of the Works, any error appears in the position, levels, dimensions or alignment of any part of the Works, the Contractor, on being required so to do by the Engineer, shall, at his own cost, rectify such error to the satisfaction of the Engineer, unless such error is based on incorrect data supplied in writing by the Engineer, in which case the Engineer shall determine an addition to the Contract Price in accordance with Clause 52 and shall notify the Contractor accordingly, with a copy to the Employer.
- The checking of any setting-out or of any line or level by the Engineer shall not in any way relieve the Contractor of his responsibility for the accuracy thereof and the Contractor shall carefully protect and preserve all bench-marks, sight-rails, pegs and other things used in setting-out the Works.
- Boreholes and Exploratory Excavation** 18.1 If, at any time during the execution of the Works, the Engineer requires the Contractor to make boreholes or to carry out exploratory excavation, such requirement shall be the subject of an instruction in accordance with Clause 51, unless an item or a Provisional Sum in respect of such work is included in the Bill of Quantities.
- Safety, Security and Protection of the Environment** 19.1 The Contractor shall, throughout the execution and completion of the Works and the remedying of any defects therein:
- (a) have full regard for the safety of all persons entitled to be upon the Site and keep the Site (so far as the same is under his control) and the Works (so far as the same are not completed or occupied by the Employer) in an orderly state appropriate to the avoidance of danger to such persons,
 - (b) provide and maintain at his own cost all lights, guards, fencing, warning signs and watching, when and where necessary or required by the Engineer or by any duly constituted authority, for the protection of the Works or for the safety and convenience of the public or others, and
 - (c) take all reasonable steps to protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of his methods of operation.
- Employer's Responsibilities** 19.2 If under Clause 31 the Employer shall carry out work on the Site with his own workmen he shall, in respect of such work:
- (a) have full regard to the safety of all persons entitled to be upon the Site, and
 - (b) keep the Site in an orderly state appropriate to the avoidance of danger to such persons.
- If under Clause 31 the Employer shall employ other contractors on the Site he shall require them to have the same regard for safety and avoidance of danger.
- Care of Works** 20.1 The Contractor shall take full responsibility for the care of the Works and materials and Plant for incorporation therein from the Commencement Date until the date of issue of the Taking-Over Certificate for the whole of the Works, when the responsibility for the said care shall pass to the Employer. Provided that:
- (a) if the Engineer issues a Taking-Over Certificate for any Section or part of the Permanent Works the Contractor shall cease to be liable for the care of that Section or part from the date of issue of the Taking-Over Certificate, when the responsibility for the care of that Section or part shall pass to the Employer, and

(b) the Contractor shall take full responsibility for the care of any outstanding Works and materials and Plant for incorporation therein which he undertakes to finish during the Defects Liability Period until such outstanding Works have been completed pursuant to Clause 49.

Responsibility to Rectify Loss or Damage

20.2 If any loss or damage happens to the Works, or any part thereof, or materials or Plant for incorporation therein, during the period for which the Contractor is responsible for the care thereof, from any cause whatsoever, other than the risks defined in Sub-Clause 20.4, the Contractor shall, at his own cost, rectify such loss or damage so that the Permanent Works conform in every respect with the provisions of the Contract to the satisfaction of the Engineer. The Contractor shall also be liable for any loss or damage to the Works occasioned by him in the course of any operations carried out by him for the purpose of complying with his obligations under Clauses 49 and 50.

Loss or Damage Due to Employer's Risks

20.3 In the event of any such loss or damage happening from any of the risks defined in Sub-Clause 20.4, or in combination with other risks, the Contractor shall, if and to the extent required by the Engineer, rectify the loss or damage and the Engineer shall determine an addition to the Contract Price in accordance with Clause 52 and shall notify the Contractor accordingly, with a copy to the Employer. In the case of a combination of risks causing loss or damage any such determination shall take into account the proportional responsibility of the Contractor and the Employer.

Employer's Risks

20.4 The Employer's risks are:

- (a) war, hostilities (whether war be declared or not), invasion, act of foreign enemies,
- (b) rebellion, revolution, insurrection, or military or usurped power, or civil war,
- (c) ionising radiations, or contamination by radio-activity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radio-active toxic explosive or other hazardous properties of any explosive nuclear assembly or nuclear component thereof,
- (d) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds,
- (e) riot, commotion or disorder, unless solely restricted to employees of the Contractor or of his Subcontractors and arising from the conduct of the Works,
- (f) loss or damage due to the use or occupation by the Employer of any Section or part of the Permanent Works, except as may be provided for in the Contract,
- (g) loss or damage to the extent that it is due to the design of the Works, other than any part of the design provided by the Contractor or for which the Contractor is responsible, and
- (h) any operation of the forces of nature against which an experienced contractor could not reasonably have been expected to take precautions.

Insurance of Works and Contractor's Equipment

21.1 The Contractor shall, without limiting his or the Employer's obligations and responsibilities under Clause 20, insure:

- (a) the Works, together with materials and Plant for incorporation therein, to the full replacement cost (the term "cost" in this context shall include profit),
- (b) an additional sum of 15 per cent of such replacement cost, or as may be specified in Part II of these Conditions, to cover any additional costs of and incidental to the rectification of loss or damage including professional fees and the cost of demolishing and removing any part of the Works and of removing debris of whatsoever nature, and
- (c) the Contractor's Equipment and other things brought onto the Site by the Contractor, for a sum sufficient to provide for their replacement at the Site.

Scope of Cover	21.2	<p>The insurance in paragraphs (a) and (b) of Sub-Clause 21.1 shall be in the joint names of the Contractor and the Employer and shall cover:</p> <p>(a) the Employer and the Contractor against all loss or damage from whatsoever cause arising, other than as provided in Sub-Clause 21.4, from the start of work at the Site until the date of issue of the relevant Taking-Over Certificate in respect of the Works or any Section or part thereof as the case may be, and</p> <p>(b) the Contractor for his liability:</p> <p style="padding-left: 40px;">(i) during the Defects Liability Period for loss or damage arising from a cause occurring prior to the commencement of the Defects Liability Period, and</p> <p style="padding-left: 40px;">(ii) for loss or damage occasioned by the Contractor in the course of any operations carried out by him for the purpose of complying with his obligations under Clauses 49 and 50.</p>
Responsibility for Amounts not Recovered	21.3	<p>Any amounts not insured or not recovered from the insurers shall be borne by the Employer or the Contractor in accordance with their responsibilities under Clause 20.</p>
Exclusions	21.4	<p>There shall be no obligation for the insurances in Sub-Clause 21.1 to include loss or damage caused by:</p> <p>(a) war, hostilities (whether war be declared or not), invasion, act of foreign enemies,</p> <p>(b) rebellion, revolution, insurrection, or military or usurped power, or civil war,</p> <p>(c) ionising radiations, or contamination by radio-activity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radio-active toxic explosive or other hazardous properties of any explosive nuclear assembly or nuclear component thereof, or</p> <p>(d) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds.</p>
Damage to Persons and Property	22.1	<p>The Contractor shall, except if and so far as the Contract provides otherwise, indemnify the Employer against all losses and claims in respect of:</p> <p>(a) death of or injury to any person, or</p> <p>(b) loss of or damage to any property (other than the Works),</p> <p>which may arise out of or in consequence of the execution and completion of the Works and the remedying of any defects therein, and against all claims, proceedings, damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto, subject to the exceptions defined in Sub-Clause 22.2.</p>
Exceptions	22.2	<p>The “exceptions” referred to in Sub-Clause 22.1 are:</p> <p>(a) the permanent use or occupation of land by the Works, or any part thereof,</p> <p>(b) the right of the Employer to execute the Works, or any part thereof, on, over, under, in or through any land,</p> <p>(c) damage to property which is the unavoidable result of the execution and completion of the Works, or the remedying of any defects therein, in accordance with the Contract, and</p> <p>(d) death of or injury to persons or loss of or damage to property resulting from any act or neglect of the Employer, his agents, servants or other contractors, not being employed by the Contractor, or in respect of any claims, proceedings, damages, costs, charges and expenses in respect thereof or in relation thereto, where the injury or damage was contributed to by the Contractor, his servants or agents, such part of the said injury or damage as may be just and equitable having regard to the extent of the responsibility of the Employer, his servants or agents or other contractors for the injury or damage.</p>

Indemnity by Employer	22.3	The Employer shall indemnify the Contractor against all claims, proceedings, damages, costs, charges and expenses in respect of the matters referred to in the exceptions defined in Sub-Clause 22.2.
Third Party Insurance (including Employer's Property)	23.1	The Contractor shall, without limiting his or the Employer's obligations and responsibilities under Clause 22, insure, in the joint names of the Contractor and the Employer, against liabilities for death of or injury to any person (other than as provided in Clause 24) or loss of or damage to any property (other than the Works) arising out of the performance of the Contract, other than the exceptions defined in paragraphs (a), (b) and (c) of Sub-Clause 22.2.
Minimum Amount of Insurance	23.2	Such insurance shall be for at least the amount stated in the Appendix to Tender.
Cross Liabilities	23.3	The insurance policy shall include a cross liability clause such that the insurance shall apply to the Contractor and to the Employer as separate insureds.
Accident or Injury to Workmen	24.1	The Employer shall not be liable for or in respect of any damages or compensation payable to any workman or other person in the employment of the Contractor or any Subcontractor, other than death or injury resulting from any act or default of the Employer, his agents or servants. The Contractor shall indemnify and keep indemnified the Employer against all such damages and compensation, other than those for which the Employer is liable as aforesaid, and against all claims, proceedings, damages, costs, charges, and expenses whatsoever in respect thereof or in relation thereto.
Insurance Against Accident to Workmen	24.2	The Contractor shall insure against such liability and shall continue such insurance during the whole of the time that any persons are employed by him on the Works. Provided that, in respect of any persons employed by any Subcontractor, the Contractor's obligations to insure as aforesaid under this Sub-Clause shall be satisfied if the Subcontractor shall have insured against the liability in respect of such persons in such manner that the Employer is indemnified under the policy, but the Contractor shall require such Subcontractor to produce to the Employer, when required, such policy of insurance and the receipt for the payment of the current premium.
Evidence and Terms of Insurances	25.1	The Contractor shall provide evidence to the Employer prior to the start of work at the Site that the insurances required under the Contract have been effected and shall, within 84 days of the Commencement Date, provide the insurance policies to the Employer. When providing such evidence and such policies to the Employer, the Contractor shall notify the Engineer of so doing. Such insurance policies shall be consistent with the general terms agreed prior to the issue of the Letter of Acceptance. The Contractor shall effect all insurances for which he is responsible with insurers and in terms approved by the Employer.
Adequacy of Insurances	25.2	The Contractor shall notify the insurers of changes in the nature, extent or programme for the execution of the Works and ensure the adequacy of the insurances at all times in accordance with the terms of the Contract and shall, when required, produce to the Employer the insurance policies in force and the receipts for payment of the current premiums.
Remedy on Contractor's Failure to Insure	25.3	If the Contractor fails to effect and keep in force any of the insurances required under the Contract, or fails to provide the policies to the Employer within the period required by Sub-Clause 25.1, then and in any such case the Employer may effect and keep in force any such insurances and pay any premium as may be necessary for that purpose and from time to time deduct the amount so paid from any monies due or to become due to the Contractor, or recover the same as a debt due from the Contractor.
Compliance with Policy Conditions	25.4	In the event that the Contractor or the Employer fails to comply with conditions imposed by the insurance policies effected pursuant to the Contract, each shall indemnify the other against all losses and claims arising from such failure.

- Compliance with Statutes, Regulations** **26.1** The Contractor shall conform in all respects, including by the giving of all notices and the paying of all fees, with the provisions of:
- (a) any National or State Statute, Ordinance, or other Law, or any regulation, or bye-law of any local or other duly constituted authority in relation to the execution and completion of the Works and the remedying of any defects therein, and
- (b) the rules and regulations of all public bodies and companies whose property or rights are affected or may be affected in any way by the Works,
- and the Contractor shall keep the Employer indemnified against all penalties and liability of every kind for breach of any such provisions. Provided always that the Employer shall be responsible for obtaining any planning, zoning or other similar permission required for the Works to proceed and shall indemnify the Contractor in accordance with Sub-Clause 22.3.
- Fossils** **27.1** All fossils, coins, articles of value or antiquity and structures and other remains or things of geological or archaeological interest discovered on the Site shall, as between the Employer and the Contractor, be deemed to be the absolute property of the Employer. The Contractor shall take reasonable precautions to prevent his workmen or any other persons from removing or damaging any such article or thing and shall, immediately upon discovery thereof and before removal, acquaint the Engineer of such discovery and carry out the Engineer's instructions for dealing with the same. If, by reason of such instructions, the Contractor suffers delay and/or incurs costs then the Engineer shall, after due consultation with the Employer and the Contractor, determine:
- (a) any extension of time to which the Contractor is entitled under Clause 44, and
- (b) the amount of such costs, which shall be added to the Contract Price,
- and shall notify the Contractor accordingly, with a copy to the Employer.
- Patent Rights** **28.1** The Contractor shall save harmless and indemnify the Employer from and against all claims and proceedings for or on account of infringement of any patent rights, design trademark or name or other protected rights in respect of any Contractor's Equipment, materials or Plant used for or in connection with or for incorporation in the Works and from and against all damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto, except where such infringement results from compliance with the design or Specification provided by the Engineer.
- Royalties** **28.2** Except where otherwise stated, the Contractor shall pay all tonnage and other royalties, rent and other payments or compensation, if any, for getting stone, sand, gravel, clay or other materials required for the Works.
- Interference with Traffic and Adjoining Properties** **29.1** All operations necessary for the execution and completion of the Works and the remedying of any defects therein shall, so far as compliance with the requirements of the Contract permits, be carried on so as not to interfere unnecessarily or improperly with:
- (a) the convenience of the public, or
- (b) the access to, use and occupation of public or private roads and footpaths to or of properties whether in the possession of the Employer or of any other person.
- The Contractor shall save harmless and indemnify the Employer in respect of all claims, proceedings, damages, costs, charges and expenses whatsoever arising out of, or in relation to, any such matters insofar as the Contractor is responsible therefor.

- Avoidance of Damage to Roads** **30.1** The Contractor shall use every reasonable means to prevent any of the roads or bridges communicating with or on the routes to the Site from being damaged or injured by any traffic of the Contractor or any of his Subcontractors and, in particular, shall select routes, choose and use vehicles and restrict and distribute loads so that any such extraordinary traffic as will inevitably arise from the moving of materials, Plant, Contractor's Equipment or Temporary Works from and to the Site shall be limited, as far as reasonably possible, and so that no unnecessary damage or injury may be occasioned to such roads and bridges.
- Transport of Contractor's Equipment or Temporary Works** **30.2** Save insofar as the Contract otherwise provides, the Contractor shall be responsible for and shall pay the cost of strengthening any bridges or altering or improving any road communicating with or on the routes to the Site to facilitate the movement of Contractor's Equipment or Temporary Works and the Contractor shall indemnify and keep indemnified the Employer against all claims for damage to any such road or bridge caused by such movement, including such claims as may be made directly against the Employer, and shall negotiate and pay all claims arising solely out of such damage.
- Transport of Materials or Plant** **30.3** If, notwithstanding Sub-Clause 30.1, any damage occurs to any bridge or road communicating with or on the routes to the Site arising from the transport of materials or Plant, the Contractor shall notify the Engineer with a copy to the Employer, as soon as he becomes aware of such damage or as soon as he receives any claim from the authority entitled to make such claim. Where under any law or regulation the haulier of such materials or Plant is required to indemnify the road authority against damage the Employer shall not be liable for any costs, charges or expenses in respect thereof or in relation thereto. In other cases the Employer shall negotiate the settlement of and pay all sums due in respect of such claim and shall indemnify the Contractor in respect thereof and in respect of all claims, proceedings, damages, costs, charges and expenses in relation thereto. Provided that if and so far as any such claim or part thereof is, in the opinion of the Engineer, due to any failure on the part of the Contractor to observe and perform his obligations under Sub-Clause 30.1, then the amount, determined by the Engineer, after due consultation with the Employer and the Contractor, to be due to such failure shall be recoverable from the Contractor by the Employer and may be deducted by the Employer from any monies due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the Employer. Provided also that the Employer shall notify the Contractor whenever a settlement is to be negotiated and, where any amount may be due from the Contractor, the Employer shall consult with the Contractor before such settlement is agreed.
- Waterborne Traffic** **30.4** Where the nature of the Works is such as to require the use by the Contractor of waterborne transport the foregoing provisions of this Clause shall be construed as though "road" included a lock, dock, sea wall or other structure related to a waterway and "vehicle" included craft, and shall have effect accordingly.
- Opportunities for Other Contractors** **31.1** The Contractor shall, in accordance with the requirements of the Engineer, afford all reasonable opportunities for carrying out their work to:
- (a) any other contractors employed by the Employer and their workmen,
 - (b) the workmen of the Employer, and
 - (c) the workmen of any duly constituted authorities who may be employed in the execution on or near the Site of any work not included in the Contract or of any contract which the Employer may enter into in connection with or ancillary to the Works.
- Facilities for Other Contractors** **31.2** If, however, pursuant to Sub-Clause 31.1 the Contractor shall, on the written request of the Engineer:
- (a) make available to any such other contractor, or to the Employer or any such authority, any roads or ways for the maintenance of which the Contractor is responsible,

(b) permit the use, by any such, of Temporary Works or Contractor's Equipment on the Site, or

(c) provide any other service of whatsoever nature for any such,

the Engineer shall determine an addition to the Contract Price in accordance with Clause 52 and shall notify the Contractor accordingly, with a copy to the Employer.

- | | | |
|--|-------------|--|
| Contractor to Keep Site Clear | 32.1 | During the execution of the Works the Contractor shall keep the Site reasonably free from all unnecessary obstruction and shall store or dispose of any Contractor's Equipment and surplus materials and clear away and remove from the Site any wreckage, rubbish or Temporary Works no longer required. |
| Clearance of Site on Completion | 33.1 | Upon the issue of any Taking-Over Certificate the Contractor shall clear away and remove from that part of the Site to which such Taking-Over Certificate relates all Contractor's Equipment, surplus material, rubbish and Temporary Works of every kind, and leave such part of the Site and Works clean and in a workmanlike condition to the satisfaction of the Engineer. Provided that the Contractor shall be entitled to retain on Site, until the end of the Defects Liability Period, such materials, Contractor's Equipment and Temporary Works as are required by him for the purpose of fulfilling his obligations during the Defects Liability Period. |

Labour

- | | | |
|---|-------------|--|
| Engagement of Staff and Labour | 34.1 | The Contractor shall, unless otherwise provided in the Contract, make his own arrangements for the engagement of all staff and labour, local or other, and for their payment, housing, feeding and transport. |
| Returns of Labour and Contractor's Equipment | 35.1 | The Contractor shall, if required by the Engineer, deliver to the Engineer a return in detail, in such form and at such intervals as the Engineer may prescribe, showing the staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such information respecting Contractor's Equipment as the Engineer may require. |

Materials, Plant and Workmanship

- | | | |
|--|-------------|---|
| Quality of Materials, Plant and Workmanship | 36.1 | All materials, Plant and workmanship shall be:
<p>(a) of the respective kinds described in the Contract and in accordance with the Engineer's instructions, and</p> <p>(b) subjected from time to time to such tests as the Engineer may require at the place of manufacture, fabrication or preparation, or on the Site or at such other place or places as may be specified in the Contract, or at all or any of such places.</p> <p>The Contractor shall provide such assistance, labour, electricity, fuels, stores, apparatus and instruments as are normally required for examining, measuring and testing any materials or Plant and shall supply samples of materials, before incorporation in the Works, for testing as may be selected and required by the Engineer.</p> |
| Cost of Samples | 36.2 | All samples shall be supplied by the Contractor at his own cost if the supply thereof is clearly intended by or provided for in the Contract. |
| Cost of Tests | 36.3 | The cost of making any test shall be borne by the Contractor if such test is:
<p>(a) clearly intended by or provided for in the Contract, or</p> <p>(b) particularised in the Contract (in cases only of a test under load or of a test to ascertain whether the design of any finished or partially finished work is appropriate for the purposes which it was intended to fulfil) in sufficient detail to enable the Contractor to price or allow for the same in his Tender.</p> |

Cost of Tests not Provided for	36.4	<p>If any test required by the Engineer which is:</p> <p>(a) not so intended by or provided for,</p> <p>(b) (in the cases above mentioned) not so particularised, or</p> <p>(c) (though so intended or provided for) required by the Engineer to be carried out at any place other than the Site or the place of manufacture, fabrication or preparation of the materials or Plant tested,</p> <p>shows the materials, Plant or workmanship not to be in accordance with the provisions of the Contract to the satisfaction of the Engineer, then the cost of such test shall be borne by the Contractor, but in any other case Sub-Clause 36.5 shall apply.</p>
Engineer's Determination where Tests not Provided for	36.5	<p>Where, pursuant to Sub-Clause 36.4, this Sub-Clause applies the Engineer shall, after due consultation with the Employer and the Contractor, determine:</p> <p>(a) any extension of time to which the Contractor is entitled under Clause 44, and</p> <p>(b) the amount of such costs, which shall be added to the Contract Price,</p> <p>and shall notify the Contractor accordingly, with a copy to the Employer.</p>
Inspection of Operations	37.1	<p>The Engineer, and any person authorised by him, shall at all reasonable times have access to the Site and to all workshops and places where materials or Plant are being manufactured, fabricated or prepared for the Works and the Contractor shall afford every facility for and every assistance in obtaining the right to such access.</p>
Inspection and Testing	37.2	<p>The Engineer shall be entitled, during manufacture, fabrication or preparation to inspect and test the materials and Plant to be supplied under the Contract. If materials or Plant are being manufactured, fabricated or prepared in workshops or places other than those of the Contractor, the Contractor shall obtain permission for the Engineer to carry out such inspection and testing in those workshops or places. Such inspection or testing shall not release the Contractor from any obligation under the Contract.</p>
Dates for Inspection and Testing	37.3	<p>The Contractor shall agree with the Engineer on the time and place for the inspection or testing of any materials or Plant as provided in the Contract. The Engineer shall give the Contractor not less than 24 hours notice of his intention to carry out the inspection or to attend the tests. If the Engineer, or his duly authorised representative, does not attend on the date agreed, the Contractor may, unless otherwise instructed by the Engineer, proceed with the tests, which shall be deemed to have been made in the presence of the Engineer. The Contractor shall forthwith forward to the Engineer duly certified copies of the test readings. If the Engineer has not attended the tests, he shall accept the said readings as accurate.</p>
Rejection	37.4	<p>If, at the time and place agreed in accordance with Sub-Clause 37.3, the materials or Plant are not ready for inspection or testing or if, as a result of the inspection or testing referred to in this Clause, the Engineer determines that the materials or Plant are defective or otherwise not in accordance with the Contract, he may reject the materials or Plant and shall notify the Contractor thereof immediately. The notice shall state the Engineer's objections with reasons. The Contractor shall then promptly make good the defect or ensure that rejected materials or Plant comply with the Contract. If the Engineer so requests, the tests of rejected materials or Plant shall be made or repeated under the same terms and conditions. All costs incurred by the Employer by the repetition of the tests shall, after due consultation with the Employer and the Contractor, be determined by the Engineer and shall be recoverable from the Contractor by the Employer and may be deducted from any monies due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the Employer.</p>

Independent Inspection	37.5	The Engineer may delegate inspection and testing of materials or Plant to an independent inspector. Any such delegation shall be effected in accordance with Sub-Clause 2.4 and for this purpose such independent inspector shall be considered as an assistant of the Engineer. Notice of such appointment (not being less than 14 days) shall be given by the Engineer to the Contractor.
Examination of Work before Covering up	38.1	No part of the Works shall be covered up or put out of view without the approval of the Engineer and the Contractor shall afford full opportunity for the Engineer to examine and measure any such part of the Works which is about to be covered up or put out of view and to examine foundations before any part of the Works is placed thereon. The Contractor shall give notice to the Engineer whenever any such part of the Works or foundations is or are ready or about to be ready for examination and the Engineer shall, without unreasonable delay, unless he considers it unnecessary and advises the Contractor accordingly, attend for the purpose of examining and measuring such part of the Works or of examining such foundations.
Uncovering and Making Openings	38.2	The Contractor shall uncover any part of the Works or make openings in or through the same as the Engineer may from time to time instruct and shall reinstate and make good such part. If any such part has been covered up or put out of view after compliance with the requirement of Sub-Clause 38.1 and is found to be executed in accordance with the Contract, the Engineer shall, after due consultation with the Employer and the Contractor, determine the amount of the Contractor's costs in respect of such of uncovering, making openings in or through, reinstating and making good the same, which shall be added to the Contract Price, and shall notify the Contractor accordingly, with a copy to the Employer. In any other case all costs shall be borne by the Contractor.
Removal of Improper Work, Materials or Plant	39.1	The Engineer shall have authority to issue instructions from time to time, for: <ul style="list-style-type: none"> (a) the removal from the Site, within such time or times as may be specified in the instruction, of any materials or Plant which, in the opinion of the Engineer, are not in accordance with the Contract, (b) the substitution of proper and suitable materials or Plant, and (c) the removal and proper re-execution, notwithstanding any previous test thereof or interim payment therefor, of any work which, in respect of <ul style="list-style-type: none"> (i) materials, Plant or workmanship, or (ii) design by the Contractor or for which he is responsible, is not, in the opinion of the Engineer, in accordance with the Contract.
Default of Contractor in Compliance	39.2	In case of default on the part of the Contractor in carrying out such instruction within the time specified therein or, if none, within a reasonable time, the Employer shall be entitled to employ and pay other persons to carry out the same and all costs consequent thereon or incidental thereto shall, after due consultation with the Employer and the Contractor, be determined by the Engineer and shall be recoverable from the Contractor by the Employer, and may be deducted by the Employer from any monies due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the Employer.

Suspension

Suspension of Work	40.1	The Contractor shall, on the instructions of the Engineer, suspend the progress of the Works or any part thereof for such time and in such manner as the Engineer may consider necessary and shall, during such suspension, properly protect and secure the Works or such part thereof so far as is necessary in the opinion of the Engineer. Unless such suspension is : <ul style="list-style-type: none"> (a) otherwise provided for in the Contract, (b) necessary by reason of some default of or breach of contract by the Contractor or for which he is responsible,
---------------------------	-------------	---

(c) necessary by reason of climatic conditions on the Site, or

(d) necessary for the proper execution of the Works or for the safety of the Works or any part thereof (save to the extent that such necessity arises from any act or default by the Engineer or the Employer or from any of the risks defined in Sub-Clause 20.4),

Sub-Clause 40.2 shall apply.

**Engineer's
Determination
following
Suspension**

40.2 Where, pursuant to Sub-Clause 40.1, this Sub-Clause applies the Engineer shall, after due consultation with the Employer and the Contractor, determine:

(a) any extension of time to which the Contractor is entitled under Clause 44, and

(b) the amount, which shall be added to the Contract Price, in respect of the cost incurred by the Contractor by reason of such suspension,

and shall notify the Contractor accordingly, with a copy to the Employer.

**Suspension
lasting more
than 84 Days**

40.3 If the progress of the Works or any part thereof is suspended on the instructions of the Engineer and if permission to resume work is not given by the Engineer within a period of 84 days from the date of suspension then, unless such suspension is within paragraph (a), (b), (c) or (d) of Sub-Clause 40.1, the Contractor may give notice to the Engineer requiring permission, within 28 days from the receipt thereof, to proceed with the Works or that part thereof in regard to which progress is suspended. If, within the said time, such permission is not granted, the Contractor may, but is not bound to, elect to treat the suspension, where it affects part only of the Works, as an omission of such part under Clause 51 by giving a further notice to the Engineer to that effect, or, where it affects the whole of the Works, treat the suspension as an event of default by the Employer and terminate his employment under the Contract in accordance with the provisions of Sub-Clause 69.1, whereupon the provisions of Sub-Clauses 69.2 and 69.3 shall apply.

Commencement and Delays

**Commencement
of Works**

41.1 The Contractor shall commence the Works as soon as is reasonably possible after the receipt by him of a notice to this effect from the Engineer, which notice shall be issued within the time stated in the Appendix to Tender after the date of the Letter of Acceptance. Thereafter, the Contractor shall proceed with the Works with due expedition and without delay.

**Possession of
Site and Access
There to**

42.1 Save insofar as the Contract may prescribe:

(a) the extent of portions of the Site of which the Contractor is to be given possession from time to time,

(b) the order in which such portions shall be made available to the Contractor,

and, subject to any requirement in the Contract as to the order in which the Works shall be executed, the Employer will, with the Engineer's notice to commence the Works, give to the Contractor possession of

(c) so much of the Site, and

(d) such access as, in accordance with the Contract, is to be provided by the Employer as may be required to enable the Contractor to commence and proceed with the execution of the Works in accordance with the programme referred to in Clause 14, if any, and otherwise in accordance with such reasonable proposals as the Contractor shall, by notice to the Engineer with a copy to the Employer, make. The Employer will, from time to time as the Works proceed, give to the Contractor possession of such further portions of the Site as may be required to enable the Contractor to proceed with the execution of the Works with due dispatch in accordance with such programme or proposals, as the case may be.

Failure to Give Possession	42.2	<p>If the Contractor suffers delay and/or incurs costs from failure on the part of the Employer to give possession in accordance with the terms of Sub-Clause 42. 1, the Engineer shall, after due consultation with the Employer and the Contractor, determine:</p> <p>(a) any extension of time to which the Contractor is entitled under Clause 44, and</p> <p>(b) the amount of such costs, which shall be added to the Contract Price, and shall notify the Contractor accordingly, with a copy to the Employer.</p>
Rights of Way and Facilities	42.3	<p>The Contractor shall bear all costs and charges for special or temporary rights of way required by him in connection with access to the Site. The Contractor shall also provide at his own cost any additional facilities outside the Site required by him for the purposes of the Works.</p>
Time for Completion	43.1	<p>The whole of the Works and, if applicable, any Section required to be completed within a particular time as stated in the Appendix to Tender, shall be completed, in accordance with the provisions of Clause 48, within the time stated in the Appendix to Tender for the whole of the Works or the Section (as the case may be), calculated from the Commencement Date, or such extended time as may be allowed under Clause 44.</p>
Extension of Time for Completion	44.1	<p>In the event of:</p> <p>(a) the amount or nature of extra or additional work,</p> <p>(b) any cause of delay referred to in these Conditions,</p> <p>(c) exceptionally adverse climatic conditions,</p> <p>(d) any delay, impediment or prevention by the Employer, or</p> <p>(e) other special circumstances which may occur, other than through a default of or breach of contract by the Contractor or for which he is responsible,</p> <p>being such as fairly to entitle the Contractor to an extension of the Time for Completion of the Works, or any Section or part thereof, the Engineer shall, after due consultation with the Employer and the Contractor, determine the amount of such extension and shall notify the Contractor accordingly, with a copy to the Employer.</p>
Contractor to Provide Notification and Detailed Particulars	44.2	<p>Provided that the Engineer is not bound to make any determination unless the Contractor has</p> <p>(a) within 28 days after such event has first arisen notified the Engineer with a copy to the Employer, and</p> <p>(b) within 28 days, or such other reasonable time as may be agreed by the Engineer, after such notification submitted to the Engineer detailed particulars of any extension of time to which he may consider himself entitled in order that such submission may be investigated at the time.</p>
Interim Determination of Extension	44.3	<p>Provided also that where an event has a continuing effect such that it is not practicable for the Contractor to submit detailed particulars within the period of 28 days referred to in Sub-Clause 44.2(b), he shall nevertheless be entitled to an extension of time provided that he has submitted to the Engineer interim particulars at intervals of not more than 28 days and final particulars within 28 days of the end of the effects resulting from the event. On receipt of such interim particulars, the Engineer shall, without undue delay, make an interim determination of extension of time and, on receipt of the final particulars, the Engineer shall review all the circumstances and shall determine an overall extension of time in regard to the event. In both such cases the Engineer shall make his determination after due consultation with the Employer and the Contractor and shall notify the Contractor of the determination, with a copy to the Employer. No final review shall result in a decrease of any extension of time already determined by the Engineer.</p>

Restriction on Working Hours **45.1** Subject to any provision to the contrary contained in the Contract, none of the Works shall, save as hereinafter provided, be carried on during the night or on locally recognised days of rest without the consent of the Engineer, except when work is unavoidable or absolutely necessary for the saving of life or property or for the safety of the Works, in which case the Contractor shall immediately advise the Engineer. Provided that the provisions of this Clause shall not be applicable in the case of any work which it is customary to carry out by multiple shifts.

Rate of Progress **46.1** If for any reason, which does not entitle the Contractor to an extension of time, the rate of progress of the Works or any Section is at any time, in the opinion of the Engineer, too slow to comply with the Time for Completion, the Engineer shall so notify the Contractor who shall thereupon take such steps as are necessary, subject to the consent of the Engineer, to expedite progress so as to comply with the Time for Completion. The Contractor shall not be entitled to any additional payment for taking such steps. If, as a result of any notice given by the Engineer under this Clause, the Contractor considers that it is necessary to do any work at night or on locally recognised days of rest, he shall be entitled to seek the consent of the Engineer so to do. Provided that if any steps, taken by the Contractor in meeting his obligations under this Clause, involve the Employer in additional supervision costs, such costs shall, after due consultation with the Employer and the Contractor, be determined by the Engineer and shall be recoverable from the Contractor by the Employer, and may be deducted by the Employer from any monies due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the Employer.

Liquidated Damages for Delay **47.1** If the Contractor fails to comply with the Time for Completion in accordance with Clause 48, for the whole of the Works or, if applicable, any Section within the relevant time prescribed by Clause 43, then the Contractor shall pay to the Employer the relevant sum stated in the Appendix to Tender as liquidated damages for such default and not as a penalty (which sum shall be the only monies due from the Contractor for such default) for every day or part of a day which shall elapse between the relevant Time for Completion and the date stated in a Taking-Over Certificate of the whole of the Works or the relevant Section, subject to the applicable limit stated in the Appendix to Tender. The Employer may, without prejudice to any other method of recovery, deduct the amount of such damages from any monies due or to become due to the Contractor. The payment or deduction of such damages shall not relieve the Contractor from his obligation to complete the Works, or from any other of his obligations and liabilities under the Contract.

Reduction of Liquidated Damages **47.2** If, before the Time for Completion of the whole of the Works or, if applicable, any Section, a Taking-Over Certificate has been issued for any part of the Works or of a Section, the liquidated damages for delay in completion of the remainder of the Works or of that Section shall, for any period of delay after the date stated in such Taking-Over Certificate, and in the absence of alternative provisions in the Contract, be reduced in the proportion which the value of the part so certified bears to the value of the whole of the Works or Section, as applicable. The provisions of this Sub-Clause shall only apply to the rate of liquidated damages and shall not affect the limit thereof.

Taking-Over Certificate 48.1 When the whole of the Works have been substantially completed and have satisfactorily passed any Tests on Completion prescribed by the Contract, the Contractor may give a notice to that effect to the Engineer, with a copy to the Employer, accompanied by a written undertaking to finish with due expedition any outstanding work during the Defects Liability Period. Such notice and undertaking shall be deemed to be a request by the Contractor for the Engineer to issue a Taking-Over Certificate in respect of the Works. The Engineer shall, within 21 days of the date of delivery of such notice, either issue to the Contractor, with a copy to the Employer, a Taking-Over Certificate, stating the date on which, in his opinion, the Works were substantially completed in accordance with the Contract, or give instructions in writing to the Contractor specifying all the work which, in the Engineer's opinion, is required to be done by the Contractor before the issue of such Certificate. The Engineer shall also notify the Contractor of any defects in the Works affecting substantial completion that may appear after such instructions and before completion of the Works specified therein. The Contractor shall be entitled to receive such Taking-Over Certificate within 21 days of completion, to the satisfaction of the Engineer, of the Works so specified and remedying any defects so notified.

Taking Over of Sections or Parts 48.2 Similarly, in accordance with the procedure set out in Sub-Clause 48.1, the Contractor may request and the Engineer shall issue a Taking-Over Certificate in respect of:

(a) any Section in respect of which a separate Time for Completion is provided in the Appendix to Tender,

(b) any substantial part of the Permanent Works which has been both completed to the satisfaction of the Engineer and, otherwise than as provided for in the Contract, occupied or used by the Employer, or

(c) any part of the Permanent Works which the Employer has elected to occupy or use prior to completion (where such prior occupation or use is not provided for in the Contract or has not been agreed by the Contractor as a temporary measure).

Substantial Completion of Parts 48.3 If any part of the Permanent Works has been substantially completed and has satisfactorily passed any Tests on Completion prescribed by the Contract, the Engineer may issue a Taking-Over Certificate in respect of that part of the Permanent Works before completion of the whole of the Works and, upon the issue of such Certificate, the Contractor shall be deemed to have undertaken to complete with due expedition any outstanding work in that part of the Permanent Works during the Defects Liability Period.

Surfaces Requiring Reinstatement 48.4 Provided that a Taking-Over Certificate given in respect of any Section or part of the Permanent Works before completion of the whole of the Works shall not be deemed to certify completion of any ground or surfaces requiring reinstatement, unless such Taking-Over Certificate shall expressly so state.

Defects Liability

Defects Liability Period 49.1 In these Conditions the expression "Defects Liability Period" shall mean the defects liability period named in the Appendix to Tender, calculated from:

(a) the date of completion of the Works certified by the Engineer in accordance with Clause 48, or

(b) in the event of more than one certificate having been issued by the Engineer under Clause 48, the respective dates so certified,

and in relation to the Defects Liability Period the expression "the Works" shall be construed accordingly.

- Completion of Outstanding Work and Remedying Defects** **49.2** To the intent that the Works shall, at or as soon as practicable after the expiration of the Defects Liability Period, be delivered to the Employer in the condition required by the Contract, fair wear and tear excepted, to the satisfaction of the Engineer, the Contractor shall:
- (a) complete the work, if any, outstanding on the date stated in the Taking-Over Certificate as soon as practicable after such date, and
- (b) execute all such work of amendment, reconstruction, and remedying defects, shrinkages or other faults as the Engineer may, during the Defects Liability Period or within 14 days after its expiration, as a result of an inspection made by or on behalf of the Engineer prior to its expiration, instruct the Contractor to execute.
- Cost of Remedying Defects** **49.3** All work referred to in Sub-Clause 49.2 (b) shall be executed by the Contractor at his own cost if the necessity thereof is, in the opinion of the Engineer, due to:
- (a) the use of materials, Plant or workmanship not in accordance with the Contract,
- (b) where the Contractor is responsible for the design of part of the Permanent Works, any fault in such design, or
- (c) the neglect or failure on the part of the Contractor to comply with any obligation, expressed or implied, on the Contractor's part under the Contract.
- If, in the opinion of the Engineer, such necessity is due to any other cause, he shall determine an addition to the Contract Price in accordance with Clause 52 and shall notify the Contractor accordingly, with a copy to the Employer.
- Contractor's Failure to Carry Out Instructions** **49.4** In case of default on the part of the Contractor in carrying out such instruction within a reasonable time, the Employer shall be entitled to employ and pay other persons to carry out the same and if such work is work which, in the opinion of the Engineer, the Contractor was liable to do at his own cost under the Contract, then all costs consequent thereon or incidental thereto shall, after due consultation with the Employer and the Contractor, be determined by the Engineer and shall be recoverable from the Contractor by the Employer, and may be deducted by the Employer from any monies due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the Employer.
- Contractor to Search** **50.1** If any defect, shrinkage or other fault in the Works appears at any time prior to the end of the Defects Liability Period, the Engineer may instruct the Contractor, with copy to the Employer, to search under the directions of the Engineer for the cause thereof. Unless such defect, shrinkage or other fault is one for which the Contractor is liable under the Contract, the Engineer shall, after due consultation with the Employer and the Contractor, determine the amount in respect of the costs of such search incurred by the Contractor, which shall be added to the Contract Price and shall notify the Contractor accordingly, with a copy to the Employer. If such defect, shrinkage or other fault is one for which the Contractor is liable, the cost of the work carried out in searching as aforesaid shall be borne by the Contractor and he shall in such case remedy such defect, shrinkage or other fault at his own cost in accordance with the provisions of Clause 49.

Alterations, Additions and Omissions

- Variations** **51.1** The Engineer shall make any variation of the form, quality or quantity of the Works or any part thereof that may, in his opinion, be necessary and for that purpose, or if for any other reason it shall, in his opinion, be appropriate, he shall have the authority to instruct the Contractor to do and the Contractor shall do any of the following:
- (a) increase or decrease the quantity of any work included in the Contract,
- (b) omit any such work (but not if the omitted work is to be carried out by the Employer or by another contractor),

- (c) change the character or quality or kind of any such work,
- (d) change the levels, lines, position and dimensions of any part of the Works,
- (e) execute additional work of any kind necessary for the completion of the Works, or
- (f) change any specified sequence or timing of construction of any part of the Works.

No such variation shall in any way vitiate or invalidate the Contract, but the effect, if any, of all such variations shall be valued in accordance with Clause 52. Provided that where the issue of an instruction to vary the Works is necessitated by some default of or breach of contract by the Contractor or for which he is responsible, any additional cost attributable to such default shall be borne by the Contractor.

Instructions for Variations **51.2** The Contractor shall not make any such variation without an instruction of the Engineer. Provided that no instruction shall be required for increase or decrease in the quantity of any work where such increase or decrease is not the result of an instruction given under this Clause, but is the result of the quantities exceeding or being less than those stated in the Bill of Quantities.

Valuation of Variations **52.1** All variations referred to in Clause 51 and any additions to the Contract Price which are required to be determined in accordance with Clause 52 (for the purposes of this Clause referred to as “varied work”), shall be valued at the rates and prices set out in the Contract if, in the opinion of the Engineer, the same shall be applicable. If the Contract does not contain any rates or prices applicable to the varied work, the rates and prices in the Contract shall be used as the basis for valuation so far as may be reasonable, failing which, after due consultation by the Engineer with the Employer and the Contractor, suitable rates or prices shall be agreed upon between the Engineer and the Contractor. In the event of disagreement the Engineer shall fix such rates or prices as are, in his opinion, appropriate and shall notify the Contractor accordingly, with a copy to the Employer. Until such time as rates or prices are agreed or fixed, the Engineer shall determine provisional rates or prices to enable on-account payments to be included in certificates issued in accordance with Clause 60.

Power of Engineer to Fix Rates **52.2** Provided that if the nature or amount of any varied work relative to the nature or amount of the whole of the Works or to any part thereof, is such that, in the opinion of the Engineer, the rate or price contained in the Contract for any item of the Works is, by reason of such varied work, rendered inappropriate or inapplicable, then, after due consultation by the Engineer with the Employer and the Contractor, a suitable rate or price shall be agreed upon between the Engineer and the Contractor. In the event of disagreement the Engineer shall fix such other rate or price as is, in his opinion, appropriate and shall notify the Contractor accordingly, with a copy to the Employer. Until such time as rates or prices are agreed or fixed, the Engineer shall determine provisional rates or prices to enable on-account payments to be included in certificates issued in accordance with Clause 60.

Provided also that no varied work instructed to be done by the Engineer pursuant to Clause 51 shall be valued under Sub-Clause 52.1 or under this Sub-Clause unless, within 14 days of the date of such instruction and, other than in the case of omitted work, before the commencement of the varied work, notice shall have been given either:

- (a) by the Contractor to the Engineer of his intention to claim extra payment or a varied rate or price, or
- (b) by the Engineer to the Contractor of his intention to vary a rate or price.

Variations Exceeding 15 per cent **52.3** If, on the issue of the Taking-Over Certificate for the whole of the Works, it is found that as a result of:

- (a) all varied work valued under Sub-Clauses 52.1 and 52.2, and

(b) all adjustments upon measurement of the estimated quantities set out in the Bill of Quantities, excluding Provisional Sums, dayworks and adjustments of price made under Clause 70,

but not from any other cause, there have been additions to or deductions from the Contract Price which taken together are in excess of 15 per cent of the "Effective Contract Price" (which for the purposes of this Sub-Clause shall mean the Contract Price, excluding Provisional Sums and allowance for dayworks, if any) then and in such event (subject to any action already taken under any other Sub-Clause of this Clause), after due consultation by the Engineer with the Employer and the Contractor, there shall be added to or deducted from the Contract Price such further sum as may be agreed between the Contractor and the Engineer or, failing agreement, determined by the Engineer having regard to the Contractor's Site and general overhead costs of the Contract. The Engineer shall notify the Contractor of any determination made under this Sub-Clause, with a copy to the Employer. Such sum shall be based only on the amount by which such additions or deductions shall be in excess of 15 per cent of the Effective Contract Price.

Daywork 52.4 The Engineer may, if in his opinion it is necessary or desirable, issue an instruction that any varied work shall be executed on a daywork basis. The Contractor shall then be paid for such varied work under the terms set out in the daywork schedule included in the Contract and at the rates and prices affixed thereto by him in the Tender.

The Contractor shall furnish to the Engineer such receipts or other vouchers as may be necessary to prove the amounts paid and, before ordering materials, shall submit to the Engineer quotations for the same for his approval.

In respect of such of the Works executed on a daywork basis, the Contractor shall, during the continuance of such work, deliver each day to the Engineer an exact list in duplicate of the names, occupation and time of all workmen employed on such work and a statement, also in duplicate, showing the description and quantity of all materials and Contractor's Equipment used thereon or therefor other than Contractor's Equipment which is included in the percentage addition in accordance with such daywork schedule. One copy of each list and statement will, if correct, or when agreed, be signed by the Engineer and returned to the Contractor.

At the end of each month the Contractor shall deliver to the Engineer a priced statement of the labour, materials and Contractor's Equipment, except as aforesaid, used and the Contractor shall not be entitled to any payment unless such lists and statements have been fully and punctually rendered. Provided always that if the Engineer considers that for any reason the sending of such lists or statements by the Contractor, in accordance with the foregoing provision, was impracticable he shall nevertheless be entitled to authorise payment for such work, either as daywork, on being satisfied as to the time employed and the labour, materials and Contractor's Equipment used on such work, or at such value therefor as shall, in his opinion, be fair and reasonable.

Procedure for Claims

Notice of Claims 53.1 Notwithstanding any other provision of the Contract, if the Contractor intends to claim any additional payment pursuant to any Clause of these Conditions or otherwise, he shall give notice of his intention to the Engineer, with a copy to the Employer, within 28 days after the event giving rise to the claim has first arisen.

Contemporary Records 53.2 Upon the happening of the event referred to in Sub-Clause 53.1, the Contractor shall keep such contemporary records as may reasonably be necessary to support any claim he may subsequently wish to make. Without necessarily admitting the Employer's liability, the Engineer shall, on receipt of a notice under Sub-Clause 53.1, inspect such contemporary records and may instruct the Contractor to keep

any further contemporary records as are reasonable and may be material to the claim of which notice has been given. The Contractor shall permit the Engineer to inspect all records kept pursuant to this Sub-Clause and shall supply him with copies thereof as and when the Engineer so instructs.

- | | | |
|---------------------------------|-------------|---|
| Substantiation of Claims | 53.3 | Within 28 days, or such other reasonable time as may be agreed by the Engineer, of giving notice under Sub-Clause 53.1, the Contractor shall send to the Engineer an account giving detailed particulars of the amount claimed and the grounds upon which the claim is based. Where the event giving rise to the claim has a continuing effect, such account shall be considered to be an interim account and the Contractor shall, at such intervals as the Engineer may reasonably require, send further interim accounts giving the accumulated amount of the claim and any further grounds upon which it is based. In cases where interim accounts are sent to the Engineer, the Contractor shall send a final account within 28 days of the end of the effects resulting from the event. The Contractor shall, if required by the Engineer so to do, copy to the Employer all accounts sent to the Engineer pursuant to this Sub-Clause. |
| Failure to Comply | 53.4 | If the Contractor fails to comply with any of the provisions of this Clause in respect of any claim which he seeks to make, his entitlement to payment in respect thereof shall not exceed such amount as the Engineer or any arbitrator or arbitrators appointed pursuant to Sub-Clause 67.3 assessing the claim considers to be verified by contemporary records (whether or not such records were brought to the Engineer's notice as required under Sub-Clauses 53.2 and 53.3). |
| Payment of Claims | 53.5 | The Contractor shall be entitled to have included in any interim payment certified by the Engineer pursuant to Clause 60 such amount in respect of any claim as the Engineer, after due consultation with the Employer and the Contractor, may consider due to the Contractor provided that the Contractor has supplied sufficient particulars to enable the Engineer to determine the amount due. If such particulars are insufficient to substantiate the whole of the claim, the Contractor shall be entitled to payment in respect of such part of the claim as such particulars may substantiate to the satisfaction of the Engineer. The Engineer shall notify the Contractor of any determination made under this Sub-Clause, with a copy to the Employer. |

Contractor's Equipment, Temporary Works and Materials

- | | | |
|---|-------------|--|
| Contractor's Equipment, Temporary Works and Materials; Exclusive Use for the Works | 54.1 | All Contractor's Equipment, Temporary Works and materials provided by the Contractor shall, when brought on to the Site, be deemed to be exclusively intended for the execution of the Works and the Contractor shall not remove the same or any part thereof, except for the purpose of moving it from one part of the Site to another, without the consent of the Engineer. Provided that consent shall not be required for vehicles engaged in transporting any staff, labour, Contractor's Equipment, Temporary Works, Plant or materials to or from the Site. |
| Employer not Liable for Damage | 54.2 | The Employer shall not at any time be liable, save as mentioned in Clauses 20 and 65, for the loss of or damage to any of the said Contractor's Equipment, Temporary Works or materials. |
| Customs Clearance | 54.3 | The Employer will use his best endeavours in assisting the Contractor, where required, in obtaining clearance through the Customs of Contractor's Equipment, materials and other things required for the Works. |
| Re-export of Contractor's Equipment | 54.4 | In respect of any Contractor's Equipment which the Contractor has imported for the purposes of the Works, the Employer will use his best endeavours to assist the Contractor, where required, in procuring any necessary Government consent to the re-export of such Contractor's Equipment by the Contractor upon the removal thereof pursuant to the terms of the Contract. |

- Conditions of Hire of Contractor's Equipment** **54.5** With a view to securing, in the event of termination under Clause 63, the continued availability, for the purpose of executing the Works, of any hired Contractor's Equipment, the Contractor shall not bring on to the Site any hired Contractor's Equipment unless there is an agreement for the hire thereof (which agreement shall be deemed not to include an agreement for hire purchase) which contains a provision that the owner thereof will, on request in writing made by the Employer within 7 days after the date on which any termination has become effective, and on the Employer undertaking to pay all hire charges in respect thereof from such date, hire such Contractor's Equipment to the Employer on the same terms in all respects as the same was hired to the Contractor save that the Employer shall be entitled to permit the use thereof by any other contractor employed by him for the purpose of executing and completing the Works and remedying any defects therein, under the terms of the said Clause 63.
- Costs for the Purpose of Clause 63** **54.6** In the event of the Employer entering into any agreement for the hire of Contractor's Equipment pursuant to Sub-Clause 54.5, all sums properly paid by the Employer under the provisions of any such agreement and all costs incurred by him (including stamp duties) in entering into such agreement shall be deemed, for the purpose of Clause 63, to be part of the cost of executing and completing the Works and the remedying of any defects therein.
- Incorporation of Clause in Subcontracts** **54.7** The Contractor shall, where entering into any subcontract for the execution of any part of the Works, incorporate in such subcontract (by reference or otherwise) the provisions of this Clause in relation to Contractor's Equipment, Temporary Works or materials brought on to the Site by the Subcontractor.
- Approval of Materials not Implied** **54.8** The operation of this Clause shall not be deemed to imply any approval by the Engineer of the materials or other matters referred to therein nor shall it prevent the rejection of any such materials at any time by the Engineer.

Measurement

- Quantities** **55.1** The quantities set out in the Bill of Quantities are the estimated quantities for the Works, and they are not to be taken as the actual and correct quantities of the Works to be executed by the Contractor in fulfilment of his obligations under the Contract.
- Works to be Measured** **56.1** The Engineer shall, except as otherwise stated, ascertain and determine by measurement the value of the Works in accordance with the Contract and the Contractor shall be paid that value in accordance with Clause 60. The Engineer shall, when he requires any part of the Works to be measured, give reasonable notice to the Contractor's authorised agent, who shall:

(a) forthwith attend or send a qualified representative to assist the Engineer in making such measurement, and

(b) supply all particulars required by the Engineer.

Should the Contractor not attend, or neglect or omit to send such representative, then the measurement made by the Engineer or approved by him shall be taken to be the correct measurement of such part of the Works. For the purpose of measuring such Permanent Works as are to be measured by records and drawings, the Engineer shall prepare records and drawings as the work proceeds and the Contractor, as and when called upon to do so in writing, shall, within 14 days, attend to examine and agree such records and drawings with the Engineer and shall sign the same when so agreed. If the Contractor does not attend to examine and agree such records and drawings, they shall be taken to be correct. If, after examination of such records and drawings, the Contractor does not agree the same or does not sign the same as agreed, they shall nevertheless be taken to be correct, unless the Contractor, within 14 days of such examination, lodges with the Engineer notice of the respects in which such records and drawings are claimed by him to be incorrect. On receipt of such notice, the Engineer shall review the records and drawings and either confirm or vary them.

Method of Measurement	57.1	The Works shall be measured net, notwithstanding any general or local custom, except where otherwise provided for in the Contract.
Breakdown of Lump Sum Items	57.2	For the purposes of statements submitted in accordance with Sub-Clause 60.1, the Contractor shall submit to the Engineer, within 28 days after the receipt of the Letter of Acceptance, a breakdown for each of the lump sum items contained in the Tender. Such breakdowns shall be subject to the approval of the Engineer.

Provisional Sums

Definition of "Provisional Sum"	58.1	"Provisional Sum" means a sum included in the Contract and so designated in the Bill of Quantities for the execution of any part of the Works or for the supply of goods, materials, Plant or services, or for contingencies, which sum may be used, in whole or in part, or not at all, on the instructions of the Engineer. The Contractor shall be entitled to only such amounts in respect of the work, supply or contingencies to which such Provisional Sums relate as the Engineer shall determine in accordance with this Clause. The Engineer shall notify the Contractor of any determination made under this Sub-Clause, with a copy to the Employer.
Use of Provisional Sums	58.2	In respect of every Provisional Sum the Engineer shall have authority to issue instructions for the execution of work or for the supply of goods, materials, Plant or services by: <ul style="list-style-type: none"> (a) the Contractor, in which case the Contractor shall be entitled to an amount equal to the value thereof determined in accordance with Clause 52, and (b) a nominated Subcontractor, as hereinafter defined, in which case the sum to be paid to the Contractor therefor shall be determined and paid in accordance with Sub-Clause 59.4.
Production of Vouchers	58.3	The Contractor shall produce to the Engineer all quotations, invoices, vouchers and accounts or receipts in connection with expenditure in respect of Provisional Sums, except where work is valued in accordance with rates or prices set out in the Tender.

Nominated Subcontractors

Definition of "Nominated Subcontractors"	59.1	All specialists, merchants, tradesmen and others executing any work or supplying any goods, materials, Plant or services for which Provisional Sums are included in the Contract, who may have been or be nominated or selected or approved by the Employer or the Engineer, and all persons to whom by virtue of the provisions of the Contract the Contractor is required to subcontract shall, in the execution of such work or the supply of such goods, materials, Plant or services, be deemed to be subcontractors to the Contractor and are referred to in this Contract as "nominated Subcontractors".
Nominated Subcontractors; Objection to Nomination	59.2	The Contractor shall not be required by the Employer or the Engineer, or be deemed to be under any obligation, to employ any nominated Subcontractor against whom the Contractor may raise reasonable objection, or who declines to enter into a subcontract with the Contractor containing provisions: <ul style="list-style-type: none"> (a) that in respect of the work, goods, materials, Plant or services the subject of the subcontract, the nominated Subcontractor will undertake towards the Contractor such obligations and liabilities as will enable the Contractor to discharge his own obligations and liabilities towards the Employer under the terms of the Contract and will save harmless and indemnify the Contractor from and against the same and from all claims, proceedings, damages, costs, charges and expenses whatsoever arising out of or in connection therewith, or arising out of or in connection with any failure to perform such obligations or to fulfil such liabilities, and

(b) that the nominated Subcontractor will save harmless and indemnify the Contractor from and against any negligence by the nominated Subcontractor, his agents, workmen and servants and from and against any misuse by him or them of any Temporary Works provided by the Contractor for the purposes of the Contract and from all claims as aforesaid.

Design Requirements to be Expressly Stated

59.3 If in connection with any Provisional Sum the services to be provided include any matter of design or specification of any part of the Permanent Works or of any Plant to be incorporated therein, such requirement shall be expressly stated in the Contract and shall be included in any nominated Subcontract. The nominated Subcontract shall specify that the nominated Subcontractor providing such services will save harmless and indemnify the Contractor from and against the same and from all claims, proceedings, damages, costs, charges and expenses whatsoever arising out of or in connection with any failure to perform such obligations or to fulfil such liabilities.

Payments to Nominated Subcontractors

59.4 For all work executed or goods, materials, Plant or services supplied by any nominated Subcontractor, the Contractor shall be entitled to:

(a) the actual price paid or due to be paid by the Contractor, on the instructions of the Engineer, and in accordance with the subcontract;

(b) in respect of labour supplied by the Contractor, the sum, if any, entered in the Bill of Quantities or, if instructed by the Engineer pursuant to paragraph (a) of Sub-Clause 58.2, as may be determined in accordance with Clause 52; and

(c) in respect of all other charges and profit, a sum being a percentage rate of the actual price paid or due to be paid calculated, where provision has been made in the Bill of Quantities for a rate to be set against the relevant Provisional Sum, at the rate inserted by the Contractor against that item or, where no such provision has been made, at the rate inserted by the Contractor in the Appendix to Tender and repeated where provision for such is made in a special item provided in the Bill of Quantities for such purpose.

Certification of Payments to Nominated Subcontractors

59.5 Before issuing, under Clause 60, any certificate, which includes any payment in respect of work done or goods, materials, Plant or services supplied by any nominated Subcontractor, the Engineer shall be entitled to demand from the Contractor reasonable proof that all payments, less retentions, included in previous certificates in respect of the work or goods, materials, Plant or services of such nominated Subcontractor have been paid or discharged by the Contractor. If the Contractor fails to supply such proof then, unless the Contractor:

(a) satisfies the Engineer in writing that he has reasonable cause for withholding or refusing to make such payments, and

(b) produces to the Engineer reasonable proof that he has so informed such nominated Subcontractor in writing,

the Employer shall be entitled to pay to such nominated Subcontractor direct, upon the certificate of the Engineer, all payments, less retentions, provided for in the nominated Subcontract, which the Contractor has failed to make to such nominated Subcontractor and to deduct by way of set-off the amount so paid by the Employer from any sums due or to become due from the Employer to the Contractor.

Provided that, where the Engineer has certified and the Employer has paid direct as aforesaid, the Engineer shall, in issuing any further certificate in favour of the Contractor, deduct from the amount thereof the amount so paid, direct as aforesaid, but shall not withhold or delay the issue of the certificate itself when due to be issued under the terms of the Contract.

Certificates and Payment

Monthly Statements

60.1 The Contractor shall submit to the Engineer after the end of each month six copies, each signed by the Contractor's representative approved by the Engineer in accordance with Sub-Clause 15.1, of a statement, in such form as the Engineer may from time to time prescribe, showing the amounts to which the Contractor considers himself to be entitled up to the end of the month in respect of:

- (a) the value of the Permanent Works executed,
- (b) any other items in the Bill of Quantities including those for Contractor's Equipment, Temporary Works, dayworks and the like,
- (c) the percentage of the invoice value of listed materials, all as stated in the Appendix to Tender, and Plant delivered by the Contractor on the Site for incorporation in the Permanent Works but not incorporated in such Works,
- (d) adjustments under Clause 70, and
- (e) any other sum to which the Contractor may be entitled under the Contract or otherwise.

Monthly Payments

60.2 The Engineer shall, within 28 days of receiving such statement, deliver to the Employer an Interim Payment Certificate stating the amount of payment to the Contractor which the Engineer considers due and payable in respect of such statement, subject:

(a) firstly, to the retention of the amount calculated by applying the Percentage of Retention stated in the Appendix to Tender, to the amount to which the Contractor is entitled under paragraphs (a), (b), (c) and (e) of Sub-Clause 60.1 until the amount so retained reaches the Limit of Retention Money stated in the Appendix to Tender, and

(b) secondly, to the deduction, other than pursuant to Clause 47, of any sums which may have become due and payable by the Contractor to the Employer.

Provided that the Engineer shall not be bound to certify any payment under this Sub-Clause if the net amount thereof, after all retentions and deductions, would be less than the Minimum Amount of Interim Payment Certificates stated in the Appendix to Tender.

Notwithstanding the terms of this Clause or any other Clause of the Contract no amount will be certified by the Engineer for payment until the performance security, if required under the Contract, has been provided by the Contractor and approved by the Employer.

Payment of Retention Money

60.3 (a) Upon the issue of the Taking-Over Certificate with respect to the whole of the Works, one half of the Retention Money, or upon the issue of a Taking-Over Certificate with respect to a Section or part of the Permanent Works only such proportion thereof as the Engineer determines having regard to the relative value of such Section or part of the Permanent Works, shall be certified by the Engineer for payment to the Contractor.

(b) Upon the expiration of the Defects Liability Period for the Works the other half of the Retention Money shall be certified by the Engineer for payment to the Contractor. Provided that, in the event of different Defects Liability Periods having become applicable to different Sections or parts of the Permanent Works pursuant to Clause 48, the expression "expiration of the Defects Liability Period" shall, for the purposes of this Sub-Clause, be deemed to mean the expiration of the latest of such periods. Provided also that if at such time there shall remain to be executed by the Contractor any work instructed, pursuant to Clauses 49 and 50, in respect of the Works, the Engineer shall be entitled to withhold certification until completion of such work of so much of the balance of the Retention Money as shall, in the opinion of the Engineer, represent the cost of the work remaining to be executed.

Correction of Certificates

60.4 The Engineer may by any Interim Payment Certificate make any correction or modification in any previous Interim Payment Certificate which shall have been issued by him and shall have authority, if any work is not being carried out to his satisfaction, to omit or reduce the value of such work in any Interim Payment Certificate.

Statement at Completion	60.5	<p>Not later than 84 days after the issue of the Taking-Over Certificate in respect of the whole of the Works, the Contractor shall submit to the Engineer six copies of a Statement at Completion with supporting documents showing in detail, in the form approved by the Engineer:</p> <p>(a) the final value of all work done in accordance with the Contract up to the date stated in such Taking-Over Certificate,</p> <p>(b) any further sums which the Contractor considers to be due, and</p> <p>(c) an estimate of amounts which the Contractor considers will become due to him under the Contract.</p> <p>The estimated amounts shall be shown separately in such Statement at Completion. The Engineer shall certify payment in accordance with Sub-Clause 60.2.</p>
Final Statement	60.6	<p>Not later than 56 days after the issue of the Defects Liability Certificate pursuant to Sub-Clause 62.1, the Contractor shall submit to the Engineer for consideration six copies of a draft final statement with supporting documents showing in detail, in the form approved by the Engineer:</p> <p>(a) the value of all work done in accordance with the Contract, and</p> <p>(b) any further sums which the Contractor considers to be due to him under the Contract or otherwise.</p> <p>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 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 (for the purposes of these Conditions referred to as the "Final Statement").</p> <p>If, following discussions between the Engineer and the Contractor and any changes to the draft final statement which may be agreed between them, it becomes evident that a dispute exists, the Engineer shall deliver to the Employer an Interim Payment Certificate for those parts of the draft final statement, if any, which are not in dispute. The dispute may then be settled in accordance with Clause 67.</p>
Discharge	60.7	<p>Upon submission of the Final Statement, the Contractor shall give to the Employer, with a copy to the Engineer, a written discharge confirming that the total of the Final Statement represents full and final settlement of all monies due to the Contractor arising out of or in respect of the Contract. Provided that such discharge shall become effective only after payment due under the Final Payment Certificate issued pursuant to Sub-Clause 60.8 has been made and the performance security referred to in Sub-Clause 10.1, if any, has been returned to the Contractor.</p>
Final Payment Certificate	60.8	<p>Within 28 days after receipt of the Final Statement, and the written discharge, the Engineer shall issue to the Employer (with a copy to the Contractor) a Final Payment Certificate stating:</p> <p>(a) the amount which, in the opinion of the Engineer, is finally due under the Contract or otherwise, and</p> <p>(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 other than under Clause 47, the balance, if any, due from the Employer to the Contractor or from the Contractor to the Employer as the case may be.</p>
Cessation of Employer's Liability	60.9	<p>The Employer shall not be liable to the Contractor for any matter or thing arising out of or in connection with the Contract or execution of the Works, unless the Contractor shall have included a claim in respect thereof in his Final Statement and (except in respect of matters or things arising after the issue of the Taking-Over Certificate in respect of the whole of the Works) in the Statement at Completion referred to in Sub-Clause 60.5.</p>

Time for Payment	60.10	The amount due to the Contractor under any Interim Payment Certificate issued by the Engineer pursuant to this Clause, or to any other term of the Contract, shall, subject to Clause 47, be paid by the Employer to the Contractor within 28 days after such Interim Payment Certificate has been delivered to the Employer, or, in the case of the Final Payment Certificate referred to in Sub-Clause 60.8, within 56 days, after such Final Payment Certificate has been delivered to the Employer. In the event of the failure of the Employer to make payment within the times stated, the Employer shall pay to the Contractor interest at the rate stated in the Appendix to Tender upon all sums unpaid from the date by which the same should have been paid. The provisions of this Sub-Clause are without prejudice to the Contractor's entitlement under Clause 69 or otherwise.
Approval only by Defects Liability Certificate	61.1	Only the Defects Liability Certificate, referred to in Clause 62, shall be deemed to constitute approval of the Works.
Defects Liability Certificate	62.1	The Contract shall not be considered as completed until a Defects Liability Certificate shall have been signed by the Engineer and delivered to the Employer, with a copy to the Contractor, stating the date on which the Contractor shall have completed his obligations to execute and complete the Works and remedy any defects therein to the Engineer's satisfaction. The Defects Liability Certificate shall be given by the Engineer within 28 days after the expiration of the Defects Liability Period, or, if different defects liability periods shall become applicable to different Sections or parts of the Permanent Works, the expiration of the latest such period, or as soon thereafter as any works instructed, pursuant to Clauses 49 and 50, have been completed to the satisfaction of the Engineer. Provided that the issue of the Defects Liability Certificate shall not be a condition precedent to payment to the Contractor of the second portion of the Retention Money in accordance with the conditions set out in Sub-Clause 60.3.
Unfulfilled Obligations	62.2	Notwithstanding the issue of the Defects Liability Certificate the Contractor and the Employer shall remain liable for the fulfilment of any obligation incurred under the provisions of the Contract prior to the issue of the Defects Liability Certificate which remains unperformed at the time such Defects Liability Certificate is issued and, for the purposes of determining the nature and extent of any such obligation, the Contract shall be deemed to remain in force between the parties to the Contract.

Remedies

Default of Contractor	63.1	<p>If the Contractor is deemed by law unable to pay his debts as they fall due, or enters into voluntary or involuntary bankruptcy, liquidation or dissolution (other than a voluntary liquidation for the purposes of amalgamation or reconstruction), or becomes insolvent, or makes an arrangement with, or assignment in favour of, his creditors, or agrees to carry out the Contract under a committee of inspection of his creditors, or if a receiver, administrator, trustee or liquidator is appointed over any substantial part of his assets, or if, under any law or regulation relating to reorganization, arrangement or readjustment of debts, proceedings are commenced against the Contractor or resolutions passed in connection with dissolution or liquidation or if any steps are taken to enforce any security interest over a substantial part of the assets of the Contractor, or if any act is done or event occurs with respect to the Contractor or his assets which, under any applicable law has a substantially similar effect to any of the foregoing acts or events, or if the Contractor has contravened Sub-Clause 3.1, or has an execution levied on his goods, or if the Engineer certifies to the Employer, with a copy to the Contractor, that, in his opinion, the Contractor:</p> <ul style="list-style-type: none"> (a) has repudiated the Contract, (b) without reasonable excuse has failed <ul style="list-style-type: none"> (i) to commence the Works in accordance with Sub-Clause 41.1, or (ii) to proceed with the Works, or any Section thereof, within 28 days after receiving notice pursuant to Sub-Clause 46.1,
------------------------------	-------------	---

(c) has failed to comply with a notice issued pursuant to Sub-Clause 37.4 or an instruction issued pursuant to Sub-Clause 39.1 within 28 days after having received it,

(d) despite previous warning from the Engineer, in writing, is otherwise persistently or flagrantly neglecting to comply with any of his obligations under the Contract, or

(e) has contravened Sub-Clause 4.1,

then the Employer may, after giving 14 days' notice to the Contractor, enter upon the Site and the Works and terminate the employment of the Contractor without thereby releasing the Contractor from any of his obligations or liabilities under the Contract, or affecting the rights and authorities conferred on the Employer or the Engineer by the Contract, and may himself complete the Works or may employ any other contractor to complete the Works. The Employer or such other contractor may use for such completion so much of the Contractor's Equipment, Temporary Works and materials as he or they may think proper.

Valuation at Date of Termination	63.2	<p>The Engineer shall, as soon as may be practicable after any such entry and termination by the Employer, fix and determine ex parte, or by or after reference to the parties or after such investigation or enquiries as he may think fit to make or institute, and shall certify:</p> <p>a) what amount (if any) had, at the time of such entry and termination, been reasonably earned by or would reasonably accrue to the Contractor in respect of work then actually done by him under the Contract, and</p> <p>(b) the value of any of the said unused or partially used materials, any Contractor's Equipment and any Temporary Works.</p>
Payment after Termination	63.3	<p>If the Employer terminates the Contractor's employment under this Clause, he shall not be liable to pay to the Contractor any further amount (including damages) in respect of the Contract until the expiration of the Defects Liability Period and there after until the costs of execution, completion and remedying of any defects, damages for delay in completion (if any) and all other expenses incurred by the Employer have been ascertained and the amount thereof certified by the Engineer. The Contractor shall then be entitled to receive only such sum (if any) as the Engineer may certify would have been payable to him upon due completion by him after deducting the said amount. If such amount exceeds the sum which would have been payable to the Contractor on due completion by him, then the Contractor shall, upon demand, pay to the Employer the amount of such excess and it shall be deemed a debt due by the Contractor to the Employer and shall be recoverable accordingly.</p>
Assignment of Benefit of Agreement	63.4	<p>Unless prohibited by law, the Contractor shall, if so instructed by the Engineer within 14 days of such entry and termination referred to in Sub-Clause 63.1, assign to the Employer the benefit of any agreement for the supply of any goods or materials or services and/or for the execution of any work for the purposes of the Contract, which the Contractor may have entered into.</p>
Urgent Remedial Work	64.1	<p>If, by reason of any accident, or failure, or other event occurring to, in, or in connection with the Works, or any part thereof, either during the execution of the Works, or during the Defects Liability Period, any remedial or other work is, in the opinion of the Engineer, urgently necessary for the safety of the Works and the Contractor is unable or unwilling at once to do such work, the Employer shall be entitled to employ and pay other persons to carry out such work as the Engineer may consider necessary. If the work or repair so done by the Employer is work which, in the opinion of the Engineer, the Contractor was liable to do at his own cost under the Contract, then all costs consequent thereon or incidental thereto shall, after due consultation with the Employer and the Contractor, be determined by the Engineer and shall be recoverable from the Contractor by the Employer, and may be deducted by the Employer from any monies due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the Employer. Provided that the Engineer shall, as soon after the occurrence of any such emergency as may be reasonably practicable, notify the Contractor thereof.</p>

Special Risks

- No Liability for Special Risks** **65.1** The Contractor shall be under no liability whatsoever in consequence of any of the special risks referred to in Sub-Clause 65.2, whether by way of indemnity or otherwise, for or in respect of:
- (a) destruction of or damage to the Works, save to work condemned under the provisions of Clause 39 prior to the occurrence of any of the said special risks,
 - (b) destruction of or damage to property, whether of the Employer or third parties, or
 - (c) injury or loss of life.
- Special Risks** **65.2** The special risks are:
- (a) the risks defined under paragraphs (a), (c), (d) and (e) of Sub-Clause 20.4, and
 - (b) the risks defined under paragraph (b) of Sub-Clause 20.4 insofar as these relate to the country in which the Works are to be executed.
- Damage to Works by Special Risks** **65.3** If the Works or any materials or Plant on or near or in transit to the Site, or any of the Contractor's Equipment, sustain destruction or damage by reason of any of the said special risks, the Contractor shall be entitled to payment in accordance with the Contract for any Permanent Works duly executed and for any materials or Plant so destroyed or damaged and, so far as may be required by the Engineer or as may be necessary for the completion of the Works, to payment for:
- (a) rectifying any such destruction or damage to the Works, and
 - (b) replacing or rectifying such materials or Contractor's Equipment,
- and the Engineer shall determine an addition to the Contract Price in accordance with Clause 52 (which shall in the case of the cost of replacement of Contractor's Equipment include the fair market value thereof as determined by the Engineer) and shall notify the Contractor accordingly, with a copy to the Employer.
- Projectile, Missile** **65.4** Destruction, damage, injury or loss of life caused by the explosion or impact, whenever and wherever occurring, of any mine, bomb, shell, grenade, or other projectile, missile, munition, or explosive of war, shall be deemed to be a consequence of the said special risks.
- Increased Costs arising from Special Risks** **65.5** Save to the extent that the Contractor is entitled to payment under any other provision of the Contract, the Employer shall repay to the Contractor any costs of the execution of the Works (other than such as may be attributable to the cost of reconstructing work condemned under the provisions of Clause 39 prior to the occurrence of any special risk) which are howsoever attributable to or consequent on or the result of or in any way whatsoever connected with the said special risks, subject however to the provisions in this Clause hereinafter contained in regard to outbreak of war, but the Contractor shall, as soon as any such cost comes to his knowledge, forthwith notify the Engineer thereof. The Engineer shall, after due consultation with the Employer and the Contractor, determine the amount of the Contractor's costs in respect thereof which shall be added to the Contract Price and shall notify the Contractor accordingly, with a copy to the Employer.
- Outbreak of War** **65.6** If, during the currency of the Contract, there is an outbreak of war, whether war is declared or not, in any part of the world which, whether financially or otherwise, materially affects the execution of the Works, the Contractor shall, unless and until the Contract is terminated under the provisions of this Clause, continue to use his best endeavours to complete the execution of the Works. Provided that the Employer shall be entitled, at any time after such outbreak of war, to terminate the Contract by giving notice to the Contractor and, upon such notice being given, the Contract shall, except as to the rights of the parties under this Clause and Clause 67, terminate, but without prejudice to the rights of either party in respect of any antecedent breach thereof.

Removal of Contractor's Equipment on Termination

65.7 If the Contract is terminated under the provisions of Sub-Clause 65.6, the Contractor shall, with all reasonable dispatch, remove from the Site all Contractor's Equipment and shall give similar facilities to his Subcontractors to do so.

Payment if Contract Terminated

65.8 If the Contract is terminated as aforesaid, the Contractor shall be paid by the Employer, insofar as such amounts or items have not already been covered by payments on account made to the Contractor, for all work executed prior to the date of termination at the rates and prices provided in the Contract and in addition:

(a) the amounts payable in respect of any preliminary items referred to in the Bill of Quantities, so far as the work or service comprised therein has been carried out or performed, and a proper proportion of any such items which have been partially carried out or performed;

(b) the cost of materials, Plant or goods reasonably ordered for the Works which have been delivered to the Contractor or of which the Contractor is legally liable to accept delivery, such materials, Plant or goods becoming the property of the Employer upon such payments being made by him;

(c) a sum being the amount of any expenditure reasonably incurred by the Contractor in the expectation of completing the whole of the Works insofar as such expenditure has not been covered by any other payments referred to in this Sub-Clause;

(d) any additional sum payable under the provisions of Sub-Clauses 65.3 and 65.5;

(e) such proportion of the cost as may be reasonable, taking into account payments made or to be made for work executed, of removal of Contractor's Equipment under Sub-Clause 65.7 and, if required by the Contractor, return thereof to the Contractor's main plant yard in his country of registration or to other destination, at no greater cost; and

(f) the reasonable cost of repatriation of all the Contractor's staff and workmen employed on or in connection with the Works at the time of such termination.

Provided that against any payment due from the Employer under this Sub-Clause, the Employer shall be entitled to be credited with any outstanding balances due from the Contractor for advances in respect of Contractor's Equipment, materials and Plant and any other sums which, at the date of termination, were recoverable by the Employer from the Contractor under the terms of the Contract. Any sums payable under this Sub-Clause shall, after due consultation with the Employer and the Contractor, be determined by the Engineer who shall notify the Contractor accordingly, with a copy to the Employer.

Release from Performance

Payment in Event of Release from Performance

66.1 If any circumstance outside the control of both parties arises after the issue of the Letter of Acceptance which renders it impossible or unlawful for either or both parties to fulfil his or their contractual obligations, or under the law governing the Contract the parties are released from further performance, then the parties shall be discharged from the Contract, except as to their rights under this Clause and Clause 67 and without prejudice to the rights of either party in respect of any antecedent breach of the Contract, and the sum payable by the Employer to the Contractor in respect of the work executed shall be the same as that which would have been payable under Clause 65 if the Contract had been terminated under the provisions of Clause 65.

Settlement of Disputes

Engineer's Decision

67.1 If a dispute of any kind whatsoever arises between the Employer and the Contractor in connection with, or arising out of, the Contract or the execution of the Works, whether during the execution of the Works or after their completion and whether before or after repudiation or other termination of the Contract, including any dispute as to any opinion, instruction, determination, certificate or valuation of the Engineer, the matter in dispute shall, in the first place, be referred in writing to the Engineer, with a copy to the other party. Such reference shall state that it is made pursuant to this Clause. No later than the eighty-fourth day after the day on which he received such reference the Engineer shall give notice of his decision to the Employer and the Contractor. Such decision shall state that it is made pursuant to this Clause.

Unless the Contract has already been repudiated or terminated, the Contractor shall, in every case, continue to proceed with the Works with all due diligence and the Contractor and the Employer shall give effect forthwith to every such decision of the Engineer unless and until the same shall be revised, as hereinafter provided, in an amicable settlement or an arbitral award.

If either the Employer or the Contractor be dissatisfied with any decision of the Engineer, or if the Engineer fails to give notice of his decision on or before the eighty-fourth day after the day on which he received the reference, then either the Employer or the Contractor may, on or before the seventieth day after the day on which he received notice of such decision, or on or before the seventieth day after the day on which the said period of 84 days expired, as the case may be, give notice to the other party, with a copy for information to the Engineer, of his intention to commence arbitration, as hereinafter provided, as to the matter in dispute. Such notice shall establish the entitlement of the party giving the same to commence arbitration, as hereinafter provided, as to such dispute and, subject to Sub-Clause 67.4, no arbitration in respect thereof may be commenced unless such notice is given.

If the Engineer has given notice of his decision as to a matter in dispute to the Employer and the Contractor and no notice of intention to commence arbitration as to such dispute has been given by either the Employer or the Contractor on or before the seventieth day after the day on which the parties received notice as to such decision from the Engineer, the said decision shall become final and binding upon the Employer and the Contractor.

Amicable Settlement

67.2 Where notice of intention to commence arbitration as to a dispute has been given in accordance with Sub-Clause 67.1, the parties shall attempt to settle such dispute amicably before the commencement of arbitration. Provided that, unless the parties otherwise agree, arbitration may be commenced on or after the fifty-sixth day after the day on which notice of intention to commence arbitration of such dispute was given, even if no attempt at amicable settlement thereof has been made.

Arbitration

67.3 Any dispute in respect of which:

- (a) the decision, if any, of the Engineer has not become final and binding pursuant to Sub-Clause 67.1, and
- (b) amicable settlement has not been reached within the period stated in Sub-Clause 67.2,

shall be finally settled, unless otherwise specified in the Contract, under the Rules of Conciliation and Arbitration of the International Chamber of Commerce by one or more arbitrators appointed under such Rules. The said arbitrator/s shall have full power to open up, review and revise any decision, opinion, instruction, determination, certificate or valuation of the Engineer related to the dispute.

Neither party shall be limited in the proceedings before such arbitrator/s to the evidence or arguments put before the Engineer for the purpose of obtaining his said decision pursuant to Sub-Clause 67.1. No such decision shall disqualify the Engineer from being called as a witness and giving evidence before the arbitrator/s on any matter whatsoever relevant to the dispute.

Arbitration may be commenced prior to or after completion of the Works, provided that the obligations of the Employer, the Engineer and the Contractor shall not be altered by reason of the arbitration being conducted during the progress of the Works.

- Failure to Comply with Engineer's Decision** 67.4 Where neither the Employer nor the Contractor has given notice of intention to commence arbitration of a dispute within the period stated in Sub-Clause 67.1 and the related decision has become final and binding, either party may, if the other party fails to comply with such decision, and without prejudice to any other rights it may have, refer the failure to arbitration in accordance with Sub-Clause 67.3. The provisions of Sub-Clauses 67.1 and 67.2 shall not apply to any such reference.

Notices

- Notice to Contractor** 68.1 All certificates, notices or instructions to be given to the Contractor by the Employer or the Engineer under the terms of the Contract shall be sent by post, cable, telex or facsimile transmission to or left at the Contractor's principal place of business or such other address as the Contractor shall nominate for that purpose.
- Notice to Employer and Engineer** 68.2 Any notice to be given to the Employer or to the Engineer under the terms of the Contract shall be sent by post, cable, telex or facsimile transmission to or left at the respective addresses nominated for that purpose in Part II of these Conditions.
- Change of Address** 68.3 Either party may change a nominated address to another address in the country where the Works are being executed by prior notice to the other party, with a copy to the Engineer, and the Engineer may do so by prior notice to both parties.

Default of Employer

- Default of Employer** 69.1 In the event of the Employer:
- (a) failing to pay to the Contractor the amount due under any certificate of the Engineer within 28 days after the expiry of the time stated in Sub-Clause 60.10 within which payment is to be made, subject to any deduction that the Employer is entitled to make under the Contract,
 - (b) interfering with or obstructing or refusing any required approval to the issue of any such certificate,
 - (c) becoming bankrupt or, being a company, going into liquidation, other than for the purpose of a scheme of reconstruction or amalgamation, or
 - (d) giving notice to the Contractor that for unforeseen economic reasons it is impossible for him to continue to meet his contractual obligations,
- the Contractor shall be entitled to terminate his employment under the Contract by giving notice to the Employer, with a copy to the Engineer. Such termination shall take effect 14 days after the giving of the notice.
- Removal of Contractor's Equipment** 69.2 Upon the expiry of the 14 days' notice referred to in Sub-Clause 69.1, the Contractor shall, notwithstanding the provisions of Sub-Clause 54.1, with all reasonable despatch, remove from the Site all Contractor's Equipment brought by him thereon.
- Payment on Termination** 69.3 In the event of such termination the Employer shall be under the same obligations to the Contractor in regard to payment as if the Contract had been terminated under the provisions of Clause 65, but, in addition to the payments specified in Sub-Clause 65.8, the Employer shall pay to the Contractor the amount of any loss or damage to the Contractor arising out of or in connection with or by consequence of such termination.

**Contractor's
Entitlement to
Suspend Work**

69.4 Without prejudice to the Contractor's entitlement to interest under Sub-Clause 60.10 and to terminate under Sub-Clause 69.1, the Contractor may, if the Employer fails to pay the Contractor the amount due under any certificate of the Engineer within 28 days after the expiry of the time stated in Sub-Clause 60.10 within which payment is to be made, subject to any deduction that the Employer is entitled to make under the Contract, after giving 28 days' prior notice to the Employer, with a copy to the Engineer, suspend work or reduce the rate of work.

If the Contractor suspends work or reduces the rate of work in accordance with the provisions of this Sub-Clause and thereby suffers delay or incurs costs the Engineer shall, after due consultation with the Employer and the Contractor, determine:

- (a) any extension of time to which the Contractor is entitled under Clause 44, and
- (b) the amount of such costs, which shall be added to the Contract Price,

and shall notify the Contractor accordingly, with a copy to the Employer.

**Resumption
of Work**

69.5 Where the Contractor suspends work or reduces the rate of work, having given notice in accordance with Sub-Clause 69.4, and the Employer subsequently pays the amount due, including interest pursuant to Sub-Clause 60.10, the Contractor's entitlement under Sub-Clause 69.1 shall, if notice of termination has not been given, lapse and the Contractor shall resume normal working as soon as is reasonably possible.

Changes in Cost and Legislation

**Increase or
Decrease
of Cost**

70.1 There shall be added to or deducted from the Contract Price such sums in respect of rise or fall in the cost of labour and/or materials or any other matters affecting the cost of the execution of the Works as may be determined in accordance with Part II of these Conditions.

**Subsequent
Legislation**

70.2 If, after the date 28 days prior to the latest date for submission of tenders for the Contract there occur in the country in which the Works are being or are to be executed changes to any National or State Statute, Ordinance, Decree or other Law or any regulation or bye-law of any local or other duly constituted authority, or the introduction of any such State Statute, Ordinance, Decree, Law, regulation or bye-law which causes additional or reduced cost to the Contractor, other than under Sub-Clause 70.1, in the execution of the Contract, such additional or reduced cost shall, after due consultation with the Employer and the Contractor, be determined by the Engineer and shall be added to or deducted from the Contract Price- and the Engineer shall notify the Contractor accordingly, with a copy to the Employer.

Currency and Rates of Exchange

**Currency
Restrictions**

71.1 If, after the date 28 days prior to the latest date for submission of tenders for the Contract, the Government or authorised agency of the Government of the country in which the Works are being or are to be executed imposes currency restrictions and/or transfer of currency restrictions in relation to the currency or currencies in which the Contract Price is to be paid, the Employer shall reimburse any loss or damage to the Contractor arising therefrom, without prejudice to the right of the Contractor to exercise any other rights or remedies to which he is entitled in such event.

**Rates of
Exchange**

72.1 Where the Contract provides for payment in whole or in part to be made to the Contractor in foreign currency or currencies, such payment shall not be subject to variations in the rate or rates of exchange between such specified foreign currency or currencies and the currency of the country in which the Works are to be executed.

Currency Proportions

72.2 Where the Employer has required the Tender to be expressed in a single currency but with payment to be made in more than one currency and the Contractor has stated the proportions or amounts of other currency or currencies in which he requires payment to be made, the rate or rates of exchange applicable for calculating the payment of such proportions or amounts shall, unless otherwise stated in Part II of these Conditions, be those prevailing, as determined by the Central Bank of the country in which the Works are to be executed, on the date 28 days prior to the latest date for the submission of tenders for the Contract, as has been notified to the Contractor by the Employer prior to the submission of tenders or as provided for in the Tender.

Currencies of Payment for Provisional Sums

72.3 Where the Contract provides for payment in more than one currency, the proportions or amounts to be paid in foreign currencies in respect of Provisional Sums shall be determined in accordance with the principles set forth in Sub-Clauses 72.1 and 72.2 as and when these sums are utilised in whole or in part in accordance with the provisions of Clauses 58 and 59.

REFERENCE TO PART II

As stated in the Foreword at the beginning of this document, the FIDIC Conditions comprise both Part I and Part II. Certain Clauses, namely Sub-Clauses 1.1 paragraph (a) (i) and (iv), 5.1 (part), 14.1, 14.3, 68.2 and 70.1 must include additional wording in Part II for the Conditions to be complete. Other Clauses may require additional wording to supplement Part I or to cover particular circumstances or the type of work (dredging is an example).

Part II Conditions of Particular Application with guidelines for the preparation of Part II are printed in a separately bound document.

PART I – GENERAL CONDITIONS

Index

	Clause
Access to Site	42.1
Access to Works, Engineer	37.1
Access, Contractor to Satisfy Himself	11.1
Accident or Injury to Workmen – Insurance Against	24.2
Accident or Injury to Workmen – Liability for	24.1
Address, Change of	68.3
Adequacy of Insurance	25.2
Adjustment of Contract Price if Variations Exceed 15 per cent of Tender Sum	52.3
Agreement	9.1
Alterations, Additions and Omissions	51. & 52.
Ambiguities in Contract Documents	5.2
Amicable Settlement of Disputes	67.2
Appointment of Assistants to Engineer	2.4
Approval by the Engineer	7.3
Approval of Materials not Implied	54.8
Approval Only by Defects Liability Certificate	61.1
Arbitration	67.3
Assignment of Contract	3.1
Avoidance of Damage to Roads	30.1
Bills of Quantities – Estimated Only	55.1
Boreholes and Exploratory Excavation	18.1
Breakdown of Lump Sum Items	57.2
Care of Works	20.1
Cash Flow Estimate to be Submitted	14.3
Certificate, Final Payment	60.8
Certificates and Payment, Monthly Statements	60.1
Certificates, Correction of	60.4
Certificate, Taking-Over	48.1
Certification of Completion of Works	48.1
Certification of Completion of Sections or Parts	48.2
Cessation of Employer’s Liability	60.9
Change of Address, Notice of	68.3
Claims, Contemporary Records	53.2
Claims, Notice of	53.1
Claims, Payment of	53.5
Claims, Substantiation of	53.3
Claims Under Performance Security	10.3
Clearance of Site on Completion	33.1
Commencement of Works	41.1
Completion of Works, Time for	43.1
Completion of Works, Time for, Extension of	44.1
Completion, Statement at	60.5
Compliance with Insurance Policy Conditions	25.4
Compliance with Statutes and Regulations	26.1
Contemporary Records for Claims	53.2
Contract Agreement	9.1
Contractor Not Relieved of Duties or Responsibilities	14.4
Contractor’s Employees	16.1
Contractor’s Employees, Engineer at Liberty to Object	16.2
Contractor’s Entitlement to Suspend Work for Employer’s Default	69.4
Contractor’s Equipment, Conditions of Hire	54.5
Contractor’s Equipment, Employer not Liable for Damage	54.2

Index

Clause

Contractor's Equipment, Insurance of	21.1
Contractor's Equipment, Reference in Subcontracts	54.7
Contractor's Equipment, Temporary Works and Materials; Exclusive Use for the Works	54.1
Contractor's Equipment, Transport of	30.2
Contractor's Failure to Carry Out Instructions	49.4
Contractor's Failure to Insure, Remedy	25.3
Contractor's General Responsibilities	8.1
Contractor's Superintendence	15.1
Contractor to Keep Site Clear	32.1
Contractor to Search	50.1
Correction of Certificates	60.4
Cost of Remedying Defects	49.3
Cost of Samples	36.2
Cost of Tests	36.3
Cost of Tests not Provided for	36.4
Covering up Work, Examination Before	38.1
Cross Liabilities	23.3
Currencies of Payment for Provisional Sums	72.3
Currencies, Rates of Exchange	72.1
Currency Restrictions	71.1
Custody and Supply of Drawings and Documents	6.1
Customs Clearance	54.3
Damage to Persons and Property	22.1
Damage to Roads, Avoidance of	30.1
Damage to Works, Special Risks	65.3
Damages, Liquidated	47.1
Dates for Inspection and Testing	37.3
Daywork	52.4
Decrease or Increase of Costs	70.1
Default of Contractor in Compliance with Instructions on Improper Work	39.2
Default of Contractor, Remedies for	63.1
Default of Employer	69.1
Defective Materials and Work	39.1
Defects, Contractor to Search for, if Required	50.1
Defects, Cost of Remedying	49.3
Defects Liability Certificate	62.1
Defects Liability Period	49.1
Defects, Remedying of	49.2
Definitions	1.1
Delay, Liquidated Damages for	47.1
Delays and Cost of Delay of Drawings	6.4
Design by Nominated Subcontractors	59.3
Discharge	60.7
Discrepancies in Documents	5.2
Dismissal of Contractor's Employees	16.2
Disorderly Conduct, etc.	34.1
Disputes, Engineer's Decision	67.1
Disruption of Progress	6.3
Documents Mutually Explanatory	5.2
Drawings	6 & 7
Drawings and Documents – Custody and Supply of	6.1
Drawings and Instructions – Supplementary	7.1
Drawings, Copy to be Kept on Site	6.2
Drawings, Delays and Cost of Delay of Drawings	6.4
Drawings, Failure by Contractor to Submit	6.5
Employer not Liable for Damage to Contractor's Equipment etc.	54.2

Index

	Clause
Employer's Liability, Cessation of	60.9
Employer's Responsibilities	19.2
Employer's Risks	20.4
Engagement of Staff and Labour	34.1
Engineer's Authority to Delegate	2.3
Engineer's Determination Where Tests not Provided for	36.5
Engineer's Duties and Authority	2.1
Engineer to Act Impartially	2.6
Environment – Protection of	19.1
Errors in Setting Out	17.1
Evidence and Terms of Insurance	25.1
Examination of Work before Covering Up	38.1
Exceptions	22.2
Exchange, Rates of	72.1
Exclusions	21.4
Extension of Time, due to Employer's Failure to give Possession of Site	42.2
Extension of Time for Completion	44.1
Extension of Time for Completion, Contractor's Claim	44.2
Extension of Time for Completion, Engineer's Determination	44.3
Extraordinary Traffic	30.
Facilities for Other Contractors	31.2
Facilities – Rights of Way and	42.3
Failure by Contractor to Submit Drawings	6.5
Failure to Comply with Claims Procedure	53.4
Failure to Comply with Engineer's Decision	67.4
Failure to Give Possession of Site	42.2
Faulty Work, Removal of	39.1
Fees and Notices	26.1
Fencing, Watching, Lighting, etc.	19.1
Final Payment Certificate	60.8
Final Statement	60.6
Foreign Currencies, Payment in	72.
Fossils	27.1
Foundations, Examination of	38.1
General Responsibilities of Contractor	8.1
Giving of Notices – Payment of Fees	26.1
Headings and Marginal Notes	1.2
Improper Work and Materials, Removal of	39.1
Increase or Decrease of Costs	70.1
Indemnity by Contract	22.1
	& 24.1
Indemnity by Employer	22.3
Independent Inspection	37.5
Injury to Persons – Damage to Property	22.1
Injury to Workmen	24.1
Inspection and Testing	37.2
Inspection and Testing, Dates for	37.3
Inspection of Foundations, etc.	38.1
Inspection of Operations	37.1
Inspection of Site by Contractor	11.1
Instructions for Variations	51.2
Instructions in Writing	2.5
Instructions, Supplementary	7.1
Insurance, Adequacy of	25.2

Index

Clause

Insurance, Evidence and Terms of	25.1
Insurance, Minimum Amount of	23.2
Insurance of Works and Contractor's Equipment	21.1
Insurance, Remedy on Failure to Insure	25.3
Insurance, Responsibility for Amounts not Recovered	21.3
Insurance, Scope of Cover	21.2
Insurance, Third Party	23.1
Insurance, Workmen	24.2
Interference with Traffic and Adjoining Properties	29.1
Interim Determination of Extension	44.3
Interpretations	1.3
Labour, Engagement of	34.1
Language/s and Law	5.1
Law to which Contract Subject	5.1
Legislation, Subsequent	70.2
Lighting, Fencing, Watching, etc.	19.1
Liquidated Damages for Delay	47.1
Liquidated Damages, Reduction of	47.2
Loss or Damage due to Employer's Risks	20.3
Loss or Damage – Responsibility to Rectify	20.2
Lump Sum Items – Breakdown of	57.2
Materials and Plant, Transport of	30.3
Materials – Approval of, etc, not Implied	54.8
Materials, Improper – Removal of	39.1
Materials, Quality of	36.1
Materials, Supply of	8.1
Measurement by Engineer	56.1
Measurement, Method of	57.1
Measurement, Quantities Estimated Only	55.1
Methods of Construction	8.2
Minimum Amount of Insurance	23.2
Monthly Payments	60.2
Nominated Subcontractors, Certification of Payments to	59.5
Nominated Subcontractors, Definition	59.1
Nominated Subcontractors, Design by	59.3
Nominated Subcontractors, Objection to Nomination	59.2
Nominated Subcontractors, Payment to	59.4
Not Foreseeable Physical Obstructions or Conditions	12.2
Notice of Claims	53.1
Notices and Fees, Payment of	26.1
Notices, Consents and Approvals	1.5
Notice to Contractor	68.1
Notice to Employer and Engineer	68.2
Objections to Contractor's Employees	16.2
Obstructions or Conditions – Not Foreseeable Physical	12.2
Omissions, Alterations and Additions	59.
Openings, Uncovering and making	38.2
Operations, Inspection of	37.1
Order of Work, Contractor to Furnish Programme	14.1
Other Contractors, Opportunities for	31.1
Patent Rights	28.1
Payment if Contract Terminated for Contractor's Default	63.3
Payment if Contract Terminated for Employer's Default	69.3
Payment of Claims	53.5

Index

Clause

Payment, Time for	60.10
Performance Security	10.1
Performance Security – Claims Under	10.3
Performance Security – Period of Validity	10.2
Period of Defects Liability	49.1
Permanent Works Designed by Contractor	7.2
Physical Obstructions or Conditions – Not Foreseeable	12.2
Physical Obstructions or Conditions – Engineer’s Determination	12.3
Plant and Materials, Transport of	30.3
Plant, Conditions of Hire	54.5
Plant, Customs Clearance	54.3
Plant, Employer not Liable for damage to	54.2
Plant, etc. – Exclusive Use for the Works	54.1
Plant, Quality of	36.1
Plant, Re-export of	54.4
Plant, Removal of	39.1
Policy of Insurance – Compliance with Conditions	25.4
Possession of Site	42.1
Possession of Site, Failure to Give	42.2
Power of Engineer to Fix Rates	52.2
Priority of Contract Documents	5.2
Programme to be Submitted	14.1
Progress – Disruption of	6.3
Progress – Rate of	46.1
Protection of Environment	19.1
Provision to Indemnify Contractor	22.3
Provision to Indemnify Employer	22.2
Provisional Sums, Currencies of Payment	72.3
Provisional Sums, Definition	58.1
Provisional Sums, Production of Vouchers	58.3
Provisional Sums, Use of	58.2
Quality of Materials and Workmanship	36.1
Quantities	55.1
Rate of Progress	46.1
Rates of Exchange	72.1
Rates, Power of Engineer to Fix	52.2
Rectification of Loss or Damage	20.2
Reduction of Liquidated Damages	47.2
Re-export of Plant	54.4
Regulations, Statutes, etc., Compliance with	26.1
Rejection	37.4
Release from Performance	66.1
Remedies for Default of Contractor	63.1
Remedying of Defects	49.2
Remedying of Defects, Cost of	49.3
Remedy on Contractor’s Failure to Insure	25.3
Removal of Contractor’s Employees	16.2
Removal of Contractor’s Equipment	69.2
Removal of Improper Work, Materials or Plant	39.1
Removal of Plant, etc.	65.7
Responsibility to Rectify Loss or Damage	20.2
Responsibility Unaffected by Approval	7.3
Restriction on Working Hours	45.1
Resumption of Work	69.5
Retention Money, Payment of	60.3
Returns of Labour and Contractor’s Equipment	35.1

Index

Clause

Revised Programme	14.2
Rights of Way and Facilities	42.3
Risks, Employer's	20.4
Risks, Special	65.
Roads, etc., - Damage by Extraordinary Traffic	30.1
Roads, Interference with Access to	29.1
Royalties	28.2
Safety, Security and Protection of the Environment	19.1
Samples, Cost of	36.2
Security, Safety and Protection of the Environment	19.1
Setting-Out	17.1
Singular and Plural	1.4
Site, Clearance on Completion	33.1
Site, Contractor to Keep Clear	32.1
Site, Inspection of by Contractor	11.1
Site Operations and Methods of Construction	8.2
Site, Possession of	42.1
Special Risks	65.
Staff, Engagement of	34.1
Statement at Completion	60.5
Statement, Final	60.6
Statutes, Regulations, etc. - Compliance with	26.1
Subcontracting	4.1
Subcontractors, Nominated	59.
Subcontractors, Responsibility of the Contractor for Acts and Default of	4.1
Subsequent Legislation	70.2
Substantial Completion of Sections or Parts	48.3
Sufficiency of Tender	12.1
Supply of Plant, Materials and Labour	8.1
Surfaces Requiring Reinstatement	48.4
Suspension, Engineer's Determination	40.2
Suspension lasting more than 84 days	40.3
Suspension of Work	40.1
Taking Over Certificate	48.1
Taking Over of Sections or Parts	48.2
Tender Documents	11.1
Tender, Sufficiency of	12.1
Termination of Contract by Employer	63.1
Termination of Contract by Employer, Assignment of Benefit	63.4
Terms of Insurance	25.1
Tests, Cost of	36.3
Tests not Provided for - Cost of	36.4
Third Party Insurance	23.1
Time for Completion	43.1
Time for Completion, Extension of	44.1
Time for Payment	60.10
Traffic, Extraordinary	30.1
Traffic, Interference with	29.1
Traffic, Waterborne	30.4
Transport of Contractor's Equipment and Temporary Works	30.2
Transport of Materials and Plant	30.3
Uncovering Work and Making Openings	38.2
Unfulfilled Obligations	62.2
Urgent Remedial Work	64.1

Index

Clause

Valuation at Date of Termination by the Employer	63.2
Variations	51.1
Variations, Daywork Basis	52.4
Variations, Exceeding 15 per cent	52.3
Variations, Instructions for	51.2
Variations, Power of the Engineer to Fix Rates	52.2
Variations, Valuation of	51.3
Vouchers, Production of	58.3
War, Outbreak of	20.4
Watching and Lighting, etc.	19.1
Waterborne Traffic	30.4
Work, Examination of Before Covering Up	38.1
Work, Improper, Removal of	39.1
Working Hours, Restriction of	45.1
Workmanship, Quality of	36.1
Workmen, Accident or Injury to	24.1
Works, Care of	20.1
Works, Completion of (Defects Liability Certificate)	62.1
Works, Commencement of	41.1
Works, Insurance of	21.1
Works, Remedying of Defects	49.2
Works, Time for Completion of	43.1
Works to be Measured	56.1
Work, Suspension of	40.1
Work to be in Accordance with the Contract	13.1

**CONDITIONS OF CONTRACT
FOR WORKS OF CIVIL
ENGINEERING CONSTRUCTION**

**PART I – GENERAL CONDITIONS
WITH FORMS OF BID AND AGREEMENT**

PART II

PARTICULAR CONDITIONS OF

CONTRACT

TABLE OF CONTENTS

PART II - PARTICULAR CONDITIONS OF CONTRACT

1.1	Definitions.....	1
2.1	Engineer's Duties And Authority	1
2.7	Engineer Not Liable.....	3
2.8	Replacement of the Engineer.....	3
5.1	Language(s) and Law	3
5.2	Priority of Contract Documents	3
6.6	Shop Drawings	4
6.7	As-Built Drawings	4
10.1	Performance Security.....	4
10.3	Claim under performance security	4
10.4	Performance Security Binding on Variations and Changes	4
14.1	Programme to be Submitted	4
14.3	Cash Flow Estimate to be Submitted.....	5
14.5	Detailed Programme and Monthly Progress Report	5
15.2	Language Ability of Contractor's Representative	6
15.3	Contractor's Representative.....	6
16.3	Language Ability of Superintending Staff of Contractor	6
16.4	Employment of Local Personnel	6
19.3	Safety Precautions	6
19.4	Lighting Work at Night.....	6
20.4	Employer's Risks.....	6
21.2	Scope of Cover.....	7
21.4	Exclusions	7
25.5	Insurance Company	8
31.3	Co-operation with other Contractors	8
34.2	Rates of Wages and Conditions of Labour	8
34.3	Employment of Persons in the Service of Others	8
34.4	Housing for Labour.....	8
34.5	Health and Safety.....	8
34.6	Epidemics.....	9

34.7	Supply of Water.....	9
34.8	Alcoholic Liquor or Drugs	9
34.9	Arms and Ammunition	9
34.10	Festivals and Religious Customs	9
34.11	Disorderly Conduct.....	9
34.12	Compliance by Subcontractors	9
34.13	Repatriation of Labour.....	9
34.14	Burial of the dead	9
35.2	Records of Safety and Health	10
35.3	Reporting of Accidents	10
36.6	Use of Pakistani Materials and Services.....	10
39.3	Engineer's Decision Final.....	10
41.1	Commencement of Works.....	10
48.1	taking over certificate	10
48.2	Taking Over of Sections or Parts	10
49.5	extension of defect liability	10
51.2	Instructions for Variations.....	11
52.1	Valuation of Variations	11
53.4	Failure to Comply	11
54.5	Conditions of Hire of Contractor's Equipment.....	11
60.1	Monthly Statements	11
60.2	Monthly Payments.....	11
60.10	Time for Payment.....	11
60.11	Secured Advance on Materials	12
60.11	Financial Assistance to Contractor.....	13
63.1	Default of Contractor	14
65.2	Special Risks.....	14
67. 3	Arbitration	14
68.1	Notice to Contractor	14
68.2	Notice to Employer and Engineer	15
69.1	default of employer.....	15
69.4	Contractor's Entitlement to Suspend Work	15
70.1	Increase or Decrease of Cost	15
73.1	Payment of Income Tax	17

73.2	Foreign Taxation	17
73.3	Local Taxation	17
73.4	Income Taxes on Staff	18
73.5	Advance Income Tax	18
73.6	Duties on Contractor's Equipment	18
73.7	Refund of Duty Drawback	18
73.8	Sale of Contractor's Equipment in Pakistan	18
73.9	Non – reimbursable costs of contractor	19
74.1	Integrity Pact	19
75.1	Termination of Contract for Employer's Convenience	19
76.1	Liability of Contractor	19
77.1	Joint and Several Liabilities.....	20
78.1	Details to be Confidential	20

PART II - PARTICULAR CONDITIONS OF CONTRACT

(Mandatory Provisions not to be Amended / Substituted except as instructed by KPPRA)

1.1 DEFINITIONS

- (a) (i) The Employer is Director General, Directorate General Small Dams, Irrigation Department Government of Khyber Pakhtunkhwa, Plot No.27, Street No.12, Sector E-8, Phase VII, Hayatabad, Peshawar.
- (a) (iv) The Engineer is "Director, Directorate General Small Dams Peshawar" or any other competent person appointed by the Employer, and notified to the Contractor, to act in replacement of the Engineer. Provided always that except in cases of professional misconduct, the outgoing Engineers is to formulate his certifications/recommendations in relation to all outstanding matters, disputes and claims relating to the execution of the Works during his tenure.

The following paragraph is added:

- (a)(vi) "Bidder or Tenderer" means any person or persons, company, corporation, firm or joint venture submitting a Bid or Tender.
- (b)(v) The following is added at the end of the paragraph:
The word "Tender" is synonymous with "Bid" and the word "Tender Documents" with "Bidding Documents".
- (b)(ix) The following paragraph is added:
"Programme" means the programme to be submitted by the Contractor in accordance with Sub-Clause 14.1 and any approved revisions thereto.
- (e)(i) The text is deleted and substituted with the following:
"Contract Price" means the sum stated in the Letter of Acceptance as payable to the Contractor for the execution and completion of the Works subject to such additions thereto or deductions there from as may be made and remedying of any defects therein in accordance with the provisions of the Contract.

2.1 ENGINEER'S DUTIES AND AUTHORITY

With reference to Sub-Clause 2.1(b), the following provisions shall also apply;

The Engineer shall obtain the specific approval of the Employer before carrying out his duties in accordance with the following Clauses:

- (i) Consenting to the sub-letting of any part of the Works under Sub-Clause 4.1 "Subcontracting".
- (ii) Certifying additional cost determined under Sub-Clause 12.2 "Not Foreseeable Physical Obstructions or Conditions".

- (iii) Any action under Clause 10 “Performance Security” and Clauses 21, 23, 24 & 25 “Insurance” of sorts.
- (iv) Any action under Clause 40 “Suspension”.
- (v) Any action under Clause 44 “Extension of Time for Completion”.
- (vi) Any action under Clause 47 “Liquidated Damages for Delay” or Payment of Bonus for Early Completion of Works (PCC Sub-Clause 47.3).
- (vii) Issuance of “Taking Over Certificate” under Clause 48.
- (viii) Issuing a Variation Order under Clause 51, except:
 - a) in an emergency* situation, as stated here below, or
 - b) if such variation would increase the Contract Price by less than the amount stated in the Appendix-A to Bid.
- (ix) Fixing rates or prices under Clause 52.
- (x) Extra payment as a result of Contractor’s claims under Clause 53.
- (xi) Release of Retention Money to the Contractor under Sub-Clause 60.3 “Payment of Retention Money”.
- (xii) Issuance of “Final Payment Certificate” under Sub-Clause 60.8.
- (xiii) Issuance of “Defect Liability Certificate” under Sub-Clause 62.1.
- (xiv) Certifying additional payment under clause 70
- (xv) Any change in the ratios of Contract currency proportions and payments thereof under Clause 72 “Currency and Rate of Exchange”.

(Note: Employer may further vary according to need of the project)

* (If in the opinion of the Engineer an emergency occurs affecting the safety of life or of the Works or of adjoining property, the Engineer may, without relieving the Contractor of any of his duties and responsibilities 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 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 52 and shall notify the Contractor accordingly, with a copy to the Employer.)

2.2 Engineer’s Representative

The following paragraph is added:

The Employer shall ensure that the Engineer’s Representative is a professional engineer as defined in the Pakistan Engineering Council Act 1975 (V of 1976)

The following Sub-Clauses 2.7 and 2.8 are added:

2.7 ENGINEER NOT LIABLE

Approval, reviews and inspection by the Engineer of any part of the Works does not relieve the Contractor from his sole responsibility and liability for the supply of materials, plant and equipment for construction of the Works and their parts in accordance with the Contract and neither the Engineer's authority to act nor any decision made by him in good faith as provided for under the Contract whether to exercise or not to exercise such authority shall give rise to any duty or responsibility of the Engineer to the Contractor, any Subcontractor, any of their representatives or employees or any other person performing any portion of the Works.

2.8 REPLACEMENT OF THE ENGINEER

"If the Employer intends to replace the Engineer, the Employer shall, not less than 14 days before the intended date of replacement, give notice to the Contractor, of the name, address and relevant experience of the intended replacement Engineer. The Employer shall not replace the Engineer with a person against whom the Contractor raises reasonable objection by notice to the Employer, with supporting particulars."

5.1 LANGUAGE(S) AND LAW

- (a) The Contract Documents shall be drawn up in the English language.
- (b) The Contract shall be subject to the Laws of Islamic Republic of Pakistan.

5.2 PRIORITY OF CONTRACT DOCUMENTS

The documents listed at (1) to (6) of the Sub-Clause are deleted and substituted with the following:

- (1) The Contract Agreement (if completed);
- (2) The Letter of Acceptance;
- (3) The completed Form of Bid;
- (4) Special Stipulations (Appendix-A to Bid);
- (5) The Particular Conditions of Contract – Part II;
- (6) The General Conditions – Part I;
- (7) The priced Bill of Quantities (Appendix-D to Bid);
- (8) The completed Appendices to Bid (B, C, E to L);
- (9) The Bid Drawings;
- (10) The Specifications; and
- (11) _____ (any other)

In case of discrepancies between drawings, those of larger scale shall govern unless they are superseded by a drawing of later date regardless of scale. All Drawings and Specifications shall be interpreted in conformity with the Contract and these Conditions. Addendum, if any, shall be deemed to have been incorporated at the appropriate places in the documents forming the Contract.

The following Sub-Clauses 6.6 and 6.7 are added:

6.6 SHOP DRAWINGS

The Contractor shall submit to the Engineer for review 3 copies of all shop and erection drawings applicable to this Contract as per provision of relevant Sub-Clause of the Contract.

Review and approval by the Engineer shall not be construed as a complete check but will indicate only that the general method of construction and detailing is satisfactory and that the Engineer's review or approval shall not relieve the Contractor of any of his responsibilities under the Contract.

6.7 AS-BUILT DRAWINGS

At the completion of the Works under the Contract, the Contractor shall furnish to the Engineer 6 copies and one reproducible of all drawings amended to conform with the Works as built. The price of such Drawings shall be deemed to be included in the Contract Price.

10.1 PERFORMANCE SECURITY

The text is deleted and substituted with the following:

The Contractor shall provide Performance Security to the Employer in the prescribed form. The said Security shall be furnished or caused to be furnished by the Contractor within 28 days after the receipt of the Letter of Acceptance. The Performance Security shall be of an amount equal to 10% of the Contract Price stated in the Letter of Acceptance. Such Security shall, at the option of the bidder, be in the form of either (a) bank guarantee from any Scheduled Bank in Pakistan (b) bank guarantee from a bank located outside Pakistan duly counter-guaranteed by a Scheduled Bank in Pakistan.

The cost of complying with requirements of this Sub-Clause shall be borne by the Contractor.

10.3 CLAIM UNDER PERFORMANCE SECURITY

Sub clause 10.3 of general conditions is deleted.

The following Sub-Clause 10.4 is added:

10.4 PERFORMANCE SECURITY BINDING ON VARIATIONS AND CHANGES

The Performance Security shall be binding irrespective of changes in the quantities or variations in the Works or extensions in Time for Completion of the Works which are granted or agreed upon under the provisions of the Contract.

14.1 PROGRAMME TO BE SUBMITTED

The programme shall be submitted within 42 days from the date of receipt of Letter of Acceptance, which shall be in the form of:

- i) A Bar Chart identifying the critical activities.
- ii) A CPM identifying the critical path/activities.

(Employer to select appropriate one)

The programme shall be revised every ninety first day and should include a chart of updated principal quantities of works, forecast for execution fortnightly and updated schedule of payment expected to be made to the contractor by the employer.

14.3 CASH FLOW ESTIMATE TO BE SUBMITTED

The detailed Cash Flow Estimate shall be submitted within 21 days from the date of receipt of Letter of Acceptance

The following Sub-Clause 14.5 is added:

14.5 DETAILED PROGRAMME AND MONTHLY PROGRESS REPORT

- a) For purposes of Sub-Clause 14.1, the Contractor shall submit to the Engineer detailed programme for the following:
- (1) Execution of Works;
 - (2) Labour Employment;
 - (3) Local Material Procurement;
 - (4) Material Imports, if any; and
 - (5) Other details as required by the Engineer.
- (b) During the period of the Contract, the Contractor shall submit to the Engineer not later than the 8th day of the following month, 10 copies each of Monthly Progress Reports covering:
- (1) A Construction Schedule indicating the monthly progress in percentage;
 - (2) Description of all work carried out since the last report;
 - (3) Description of the work planned for the next 56 days sufficiently detailed to enable the Engineer to determine his programme of inspection and testing;
 - (4) Monthly summary of daily job record;
 - (5) Photographs to illustrate progress; and
 - (6) Information about problems and difficulties encountered, if any, and proposals to overcome the same.
- (c) During the period of the Contract, the Contractor shall keep a daily record of the work progress, which shall be made available to the Engineer as and when requested. The daily record shall include particulars of weather conditions, number of men working, deliveries of materials, quantity, location and assignment of Contractor's equipment.

The following Sub-Clauses 15.2 and 15.3 are added:

15.2 LANGUAGE ABILITY OF CONTRACTOR'S REPRESENTATIVE

The Contractor's authorised representative shall be fluent in the English language. Alternately an interpreter with ability of English language shall be provided by the Contractor on full time basis.

15.3 CONTRACTOR'S REPRESENTATIVE

The Contractor's authorised representative and his other professional engineers working at Site shall register themselves with the Pakistan Engineering Council.

The Contractor's authorised representative at Site shall be authorised to exercise adequate administrative and financial powers on behalf of the Contractor so as to achieve completion of the Works as per the Contract.

The following Sub-Clauses 16.3 and 16.4 are added:

16.3 LANGUAGE ABILITY OF SUPERINTENDING STAFF OF CONTRACTOR

A reasonable proportion of the Contractor's superintending staff shall have a working knowledge of the English language. If the Contractor's superintending staff is not fluent in English language, the Contractor shall make competent interpreters available during all working hours in a number deemed sufficient by the Engineer.

16.4 EMPLOYMENT OF LOCAL PERSONNEL

The Contractor is encouraged, to the extent practicable and reasonable, to employ staff and labour from sources within Pakistan particularly from project area.

The following Sub-Clauses 19.3 and 19.4 are added:

19.3 SAFETY PRECAUTIONS

In order to provide for the safety, health and welfare of persons, and for prevention of damage of any kind, all operations for the purposes of or in connection with the Contract shall be carried out in compliance with the Safety Requirements of the Government of Pakistan with such modifications thereto as the Engineer may authorise or direct and the Contractor shall take or cause to be taken such further measures and comply with such further requirements as the Engineer may determine to be reasonably necessary for such purpose.

The Contractor shall make, maintain and submit reports to the Engineer concerning safety, health and welfare of persons and damage to property, as the Engineer may from time to time prescribe.

19.4 LIGHTING WORK AT NIGHT

In the event of work being carried out at night, the Contractor shall at his own cost, provide and maintain such good and sufficient light as will enable the work to proceed satisfactorily and without danger. The approaches to the Site and the Works where the night-work is being carried out shall be sufficiently lighted. All arrangement adopted for such lighting shall be to the satisfaction of the Engineer's Representative.

20.4 EMPLOYER'S RISKS

The Employer's risks are:

Delete the text and substitute with the following:

- (a) insofar as they directly affect the execution of the Works in Pakistan:
 - (i) war and hostilities (whether war be declared or not), invasion, act of foreign enemies,
 - (ii) rebellion, revolution, insurrection, or military or usurped power, or civil war,
 - (iii) ionizing radiations, or contamination by radioactivity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radioactive toxic explosive or other hazardous properties of any explosive nuclear assembly or nuclear component thereof,
 - (iv) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds,
 - (v) riot, commotion or disorder, unless solely restricted to the employees of the Contractor or of his Subcontractors and arising from the conduct of the Works;
- (b) loss or damage due to the use or occupation by the Employer of any Section or part of the Permanent Works, except as may be provided for in the Contract;
- (c) loss or damage to the extent that it is due to the design of the Works, other than any part of the design provided by the Contractor or for which the Contractor is responsible; and
- (d) any operation of the forces of nature (insofar as it occurs on the Site) which an experienced contractor:
 - (i) could not have reasonably foreseen, or
 - (ii) could reasonably have foreseen, but against which he could not reasonably have taken at least one of the following measures:
 - (a) prevent loss or damage to physical property from occurring by taking appropriate measures, or
 - (b) insure against.

21.2 SCOPE OF COVER

Paragraph (a) of sub – clause 21.2 is amended by deletion of the words “....from start of work at site....” And by substitution thereof by the words “....from first working day after the commencement date”

21.4 EXCLUSIONS

The text is deleted and substituted with the following:

There shall be no obligation for the insurances in Sub-Clause 21.1 to include loss or damage caused by the risks listed under Sub-Clause 20.4 paras (a) (i) to (iv).

The following Sub-Clause 25.5 is added:

25.5 INSURANCE COMPANY

The Contractor shall be obliged to place all insurances relating to the Contract (including, but not limited to, the insurances referred to in Clauses 21, 23 and 24) with either National Insurance Company of Pakistan or any other insurance company operating in Pakistan and acceptable to the Employer.

Costs of such insurances shall be borne by the Contractor.

The following Sub-Clause 31.3 is added:

31.3 CO-OPERATION WITH OTHER CONTRACTORS

During the execution of the Works, the Contractor shall co-operate fully with other contractors working for the Employer at and in the vicinity of the Site and also shall provide adequate precautionary facilities not to make himself a nuisance to local residents and other contractors.

The following Sub-Clauses 34.2 to 34.12 are added:

34.2 RATES OF WAGES AND CONDITIONS OF LABOUR

The Contractor shall pay rates of wages and observe conditions of labour not less favourable than those established for the trade or industry where the work is carried out. In the absence of any rates of wages or conditions of labour so established, the Contractor shall pay rates of wages and observe conditions of labour which are not less favourable than the general level of wages and conditions observed by other employers whose general circumstances in the trade or in industry in which the Contractor is engaged are similar.

34.3 EMPLOYMENT OF PERSONS IN THE SERVICE OF OTHERS

The Contractor shall not recruit his staff and labour from amongst the persons in the services of the Employer or the Engineer; except with the prior written consent of the Employer or the Engineer, as the case may be.

34.4 HOUSING FOR LABOUR

Save insofar as the Contract otherwise provides, the Contractor shall provide and maintain such housing accommodation and amenities as he may consider necessary for all his supervisory staff and labour, employed for the purposes of or in connection with the Contract including all fencing, electricity supply, sanitation, cookhouses, fire prevention, water supply and other requirements in connection with such housing accommodation or amenities. On completion of the Contract, these facilities shall be handed over to the Employer or if the Employer so desires, the temporary camps or housing provided by the Contractor shall be removed and the Site reinstated to its original condition, all to the approval of the Engineer.

34.5 HEALTH AND SAFETY

Due precautions shall be taken by the Contractor, and at his own cost, to ensure the safety of his staff and labour at all times throughout the period of the Contract. The Contractor shall further ensure that suitable arrangements are made for the prevention of epidemics and for all necessary welfare and hygiene requirements.

34.6 EPIDEMICS

In the event of any outbreak of illness of an epidemic nature, the Contractor shall comply with and carry out such regulations, orders and requirements as may be made by the Government, or the local medical or sanitary authorities, for purpose of dealing with and overcoming the same.

34.7 SUPPLY OF WATER

The Contractor shall, so far as is reasonably practicable, having regard to local conditions, provide on the Site, to the satisfaction of the Engineer or his representative, adequate supply of drinking and other water for the use of his staff and labour.

34.8 ALCOHOLIC LIQUOR OR DRUGS

The Contractor shall not, otherwise than in accordance with the Statutes, Ordinances and Government Regulations or Orders for the time being in force, import, sell, give, barter or otherwise dispose of any alcoholic liquor or drugs, or permit or suffer any such importation, sale, gift, barter or disposal by his Subcontractors, agents, staff or labour.

34.9 ARMS AND AMMUNITION

The Contractor shall not give, or otherwise dispose of to any person or persons, any arms or ammunition of any kind or permit or suffer the same as aforesaid.

34.10 FESTIVALS AND RELIGIOUS CUSTOMS

The Contractor shall in all dealings with his staff and labour have due regard to all recognised festivals, days of rest and religious and other customs.

34.11 DISORDERLY CONDUCT

The Contractor shall at all times take all reasonable precautions to prevent any unlawful, riotous or disorderly conduct by or amongst staff and labour and for the preservation of peace and protection of persons and property in the neighbourhood of the Works against the same.

34.12 COMPLIANCE BY SUBCONTRACTORS

The Contractor shall be responsible for compliance by his Subcontractors of the provisions of this Clause.

34.13 REPATRIATION OF LABOUR

The Contractor shall be responsible for the return to the place where they were recruited or to their domicile of all such persons as he recruited and employed for the purposes of or in connection with the Contract and shall maintain such persons as are to be so returned in a suitable manner until they shall have left the Site or, in the case of persons who are not nationals of and have been recruited outside Pakistan, shall have left Pakistan.

34.14 BURIAL OF THE DEAD

The Contractor shall make necessary arrangements for transport, to any place as required for burial, of any of his expatriate employees or members of their families who may die in Pakistan. The Contractor shall also be responsible, to the extent required by the local regulations, for making any arrangements with regard to transportation and burial of any of his local employees who may die while engaged upon the Works.

The following Sub-Clauses 35.2 and 35.3 are added:

35.2 RECORDS OF SAFETY AND HEALTH

The Contractor shall maintain such records and make such reports concerning safety, health and welfare of persons and damage to property as the Engineer may from time to time prescribe.

35.3 REPORTING OF ACCIDENTS

The Contractor shall report to the Engineer details of any accident as soon as possible after its occurrence. In the case of any fatality or serious accident, the Contractor shall, in addition, notify the Engineer immediately by the quickest available means.

The following Sub-Clause 36.6 is added:

36.6 USE OF PAKISTANI MATERIALS AND SERVICES

The Contractor shall, so far as may be consistent with the Contract, make the maximum use of materials, supplies, plant and equipment indigenous to or produced or fabricated in Pakistan and services, available in Pakistan provided such materials, supplies, plant, equipment and services shall be of required standard.

39.3 ENGINEER'S DECISION FINAL

Any decision of the Engineer under Sub – Clause 39.1 shall be final and conclusive.

41.1 COMMENCEMENT OF WORKS

The text is deleted and substituted with the following:

The Contractor shall commence the Works on Site within the period named in Appendix-A to Bid from the date of receipt by him from the Engineer of a written Notice to Commence. Thereafter, the Contractor shall proceed with the Works with due expedition and without delay.

The following Sub-Clause 47.3 is added:

48.1 TAKING OVER CERTIFICATE

Add “and commissioning” after the word “completion” in line 17 in the text of this clause under General Conditions.

48.2 TAKING OVER OF SECTIONS OR PARTS

Taking over by parts is not envisaged.

49.5 EXTENSION OF DEFECT LIABILITY

The following new Sub-Clause is added:

The provisions of this sub-clause shall apply to all replacements or renewals of plant carried out by the Contractor to remedy defects and damages as if the replacements and renewals had been taken over on the date they were completed. The Defects Liability Period for the Works shall be extended by a period equal to the period during which the Works cannot be used by reason of a defect or damage. If only part of the Works is affected, the Defects Liability Period shall be extended only for that part. In neither case, defects liability period shall be extended beyond two (2) years from the date of taking over.

When progress in respect of Plant has been suspended under clause 40, the Contractor's obligations under this clause shall not apply to any defects occurring more than three (3) years after the Time for Completion established on the date of Letter of Acceptance.

51.2 INSTRUCTIONS FOR VARIATIONS

At the end of the first sentence, after the word "Engineer", the words "in writing" are added.

52.1 VALUATION OF VARIATIONS

In the tenth line, after the words "Engineer shall" the following is added:

Within a period not exceeding one-eighth of the completion time subject to a minimum of 56 days from the date of disagreement whichever is later.

53.4 FAILURE TO COMPLY

This Sub-Clause is deleted in its entirety.

54.5 CONDITIONS OF HIRE OF CONTRACTOR'S EQUIPMENT

The following paragraph is added:

The Contractor shall, upon request by the Engineer at any time in relation to any item of hired Contractor's Equipment, forthwith notify the Engineer in writing the name and address of the Owner of the equipment and shall certify that the agreement for the hire thereof contains a provision in accordance with the requirements set forth above.

60.1 MONTHLY STATEMENTS

In the first line after the word "shall", the following is added:

"on the basis of the joint measurement of work done under Clause 56.1,"

In Para (c) the words "the Appendix to Tender" are deleted and substituted with the words "Sub-Clause 60.11 (a)(6) hereof".

(in case Clause 60.11 is applicable)

60.2 MONTHLY PAYMENTS

In the first line, "28" is substituted by "14".

60.10 TIME FOR PAYMENT

The text is deleted and substituted with the following:

The amount due to the Contractor under any Interim Payment Certificate issued by the Engineer pursuant to this Clause, or to any other terms of the Contract, shall , subject to Clause 47, be paid by the Employer to the Contractor within 30 days after such Interim Payment Certificate has been jointly verified by Employer and Contractor, or, in the case of the Final Certificate referred to in Sub Clause 60.8, within 60 days after such Final Payment Certificate has been jointly verified by Employer and Contractor; Provided that the Interim Payment shall be caused in 42 days and Final Payment in 60 days in case of foreign funded project. In the event of the failure of the Employer to make payment within the times stated, the Employer shall pay to the Contractor compensation at the 28 days rate of KIBOR+2% per annum for local currency and LIBOR+1% for foreign currency, upon all sums unpaid from the date by which the same should have been paid. The provisions of this Sub-Clause are without prejudice to the Contractor's entitlement under Clause 69.

60.11 SECURED ADVANCE ON MATERIALS

- a. The Contractor shall be entitled to receive from the Employer Secured Advance against an indemnity bond acceptable to the Employer of such sum as the Engineer may consider proper in respect of non-perishable materials brought at the Site but not yet incorporated in the Permanent Works provided that:
- (1) The materials are in accordance with the Specifications for the Permanent Works;
 - (2) Such materials have been delivered to the Site and are properly stored and protected against loss or damage or deterioration to the satisfaction of the Engineer but at the risk and cost of the Contractor;
 - (3) The Contractor's records of the requirements, orders, receipts and use of materials are kept in a form approved by the Engineer, and such records shall be available for inspection by the Engineer;
 - (4) The Contractor shall submit with his monthly statement the estimated value of the materials on Site together with such documents as may be required by the Engineer for the purpose of valuation of materials and providing evidence of ownership and payment therefor;
 - (5) Ownership of such materials shall be deemed to vest in the Employer and these materials shall not be removed from the Site or otherwise disposed of without written permission of the Employer; and
 - (6) The sum payable for such materials on Site shall not exceed 75 % of the (i) landed cost of imported materials, or (ii) ex-factory / ex-warehouse price of locally manufactured or produced materials, or (iii) market price of other materials.
- b. The recovery of Secured Advance paid to the Contractor under the above

provisions shall be effected from the monthly payments on actual consumption basis.

60.12 FINANCIAL ASSISTANCE TO CONTRACTOR

Financial assistance shall be made available to the Contractor by the Employer by adopting any one of the following three Alternatives:

(Appropriate alternative only to be retained)

Alternative One: Mobilization Advance

- (a) An interest-free Mobilization Advance up to 10% of the Contract Price stated in the Letter of Acceptance shall be paid by the Employer to the Contractor in two equal parts upon submission by the Contractor of a Mobilization Advance Guarantee/Bond for the full amount of the Advance in the specified form from a Scheduled Bank in Pakistan acceptable to the Employer:
- (1) First part within 14 days after signing of the Contract Agreement or date of receipt of Engineer's Notice to Commence, whichever is earlier; and
 - (2) Second part within 42 days from the date of payment of the first part, subject to the satisfaction of the Engineer as to the state of mobilization of the Contractor.
- (b) This Advance shall be recovered in equal instalments; first instalment at the expiry of third month after the date of payment of first part of Advance and the last instalment two months before the date of completion of the Works as per Clause 43 hereof.

Alternative Two: Mobilization/ Demobilization Cost

Mobilization Cost shall be paid to the Contractor as a part of the priced Bill of Quantities. This cost shall not exceed 10% of the Tender Price and shall be paid to the Contractor as follows:

- (i) 80% of the Mobilization Cost shall be paid for mobilization at Site. This payment shall be in three stages as follows:
- Stage I: 20% of Mobilization Cost upon obtaining and furnishing of Performance Security and insurance policies and construction of camp and housing facilities as required under the Contract;
- Stage II: 30% of Mobilization Cost upon providing & installing preliminary requirements of Contractor's Equipment, materials and temporary structures for the commencement of Works to the satisfaction of the Engineer and achieving 3 % value of the Works (excluding payment under Stage-I);
- Stage III: 30% of Mobilization Cost upon providing balance Contractor's Equipment to complete full requirement for the entire work and after achievement of progress to the extent of 6 % value of the Works (excluding payments under Stages I and II); and
- (ii) 20% of Mobilization Cost shall be paid for operation and maintenance of the (160)

constructed facilities and for demobilization as per schedule of payment to be submitted by the Contractor in accordance with Clause 57.2 and approved by the Engineer.

Alternative Three: Materials Supplied by Employer

The Employer shall supply to the Contractor materials, like cement, steel, bitumen or any other material whichever deemed necessary to complete the project; and the cost thereof shall be recovered from the Contractor through monthly statements on the basis of actual consumption.

The list of materials, quantities and rates to be charged to the Contractor shall be provided along with Appendix-A to Bid "Special Stipulations".

(Employer may opt either "Secured Advance on Materials" or "Financial Assistance to Contractor").

63.1 DEFAULT OF CONTRACTOR

The following para is added at the end of the Sub-Clause:

Provided further that in addition to the action taken by the Employer against the Contractor under this Clause, the Employer may also refer the case of default of the Contractor to Pakistan Engineering Council for punitive action under the Construction and Operation of Engineering Works Bye-Laws 1987, as amended from time to time.

65.2 SPECIAL RISKS

The text is deleted and substituted with the following:

The Special Risks are the risks defined under Sub-Clause 20.4 sub paragraphs (a) (i) to (a) (v).

67.3 ARBITRATION

In the sixth to eight lines, the words "shall be finally settled appointed under such Rules" are deleted and substituted with the following:

'shall be finally settled under the provisions of the Arbitration Act, 1940 as amended or any statutory modification or re-enactment thereof for the time being in force.'

The following paragraph is added:

The place of arbitration shall be Peshawar, Pakistan.

68.1 NOTICE TO CONTRACTOR

The following paragraph is added:

For the purposes of this Sub-Clause, the Contractor shall, immediately after receipt of Letter of Acceptance, intimate in writing to the Employer and the Engineer by registered post, the address of his principal place of business or any change in such address during the period of the Contract.

68.2 NOTICE TO EMPLOYER AND ENGINEER

For the purposes of this Sub-Clause, the respective addresses are:

a) The Employer

The Employer is "Directorate General of Small Dams, Irrigation Department Government of Khyber Pakhtunkhwa Plot No. 27, Street No. 12, Sector E-8, Phase-VII, Hayatabad Peshawar".

b) The Engineer

The Engineer is "Project Manager", PES consultants, Lahore.

69.1 DEFAULT OF EMPLOYER

Payment to the contractor shall be ensured in time as stated in Sub-Clause 60.1, subject to:

- a) Availability of funds for the project.
- b) If the project is in Revision Stage i.e. "R" Stage, then Contractor's payment beyond the effective contract price will be measured, but payment to the Contractor shall be made upon approval of the revised scope through revised administrative approval from the competent authority.

In such events, the Contractor would not be entitled to terminate his employment under the contract, by giving notice to the employer.

69.4 CONTRACTOR'S ENTITLEMENT TO SUSPEND WORK

Without prejudice to the Contractor's entitlement Sub-Clause 60.1, the Contractor, shall not be entitled to terminate the contract for reasons covered under Sub-Clause 69.4.

70.1 INCREASE OR DECREASE OF COST

Sub-Clause 70.1 is deleted in its entirety, and substituted with the following:

The amounts payable to the Contractor, pursuant to Sub-Clause 60.1, shall be adjusted in respect of the rise or fall in the cost of labor, materials, and other inputs to the Works, by applying to such amount the formula prescribed in this Sub-Clause.

(a) Other Changes in Cost

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

(b) Adjustment Formula

The price adjustment formula shall not be applied before expiry of one year from date fixed for receiving of tenders and price of works and goods done or delivered during that period are not subject to escalation.

The adjustment to the monthly statements in respect of changes in cost shall be determined from the following formula:-

$$P_n = A + b \frac{L_n}{L_o} + c \frac{M_n}{M_o} + d \frac{E_n}{E_o} + \dots$$

Where:

“P_n” is a price adjustment factor to be applied to the amount for the payment of the work carried out in the subject month, determined in accordance with Paragraph 60.1 (a), and with Paragraphs 60.1 (b) and (e), where any variations and daywork are not otherwise subject to adjustment;

“A” is a constant, specified in Appendix-C to Bid, representing the nonadjustable portion in contractual payments;

b, c, d, etc., are weightages or coefficients representing the estimated proportion of each cost element (labour, cement and reinforcing steel etc.) in the Works or Sections thereof, net of Provisional Sums and Prime Cost; the sum of A, b, c, d, etc., shall be one;

“L_n”, “M_n”, “E_n”, etc., are the current cost indices or reference prices of the cost elements for month “n”, determined pursuant to Sub-Clause 70.1(d), applicable to each cost element; and

“L_o”, “M_o”, “E_o”, etc., are the base cost indices or reference prices corresponding to the above cost elements at the date specified in Sub-Clause 70.1(d).

(c) Sources of Indices and Weightages

The sources of indices shall be those listed in Appendix-C to Bid, as approved by the Engineer. As the proposed basis for price adjustment, the Contractor shall have submitted with his bid the tabulation of Weightages and Source of Indices if different than those given in Appendix-C to Bid, which shall be subject to approval by the Engineer.

(d) Base, Current, and Provisional Indices

The base cost indices or prices shall be those prevailing on the day 28 days prior to the latest date for submission of bids. Current indices or prices shall be those prevailing on the day 28 days prior to the last day of the period to which a particular monthly statement is related. If at any time the current indices are not available, provisional indices as determined by the Engineer will be used, subject to subsequent correction of the amounts paid to the Contractor when the current indices become available.

(e) Adjustment after Completion

If the Contractor fails to complete the Works within the Time for Completion prescribed under Clause 43, adjustment of prices thereafter until the date of completion of the Works shall be made using either the indices or prices relating

to the prescribed time for completion, or the current indices or prices, whichever is more favorable to the Employer, provided that if an extension of time is granted pursuant to Clause 44, the above provision shall apply only to adjustments made after the expiry of such extension of time.

(f) Weightages

The weightages for each of the factors of cost given in Appendix-C to Bid shall be adjusted if, in the opinion of the Engineer, they have been rendered unreasonable, unbalanced, or inapplicable as a result of varied or additional work executed or instructed under Clause 51. Such adjustment(s) shall have to be agreed in the variation order.

(g) Subsequent Legislation

If, after the date 28 day prior to the latest date for submission of tenders for the Contract, there occur in Pakistan changes to any National or State Statute, Ordinance, Decree or other Law or any regulation or by-law of any local or other duly constituted authority or the introduction of any such State Statute, Ordinance, Law, regulation or by-law which causes additional or reduced cost to the Contractor, other than under the preceding Sub-Clauses of this Clause, in the execution of the Contract, such additional or reduced cost shall, after due consultation with the Employer and the Contractor, be determined by the Engineer and shall be added to or deducted from the Contract Price and the Engineer shall notify the Contractor accordingly, with a copy of the Employer. Notwithstanding the foregoing, such additional or reduced cost shall not be separately paid or credited if the same shall already have taken into account in the indexing of any inputs to the Price Adjustment Formula in accordance with the provisions of Sub-Clauses 70.1 a through f.

The following Sub-Clauses 73.1, 73.2, 74.1, 75.1, 76.1, 77.1 and 78.1 are added:

73.1 PAYMENT OF INCOME TAX

The Contractor, Subcontractors and their employees shall be responsible for payment of all their income tax, super tax and other taxes on income arising out of the Contract and the rates and prices stated in the Contract shall be deemed to cover all such taxes.

73.2 FOREIGN TAXATION

The prices bided by the Contractor shall include all taxes, duties and other charges imposed outside the Employer's country on the production, manufacture, sale and transport of the Contractor's Equipment, Plant, materials and supplies to be used on or furnished under the Contract and on the services performed under the Contract.

(Employer may incorporate provisions where applicable).

73.3 LOCAL TAXATION

The prices bided by the Contractor shall include all customs duties, import duties, business taxes, income and other taxes that may be levied in accordance to the laws and regulations in force as of the date 28 days prior to the closing date for submission of tenders in Pakistan

on the Contractor's Equipment, Plant, material and supplies (permanent, temporary and consumable) acquired for the purpose of the Contract and on the services performed under the Contract. Nothing in the contract shall relieve the Contractor from his responsibility to pay any tax that may be levied in Pakistan on profits made by him in respect of the Contract.

73.4 INCOME TAXES ON STAFF

The Contractor's staff personnel and labour will be liable to pay personal income taxes in Pakistan in respect of such of their salaries and wages as are chargeable under the laws and regulations 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 and regulations.

73.5 ADVANCE INCOME TAX

Deduction of advance income tax from the net payable bill amounts shall be made in accordance with prevalent Income Tax Laws of the Government of Pakistan. These deductions shall be deposited, in the Government Treasury by the Employer, to the account of the Contractor.

73.6 DUTIES ON CONTRACTOR'S EQUIPMENT

Notwithstanding the provisions of Sub Clause 73.3, Contractor's Equipment including essential spare parts therefore, imported by the Contractor for the sole purpose of executing the Contract shall be exempt from the payment of custom duties, import duties and taxes levied in Pakistan, and any such duties and taxes so paid by the Contractor shall be reimbursed by the Employer to the Contractor which shall not include any other cost, profits or overheads. Reimbursement shall be made subject to the provisions of the Sub Clauses 73.7, 73.8 and 73.9.

73.7 REFUND OF DUTY DRAWBACK

On the re-export of Contractor's Equipment, a portion of duties and taxes paid on the import of the same are refunded by Government of Pakistan which are called Duty Drawback. The Contractor shall receive and pay the same Duty Drawback to the employer.

73.8 SALE OF CONTRACTOR'S EQUIPMENT IN PAKISTAN

- (a) If the Contractor's Equipment is not re – exported after removal from Site and is used elsewhere or sold in Pakistan, then the portion of duties and taxes reimbursed under Sub – Clause 73.6 proportionate to the residual value of the Contractor'
- (b) In case on the import of Contractor's Equipment, no or partial duties and taxes are imposed by the Government of Pakistan on all or any portion thereof and consequently no or partial imbursements are made by the Employer and the Contractor, at any time during or after the completion of Works, desires to sell in Pakistan any such equipment then prior permission of the Government of Pakistan will be required who may impose duties and taxes on such sales. Any such duties and taxes paid by the Contractor to the Government shall not be reimbursed by the Employer to the Contractor.

73.9 NON – REIMBURSABLE COSTS OF CONTRACTOR

- (a) In case partial or total exemption of any duty or tax is permissible on Contractor's Equipment in any case due to Government rules and regulations which the Contractor can get by due and timely application to the appropriate authority and the Contractor fails to get this exemption then the payment made by the Contractor of duties and taxes to the extent of exemption permissible, will not be reimbursed.
- (b) any element of duty or tax inherent in the price of locally produced goods and services shall be deemed to be included in the rates and prices stated in the priced Bill of Quantities and will not separately be reimbursed.

74.1 INTEGRITY PACT

If the Contractor or any of his Subcontractors, agents or servants is found to have violated or involved in violation of the Integrity Pact signed by the Contractor as Appendix-L to his Bid, then the Employer shall be entitled to:

- (a) recover from the Contractor an amount equivalent to ten times the sum of any commission, gratification, bribe, finder's fee or kickback given by the Contractor or any of his Subcontractors, agents or servants;
- (b) terminate the Contract; and
- (c) recover from the Contractor any loss or damage to the Employer as a result of such termination or of any other corrupt business practices of the Contractor or any of his Subcontractors, agents or servants.

The termination under Sub-Para (b) of this Sub-Clause shall proceed in the manner prescribed under Sub-Clauses 63.1 to 63.4 and the payment under Sub-Clause 63.3 shall be made after having deducted the amounts due to the Employer under Sub-Para (a) and (c) of this Sub-Clause.

75.1 TERMINATION OF CONTRACT FOR EMPLOYER'S CONVENIENCE

The Employer shall be entitled to terminate the Contract at any time for the Employer's convenience after giving 56 days prior notice to the Contractor, with a copy to the Engineer. In the event of such termination, the Contractor:

- (a) shall proceed as provided in Sub-Clause 65.7 hereof; and
- (b) shall be paid by the Employer as provided in Sub-Clause 65.8 hereof.

76.1 LIABILITY OF CONTRACTOR

The Contractor or his Subcontractors or assigns shall follow strictly, all relevant labour laws including the Workmen's Compensation Act and the Employer shall be fully indemnified for all claims, damages etc. arising out of any dispute between the Contractor, his Subcontractors or assigns and the labour employed by them.

77.1 JOINT AND SEVERAL LIABILITIES

If the Contractor is a joint venture of two or more persons, all such persons shall be jointly and severally bound to the Employer for the fulfilment of the terms of the Contract and shall designate one of such persons to act as leader with authority to bind the joint venture. The composition or the constitution of the joint venture shall not be altered without the prior consent of the Employer.

78.1 DETAILS TO BE CONFIDENTIAL

The Contractor shall treat the details of the Contract as private and confidential, save in so far as may be necessary for the purposes thereof, and shall not publish or disclose the same or any particulars thereof in any trade or technical paper or elsewhere without the prior consent in writing of the Employer or the Engineer. If any dispute arises as to the necessity of any publication or disclosure for the purpose of the Contract, the same shall be referred to the decision of the Engineer whose award shall be final.

SPECIFICATIONS

SPECIAL PROVISIONS

TABLE OF CONTENTS

SPECIAL PROVISIONS

SP-01	DESCRIPTION OF THE PROJECT	1
SP-02	PROJECT FEATURES	2
SP-03	DRAWINGS.....	3
SP-04	LAYOUT OF WORK AND SURVEYS	7
SP-05	ABBREVIATIONS OF STANDARDS	8
SP-06	STANDARDS OTHER THAN THOSE SPECIFIED	9
SP-07	APPROVAL OF MATERIALS, EQUIPMENT AND WORKMANSHIP	9
SP-08	INSPECTION.....	9
SP-09	CONSTRUCTION SCHEDULE.....	10
SP-10	CONTRACTOR'S CAMP AND SITE FACILITIES TO BE PROVIDED BY THE CONTRACTOR - CONSTRUCTION AND MAINTENANCE	10
SP-11	WATER FOR CONSTRUCTION AND OTHER USES	11
SP-12	WEATHER CONDITIONS	11
SP-13	ASSISTANCE FOR ENGINEER/CLIENT	11
SP-14	STORAGE AND USE OF EXPLOSIVES.....	12
SP-15	VENTILATION AND DUST CONTROL	13
SP-16	PHOTOGRAPHS.....	13
SP-17	PROVIDES SECURITY GUARDS & MANPOWER FOR EMPLOYER & ENGINEER/ENGINEER REPRESENTATIVE OFFICES ALONG WITH SERVICE CHARGES.....	13
SP-18	DIRECTED AND REQUIRED	13
SP-19	CONTRACTOR TO COOPERATE WITH OTHERS.....	14
SP-20	PROGRESS REPORTS AND PHOTOGRAPHS.....	14
SP-21	SAFETY AND HEALTH	14
SP-22	RESTRICTION OF WORKMEN TO SITE.....	15
SP-23	PROTECTION CHARGES AND TRIBAL ROYALTIES	15
SP-24	MOBILIZATION ADVANCE.....	15
SP-25	COMMUNICATION TO THE ENGINEERS.....	16

SP-26	WORK DONE AFTER COMPLETION DATE	16
SP-27	MEASUREMENT AND PAYMENT	16
SP-28	DECISION OF EMPLOYER	17
SP-29	ADDITIONS TO AND DELETIONS FROM CLAUSES	17
SP-30	CONSTRUCTION ITEMS.....	17

SPECIFICATIONS

SPECIAL PROVISIONS

SP-01 DESCRIPTION OF THE PROJECT

i) Location of the project

The project area falls in Lower Dir District of Khyber Pakhtunkhwa. The proposed dam site is located on the Asbanr Nullah and is about 22 km North-West of Saidu Sharif and 16 km from Chakdara Town. The coordinates of the dam site are 34° 46' 48" N and 72° 06' 51" E.

ii) Site of works

The site of works is the area for Construction of Sanam Dam within the right-of-way lines, boundaries and limits shown on the Drawings and such additional areas adjacent there to as may be designated under the Contract Documents, and all such areas and additional areas shall be included in the site as defined in Clause 1.1 of the Conditions of Contract.

Within the areas which may from time to time be defined as the Site, the Contractor shall carry out and perform the construction of the works and subject to the approval of the Engineer will be permitted to construct diversion works, road ways / access road, camps buildings and temporary works which he may be required for the construction of the works. If the Contractor wishes to use any land other than as aforesaid for construction of camps or for any other Contract purposes, the Contractor shall make all necessary arrangements with the owner thereof and shall bear all rentals or other costs connected therewith.

The Employer will give to the Contractor possession of as much of the areas designated and defined as the site and shown on the drawings as may be required to implement the works when the Engineer's order to commence work is given.

The site is subjected to seismic disturbances, rain storms and floods. Attention is drawn to the necessity for allowing for these factors in the design and specification of temporary works, materials, plant and equipment for which the Contractor may be responsible.

SP-02 PROJECT FEATURES**i) Work by Contractor**

The scope of work under this contract consists of furnishing all plant, labour, equipment, superintendence and other services and facilities required for completion and maintenance of Sanam Dam, as required in the contract. The contractor shall also furnish all the materials required for the works. The project features under this contract will consist of Approach Road, Chowkidar Hut, Main Dam, Spillway (composite), Outlet Structure and Irrigation system & allied components. Following are the principal features of the works to be executed, which shall be of capacities, size and specifications as shown in the contract document.

1) Main Dam

The main dam will be 96 ft. high Earth fill Dam about 885 ft. long extending across the Asbnar Nullah with Central Impervious Core. Owing the presence of thick overburden layer and pervious abutment towards the right side, the dam axis has been curved around its mid-length to close the rim through exposed rock at its right abutment. The dam will create a gross storage of 1082 Acre Feet with maximum storage level of 3306 Feet and live storage of 786 Acre Feet.

2) Spillway

Spillway (DWG: BQB-SDP-SP-01 to 23): The spillway consists of a simple overflow type concrete gravity structure with its crest fixed at the maximum conservation level (el; 3306). It has an ogee shaped crest with length of 265 feet. 3.5 feet thick piers supported bridge with 18 feet lane width, village road bridge across the spillway has been proposed. The spillway structure is made of mass concrete (3000 psi at 90 days) with a reinforced concrete (3000 psi at 28 days) outer shell for prevention of seepage through the spillway body and for withstanding high pressure flows during its' use. It has been designed to safely route 29,100 cusecs (1 in 500 flood) with a clear free board of 4 feet below the soffit of the spillway bridge.

3) Outlet Structure

The conduit for Sanam outlet works will have smooth and gradual geometrical transition near the intake. The transition will provide a smooth flow and will reduce the losses in the pipe. The total length of conduit is 304 ft. having a 1V:1000H slope: Head discharge relationship

has been developed for RCC pipe conduit of 2.0 ft. diameter. Value of Manning's roughness coefficient has been estimated as 0.012.

4) Irrigation Canal and Affiliated Structures

Sanam Dam's irrigation canal is proposed to be off-taken from Dam's disposal conduit (outlet) at downstream right side. This Irrigation conduit is proposed to divert nullah supplies during construction and for post construction irrigation of the downstream plain (valley) on both sides of nullah, which at present depends on rain water. The total gross area of these plains is 2375 acres, out of which 2150 acres (90% of GCA) culturable command area (CCA) has been selected. The canal is proposed to traverse with a bed slope of 1 in 500 for most of its length. Total length of main channel is 7839.15 m (25719 ft.) with one distributary on left side along the hill slopes and drop falls will be provided. Length of the distributary is 5314.5 m (17436 ft.) which originates from main canal at RD 7+908. Both distributary and main channel are basically contour channels.

The available topography, hydrology, soil suitability, extent of water and area is reviewed for selection of the detailed design. Canal and its appurtenant structures has been pre-determined and marked on topography map.

5) Approach Road

Approach Road to the dam site shall be constructed by the Contractor using the existing road in such a way that shortest possible path that requires minimum excavation is constructed.

Details can be seen in the bid drawings (Vol. II)

SP-03 DRAWINGS

i) Drawings in Contract

The Drawings titled Sanam Dam herein after referred to as Bid/Tender Drawings; show the scope of work to be performed by the Contractor. The Bid Drawings shall not be used as a basis for fabrication or construction but may be used for planning, scheduling and placing preliminary orders for materials, subject to corrections based on the future issue of Drawings as provided under sub-clause SP – 03 (ii), Construction Drawings. Any other drawings which are issued as Addenda before opening of Bids shall become part of this list.

ii) Construction Drawings

After award of Contract, the Bid Drawings will be replaced by drawings issued by the Engineer for construction, with the supplementary specifications as may be necessary. The Drawings issued for construction will include Bid Drawings reissued, Bid Drawings as may be modified, and additional drawings as required to develop in greater detail the construction required and shall be referred to hereinafter as Construction Drawings. The Construction Drawings will be drawings from which shop erection, concrete placing, formwork or other detailed drawings shall be prepared by the Contractor. The work shall be executed in conformity with the Construction Drawings.

iii) Definition of Term Drawings

The term Drawings as used throughout the Specifications apply to both the Bid Drawing defined in sub-clause SP – 03 (i), Drawings in Contract and to the drawings issued for construction as described in sub-clause SP – 03 (ii), Construction Drawings.

iv) Checking of Drawings

The Contractor shall check all Construction Drawings carefully as soon as practicable after receipt thereof and shall promptly advise the Engineer of any errors or omission/improvement.

v) Copies of Drawings and Specifications

Drawings and Specifications will be issued to the Contractor as follows:

1. Bid Drawings

Sets of Bid/Tender Drawings have been uploaded on Irrigation website which may be downloaded by the intended bidder. However, hard copies can be provided at cost of reproduction upon written request of the contractor.

2. New Construction Drawings

Two copies of each drawing (free of charge) will be provided to the Contractor.

3. Specifications

For schedule items the respective MRS-2021 specifications will be adopted coupled with the technical specification provided in the tender documents.

vi) Drawings to be furnished by the Contractor**1. Shop Drawings**

All shop drawings required for the work (except reinforcing steel bending and cutting drawings and such drawings as are specified to be furnished by others under separate contracts) including field erection layout and construction detail drawings shall be furnished by the Contractor for approval of the Engineer. All detail drawings are necessary to complete any part of the work, such detailed drawing shall be prepared by the Contractor and submitted to the Engineer for approval. All drawings shall be completed and submitted in due time and in logical order to facilitate proper coordination. All drawings submitted and approved will form part of the Contract.

2. Lift Drawings

Not less than fifteen calendar days prior to starting construction of any lift or other placement of concrete the Contractor shall submit to the Engineer for approval, detailed drawings hereinafter called lift drawings to such scale as to show clearly all recesses openings and embedded work including embedded structural, mechanical and electrical items, in each lift or placement in sufficient detail for proper prosecution of the work. Lift drawings shall be submitted for every lift or other placement of concrete.

3. Camp Layout Drawings

Three prints of drawings showing the layout of the Contractor's camps with locations of his offices, labour camps, workshops, stores, sheds, yards and the constructional plant which the Contractor proposes to use on the works shall be submitted by the Contractor to Engineer for review. The drawings shall be submitted sufficiently in time to permit adequate review by the Engineer. Two sets of the drawings will be retained by the Engineer and one set will be returned to the Contractor with comments if any.

4. Other Drawings

Drawings showing proposed methods of construction for Temporary Works and other drawings additional to those referred to hereinabove, required by the Specifications, shall also be submitted to the Engineer for approval.

5. Ownership of Drawings

All the drawings, bill of materials and any other information or documents furnished by the Contractor shall become the property of the Employer and shall be non-returnable.

vii) Submission and Approval

1. Drawings for Approval

The Contractor shall send drawings requiring approval obtaining of the Engineer by air mail as follows:

Project Manager	1 reproducible and 2 prints
-----------------	--------------------------------

With copy to

Resident Engineer	One Print
-------------------	-----------

Within fifteen calendar days after receipt, the Engineer will send one copy to the Contractor marked "Approved". "Approved Except as Noted" or "Returned for Correction". The notation "Approved" and "Approved Except as Noted" will authorize the Contractor to proceed with the fabrication of the materials and equipment or construction work covered by such drawings subject to the corrections, if any indicated thereon.

When prints of drawings have been "Returned for Correction" the Contractor shall make the necessary revisions on the drawings and shall resubmit prints for approval in the same manner as for new drawings. Every revision made during the life of the Contract shall be shown by number, date and subject in a revision block.

2. Work Prior to Approval

Any work done prior to the approval of drawings shall be at the Contractor's risk. The engineer shall have the right to request any additional details and to require the Contractor to make any changes in the design which are necessary to conform to the provisions and intent of these Specifications without additional cost to the Employer. The approval of the drawings by the Engineer shall not be construed as a complete check but satisfactory. Approval by the Engineer of the Contractor's drawings shall not be held to relieve the Contractor of the obligation to meet all the requirements of these Specifications or of the responsibility for the correctness of the Contractor's drawings or of the responsibility for correct fit of assembled parts in final position or of the responsibility for the adequacy of method of construction.

3. Sequence of Submission

The sequence of submission of all drawings shall be such that all information is available for checking each drawing when it is received. All drawings submitted for approval shall be provided with a blank white space approximately 100 mm in height by 200 mm in width near the lower right-hand corner to be used for notations by the Engineer.

4. **Approved Drawings**

All approved Drawings and data shall form part of the Contract. If revisions are made after a drawing has been approved, the Contractor shall furnish for approval additional copies as specified for the initial submission, subsequent to each revision. The contractor shall distribute approved drawings by air mail to the addresses as follows:

- | | | |
|----|--|--------------------------------|
| 1. | Director General Small Dams
Irrigation Department
Government of Khyber Pakhtunkhwa | 1 reproducible and
2 prints |
| 2. | Director (North), Directorate General Small Dams,
Irrigation Department
Government of Khyber Pakhtunkhwa | 2 prints |
| 3. | Project Manager | 1 reproducible and
2 prints |
| 4. | Resident Engineer | Two prints |

The distribution may be varied in the course of the Contract.

viii) **Record Drawings**

The Contractor shall during the progress of the work, keep a record of all changes in and corrections to the designs and layouts shown on the drawings. The Contractor shall prepare the record drawings under the supervision of the Engineer. The Contractor shall furnish to the Engineer three copies of all the record drawings after approval by the Engineer.

ix) **Drawings, Data, Correspondence – Language**

Unless otherwise approved by the Engineer all drawings, data correspondence and other submissions made by the contractor shall be in the English language.

SP-04 LAYOUT OF WORK AND SURVEYS

i) **Reference Points, Lines and Levels**

The Engineer will layout a reference line or lines in the field with accompanying points and benchmarks with the assistance of surveyors / equipment, labour and materials provided by the Contractor. The Contractor shall establish all permanent

reference points for construction control as a consequence of this work.

ii) Verification

The Engineer may make check as the work progresses to verify lines and grades established by the Contractor and to determine the conformance of the work as it progresses with the requirements of Specifications and Drawings. Such checking by the Engineer shall not relieve the contractor of his responsibility to perform all work in accordance with the Drawings and Specifications and the lines and grades given therein.

SP-05 ABBREVIATIONS OF STANDARDS

Standard specifications and codes of the following listed authorities wherever cited herein are referred to by use of the acronyms shown below. All materials and workmanship shall comply with requirements of latest revisions of applicable codes.

1.	American National Standards Institute, Inc.	ANSI
2.	American Society for Testing and Materials	ASTM
3.	American Association of State Highway & Transport Officials	AASHTO
4.	British Standards Institution	BS
5.	American Standards Association	ASA
6.	American Concrete Institute	ACI
7.	United States Bureau of Reclamation	USBR
8.	Steel Structures Painting Council	SSPC
9.	National Electrical Manufacturers Association	NEMA
10.	Insulated Power Cable Engineers Association	IPCEA
11.	American Society of Mechanical Engineers	ASME
12.	American Welding Society	AWS
13.	American Water Works Association	AWWA
14.	American Institute of Steel Construction	AISC
15.	Federal Highway Administration	FHWA
16.	American Institute of Architects	AIA
17.	American Society of Civil Engineers	ASCE
18.	American Wood Preservers Association	AWPA
19.	American Wire Gauge	AWG

SP-06 STANDARDS OTHER THAN THOSE SPECIFIED

Where requirements for materials or equipment are specified by reference to a standard which has its origin in one country, it is not the intention to restrict the requirements solely to that standard and that country. Other standards including standards of other countries will be accepted provided the requirements thereof in the sole opinion of the Engineer are at least equal to the requirements of the standard specified. The Contractor may propose to the Engineer an equivalent standard other than that specified in which case he shall submit the proposed standard and all other information required by the Clause SP-07 and shall submit written proof that his proposed standard is equivalent in all significant respects to the standard specified.

SP-07 APPROVAL OF MATERIALS, EQUIPMENT AND WORKMANSHIP**i. Manufacturer's Certificate of Compliance**

In the case of standard labelled stock products of standard manufacture, which have a record of satisfactory performance in similar work over a period of not less than two years, the Engineer may accept a notarized statement from the manufacturer certifying that the product conforms to the applicable specifications.

ii. Mill Certificates

In the case of materials for which such practice is usual, the Engineer may accept the manufacturer's certified mill and laboratory certificate.

iii. Testing Laboratory Certificate

The Engineer may accept a certificate from a commercial testing laboratory, satisfactory to him, certifying that the product has been tested within a period acceptable to the Engineer and that it conforms to the requirements of the Specifications.

iv. Service Record

If a demonstrable satisfactory service record is available for a material, certain specified tests may be waived by the Engineer.

v. Cost

The cost of any additional laboratory field and shop tests required through the resubmission of samples because of failure to comply with the Specifications shall be borne by the Contractor and will be deducted from any money due to him.

SP-08 INSPECTION

All material and equipment furnished and all work performed by the Contractor shall be subject to inspection by the Engineer at all times and in all states of completion both off-site and on-site. The Contractor shall furnish promptly, without additional charge, all facilities,

labour and material reasonably needed by the Engineer to perform such inspection and tests. Selected materials and equipment may be inspected at the source e.g. borrow area, manufacturer's plant etc. as well as at the Site. Acceptance of materials and equipment or the waiving of inspection thereof shall in no way relieve the Contractor of the responsibility for furnishing materials and equipment meeting the requirements of the Contract.

SP-09 CONSTRUCTION SCHEDULE

i. Schedule to be provided

The Contractor shall carry out the Works in accordance with the dates specified in the Bid. Pursuant to Clause 14.1 of the Conditions of Contract, programme to be furnished, the Contractor shall within 15 days of the Order to Proceed submit to the Engineer for approval his proposed Schedule for construction and completion of the works.

ii. Form of Schedule

The schedule shall be in a form acceptable to the Engineer

Activities shown on the schedule shall consist not only of the actual construction operations but shall also include the submittal and approval of drawings and samples, procurement of materials and equipment, and installation and testing of major and critical items.

iii. Shipping of Materials and Equipment to the Site

In preparing the Schedule, the Contractor shall fully take into account the requirements, limitations and possibilities of ocean or air freight, inland and rail transportation etc. Progress of all shipments to the site shall be continuously monitored and the Contractor shall provide staff or agents to expedite all shipments and ensure compliance with the approved schedule.

iv. Approved Schedule

After initial approval by the Engineer the Contractor shall monitor the Schedule .and regularly but at intervals not exceeding 90 days submit copies for the information of the Engineer. All revisions shall be accompanied by an explanation of the reasons for the change(s). Any required as a result of the Engineer's review or of changes in the overall project schedule shall be executed by the Contractor within 15 days of receipt of the Engineer's notice that such a revision is required. The schedule shall govern for such purposes as determination of extension of time, as the Engineer may require.

SP-10 CONTRACTOR'S CAMP AND SITE FACILITIES TO BE PROVIDED BY THE

CONTRACTOR - CONSTRUCTION AND MAINTENANCE

- i. The Contractor's camps shall comply with the rules of the Pakistan Labour Camp Rules, (latest edition), issued by the Pakistan Health, Welfare and Local Government Department and the requirements therein set forth.
- ii. The Contractor shall establish his own material testing laboratory near the dam site. He shall provide all equipment required to perform tests attached as Annex-1.
- iii. The Contractor with the approval of the Engineer shall provide and maintain such haulage and access roads, as are necessary for construction of the works. It shall also include access road to the dam site. Construction and maintenance of haul and access roads will not be measured for payment.
- iv. No separate payment will be made for any of the construction for Contractor's camps and utilities and their maintenance, and other facilities for use of the Engineer/Employer and the Consultant under these specifications, and all cost therefore shall be included in the unit rates bided for the items of the Bill of Quantities under this Contract.
- v. Vacating Camp
At such time when portions of the facilities provided by the Contractor are no longer required for the execution of the work, and in accordance with a schedule of time and the instructions furnished by the Engineer, the Contractor shall vacate and hand over to the employer in reasonably good condition, fair wear and tear considered, all buildings, housing, area improvements, utility systems, equipment, furniture and other facilities including furnishings and supplies constructed and provided as part of the facilities, except
The Contractor's construction and fabricating equipment, tools and supplies, and Such temporary buildings and facilities as may be specifically designated by the Engineer for removal by the Contractor.

SP-11 WATER FOR CONSTRUCTION AND OTHER USES

It is expressly expounded that the Contractor shall make his own investigations and arrangements for procurement and supply of water for construction and other uses. The Employer shall not accept any responsibility or entertain any claims by the Contractor due to non- availability of sufficient quantity or required quality of water.

SP-12 WEATHER CONDITIONS

The Contractor shall be deemed to have taken all possible weather and river flow conditions into account when preparing his bid and shall not be entitled to extra payment by reason of the occurrence or effect of excessive rainfall, drought, temperature or humidity, high winds, floods or any other meteorological phenomenon.

SP-13 ASSISTANCE FOR ENGINEER/CLIENT

- i. The Contractor shall provide for the use of the Engineer whenever required during the Contract, all chainmen, staff men, labourers, tradesmen, technicians, instruments, apparatus, protective head gear and other equipment as the Engineer

deems necessary for the execution of his duties in connection with the Contract.

The Contractor shall be solely responsible for all such instruments and apparatus and shall ensure that they are at all times in good repair and adjustment.

All equipment other than expendable items shall revert to the Contractor on completion of the Works.

No separate payment will be made for the work done pursuant to this Clause.

II. ASSISTANCE FOR CLIENT STAFF

Contractor shall provide appropriate conveyance facility for local duty at project site to the lower field staff for which no separate payment will be made.

SP-14 STORAGE AND USE OF EXPLOSIVES

- i. Explosives shall be stored, transported, handled and used in accordance with the law. The Contractor shall comply with all special rules and regulations that may be made by the authorities having jurisdiction, and by the Engineer, regarding construction of, and storage in magazines, precautions on blasting work, and the like. The Contractor will be held responsible to the Employer for all claims for damage caused.
- ii. Explosives and detonators shall not be transported in the same vehicle. Explosives shall be stored in suitable magazines in an approved location. Detonators shall be kept in a separate magazine. The magazine shall be plainly marked with large letters EXPLOSIVES — DANGEROUS in English and Urdu and shall be locked and guarded at all times. Keys to unlock the magazines shall be kept only by magazine keepers. Each magazine shall have around it a clear area suitably barricaded with a security fence.
- iii. Before starting any drilling and blasting of rock the Contractor shall submit his proposed plan in writing for such operations to the Engineer for approval, shall not deviate there from without the written permission of the Engineer. The Contractor's plan shall include statement of maximum safe distance; means of protection of concrete and other works and structures, all of which shall be compatible with good practices as indicated in the approved safety manuals and other approved publications. Approval by the Engineer of the Contractor's plan of operation shall in no case relieve the Contractor of full responsibility for the entire drilling and blasting operation, including the safety of persons and the work.
- iv. The Contractor shall satisfactorily cover shots in open cut excavation as may be required to prevent damage to the works and injury to persons, and shall take extra precautions on all blasting work when required by the Engineer. Flagmen shall be employed by the Contractor to warn of pending blasts, and no radios shall be operated in the proximity of blasting operation.

The Contractor shall blast to the extent approved in a manner which will not open seams nor crack or otherwise damage the rock outside of the prescribed limits of excavation, nor unduly shake up the ground and make it unstable, nor injure concrete already placed or existing structures at the Site or in the vicinity thereof, nor in any way affect foundation and other rock and soil that is grouted. Whenever, in the Engineer's opinion, the Contractor's blasting operations may cause damage to rock against which concrete is to be placed, or rock that has been grouted, or otherwise cause damage, the Contractor shall drill shorter holes and use lighter charges or use mechanical rock removal or other suitable methods to complete the excavation.

SP-15 VENTILATION AND DUST CONTROL

The Contractor shall keep the air of the excavations and other spaces in a condition suitable for the health of men and clear enough for surveying operations.

SP-16 PHOTOGRAPHS

No photographs of the Site of the Works or any part thereof shall be published or otherwise circulated without the permission of the Employer.

No such permission shall exempt the Contractor from complying with any statutory provisions in regard to the taking and publication of photographs.

SP-17 PROVIDES SECURITY GUARDS & MANPOWER FOR EMPLOYER & ENGINEER/ENGINEER REPRESENTATIVE OFFICES ALONG WITH SERVICE CHARGES.

Contractor shall provide security guards for the office of Employer/Engineer and Consultant representative to ensure proper security. The security guards shall perform the duties in three shifts. The guard provided should be from security agency have necessary approval of the Interior Ministry and Home Department of KP Government.

All the payments to the security agency shall be borne by contractor.

SP-18 DIRECTED AND REQUIRED

Unless otherwise stated, wherever in the Specifications or upon the Drawings, the words 'directed', 'required', 'permitted', 'ordered', 'designated', 'prescribed' or words of like import are used it shall be understood that the 'direction', 'requirement', 'permission', 'order', 'designation' or 'prescription' of the Engineer is intended and similarly the words approved acceptable satisfactory or words of like import shall mean approved by or acceptable or

satisfactory to the Engineer.

SP-19 CONTRACTOR TO COOPERATE WITH OTHERS

Pursuant to Clause 31.2 of the Conditions of Contract, the Contractor shall coordinate his work with that of other Contractors/Sub-Contractors at the Site to whatever extent may be necessary to complete the Project in accordance with the Schedule, the Drawings and Specifications and the requirements of the Engineer. Should a disagreement or dispute arise between the Contractor, and any of the other Contractor / Sub-Contractors, the same shall be submitted without delay to the Engineer for his decision. Upon such decision, the Contractor, and the other Contractor / Sub Contractors shall proceed with the work in accordance therewith, immediately.

SP-20 PROGRESS REPORTS AND PHOTOGRAPHS

On the Tenth day of each month the Contractor shall submit four copies of a detailed written report in a form acceptable to the Engineer of the progress of the work during the preceding month. The report shall show, among such other data as the Engineer may request, the percentage of each type of work completed during the month and the total percentages of completion as of the date of the report. The Contractor shall also supply to the Engineer 8"x10" colour photographs of the work in progress throughout the Contract period. The photographs shall be taken at the start and completion of each major component of the work and at other times as directed by the Engineer to show the progress of the Project and each feature thereof. The Contractor shall provide one negative and four glossy prints of each photograph monthly. Only clear, sharply defined photographs will be accepted. No separate payment will be made for work done pursuant to this Clause.

SP-21 SAFETY AND HEALTH

i. General

In prosecuting the work, the Contractor shall provide working conditions on each operation that shall be safe and healthful as the nature of that operation permits. The crushing of rock, the dumping of stone, the mixing of concrete and handling of cement, steel and other materials shall be so conducted that these operations will not be injurious to life, limb or health. All work shall be performed in: accordance with applicable local and national law, codes requirements and regulations including safety, health, welfare of persons and others.

ii. Accident and Fire Prevention

The Contractor shall enforce rules and regulations for the safe prosecution of the work in order to avoid preventable accidents and to minimize injuries to his employees and those of the Employer, the Engineer and other third Parties work

areas shall be adequately posted with safety signs and posters. Machinery and equipment shall be guarded and all hazards eliminated. All reasonable precautions shall be taken against fire, and provisions shall be made for the expeditious extinguishing thereof.

In addition to the reports which the Contractor may be required to file under the law he shall file with the Engineer on or before the tenth day of each month, a report giving the total force employed on this Contract in man-days during the previous calendar month, the number and character of all accidents resulting in loss of time, and any other information on classification of employees, injuries received on the work and disabilities arising there from that may be required by the Engineer.

During the entire period of his operations at the site, the Contractor shall be required to make arrangements for providing emergency medical treatment including first aid treatment and approved qualified personnel to administer such treatment to all injured persons including the Employer's and Engineer's personnel. The Contractor shall designate one or more approved competent licensed physicians who shall at all times be ready to supply medical and surgical services. The Contractor shall submit for the approval of the Engineer and upon such approval install a means of rapidly summoning the physicians to the site of an accident or fire.

SP-22 RESTRICTION OF WORKMEN TO SITE

The Contractor shall restrict his workmen to the Site and prevent trespass into adjoining property and completed parts of the works and shall take all necessary precautions to prevent and indemnify the Employer against any damages arising from nuisance of any kind.

SP-23 PROTECTION CHARGES AND TRIBAL ROYALTIES

The Contractor or any of his sub-contractors shall be responsible for the payment of protection charges and tribal royalties, if so required to be paid in accordance with any locally established tradition custom or practice and the rates and prices stated in the priced Bill of Quantities shall be deemed to cover all such protection charges, tribal royalties and other such payments.

SP-24 MOBILIZATION ADVANCE

An interest free mobilization advance is to be paid under Clause 60.12 of the conditions of Contract Part-II, to compensate the Contractor for operation including, but not limited to, any necessary mobilization expenses for all equipment, related components and supplies and delivery to the Site; those necessary for the interim salaries and the movement or personnel, household effects, supplies and incidentals to the project site, for site preparation, the establishment of workshops, storage, offices, accommodation, services and other facilities deemed to be required under the Contract; and for any other work and operation which must be performed or costs which must be incurred prior to the initiation of works under the Contract. The advance payment shall be repaid by the Contractor in accordance with Clause 60.12 of condition of Contract Part-II.

SP-25 COMMUNICATION TO THE ENGINEERS

The Contractor shall address all communications as follows:

1. The Engineer

Director (North), Directorate General Small Dams, Irrigation Department ,
Government of Khyber Pakhtunkhwa.

2. Engineer's Representative

M/S BARQAAB Consulting Services (Pvt) Ltd Lahore

SP-26 WORK DONE AFTER COMPLETION DATE

The contractor's obligation to provide facilities and services to the personnel and officers of the Employer, the Engineer and other contractors will terminate upon date of the final Certificate of Completion. However, if directed by the engineer, the contractor shall continue such work to the extent directed by the Engineer for an additional period of up to twelve months. Payment for such additional work will be made under the provisional sum for the item, Continuation of the Contractor-Provided Services. No payment under this Clause will be made for those parts of the Contractor's camp and other facilities, which he requires for his own use during the Defects Liability Period.

The aforementioned schedule of time and instructions will require handing over of certain portions of the facilities on the date of final Certificate of Completion. The Contractor will be permitted to retain possession of and use such portions of the camp as he may reasonably require to carry out his obligations and work remaining under the Contract after the date of the final Certificate of Completion and shall hand over such portions to the Employer when no longer needed during the Defects Liability Period.

SP-27 MEASUREMENT AND PAYMENT

General

Unless specifically provided, all works/services required to be provided under Special Provisions, shall be deemed to be included in the unit rates of Bill of Quantities and no separate measurement or payment shall be made.

SP-28 DECISION OF EMPLOYER

In these Clauses, if there is anything repugnant to the conditions of Contract then decision of the Employer shall be final.

SP-29 ADDITIONS TO AND DELETIONS FROM CLAUSES

Employer has the right of making any additions to and/or deletions from any conditions of contract special provisions, Technical Specifications and any other document forming a part of Bid/Contract Documents.

SP-30 CONSTRUCTION ITEMS

Employer has the right to add or delete any item of Construction.

TECHNICAL SPECIFICATIONS

TABLE OF CONTENTS

SECTION - 1	CARE AND HANDLING OF WATER	1 - 2
SECTION - 2	EXCAVATION	3 - 17
SECTION - 3	CONSTRUCTION OF EARTHFILL	18 - 38
SECTION - 4	EMBANKMENT INSTRUMENTATION	39 - 41
SECTION - 5	PLAIN AND REINFORCED CONCRETE	42 - 70
SECTION - 6	BRICK WORK	71 - 73
SECTION - 7	REINFORCED CEMENT CONCRETE PIPE	74 - 77

TECHNICAL SPECIFICATIONS

SECTION – 1

CARE AND HANDLING OF WATER

1.1 GENERAL

This section covers the construction, maintenance, and required removal of structures and other facilities, and the performance of all work necessary to Care and Handling of spring water, river water, ground water, rain water, flood water, water from any other source, and local drainage in connection with entire contract i.e. during construction and maintenance periods so that such water does not interfere with the progress or affect the quality of construction. The work includes but is not limited to the following:

- i) Construction and Maintenance of coffer dams, Excavation of Diversion Channel,
- ii) Un-watering and handling of water behind coffer dams,
- iii) Dewatering of Foundations and Trenches,
- iv) Care and Handling of river work/water

1.2 COFFER DAMS

Coffer dam shall be constructed if required in accordance with the requirements and as specified herein or as directed by the Engineer. The proposed cofferdam section may be modified by the Contractor with the approval of the Engineer. The contractor may also increase the height of the cofferdam, if necessary, with the prior approval of the Engineer. All such construction if carried out shall be at the Contractor's expense. The construction shall be carried out in two stages. The construction in Stage-I shall be carried out on the left flank of main river up to elevation as directed by the engineer and the flow of the main river will pass through the right portion of the river channel. Embankment slopes facing river shall be protected by providing temporary stone protection Renomattress parallel to river flows up to the elevation as suggested by the engineer in charge. In Stage-II, construction of the dam in the river channel shall be started at the advent of dry season. Slope protection Renomattress will be removed before undertaking construction of dam in this stage. Embankment Dam in Stage-II construction must be completed in all respects prior to the next flood season. Engineer's approval shall be necessary for selection and demarcation of the borrow areas. The coffer dam shall be constructed by compacting river bed material. Each layer shall have a compacted thickness of 60 cm and shall be subjected to not less than two passes of a 10 ton tamping or other approved roller. Trapped water, if any, between the main dam and the cofferdams shall be drained off by any method proposed by the Contractor and approved by the Engineer. A constant watch shall be maintained by Contractor to check and close any leaks through the body or foundation of cofferdams. Dewatering arrangements including pumps, if required, shall be provided on the downstream of the cofferdams to keep the area dry while placing the embankment fill. Cofferdams shall be maintained till such time that the embankment has been completed in all respects.

The proposed method of Care and handling of Water is tentative, only for guidance and in no way limits the responsibility of the Contractor to provide risk - free care of water. The Contractor shall obtain the prior approval of the Engineer for any alternative method of care and handling of water. The Contractor shall also obtain the prior approval of the Engineer in respect of the date on which he proposes to start the Cofferdam filling, which date shall be as soon as practicable after the commencement of the dry season and in accordance with the Construction Schedule to be provided by the Contractor.

1.3 MEASUREMENT AND PAYMENT

Care and Handling of Water including Construction of Cofferdams Measurement will be made as lump sum of all work acceptably performed under Section SP 1.1 (i), (ii), (iii) and (iv) and which is not included for payment under any other item.

Payment will be made for the unit measured as provided above at the Contract lump sum price for Care and Handling of Water during construction and maintenance and shall constitute full compensation for all costs related to care and handling of water during construction and maintenance and other works for which payment is not made under other items, including review is not made under other items, including review of scheme shown on the Drawing, submission for approval, accepted adjustments of scheme, construction including excavation and fill for cofferdams and their maintenance dewatering including pumping, repair or replacement of damaged work due to flood and other waters, expense incidental to over topping of coffer dams, dewatering, re-excavation, refill and all other work related to the item. Payment for this item shall be made accordingly to the schedule of payment approved by the Engineer.

SECTION – 2

EXCAVATION

2.1 GENERAL

This section covers the excavation for embankment dam, spillway, approach channel, intake outlet structure, irrigation conduit, irrigation system, access road, chowkidar hut, borrow areas; dental excavation; other excavation not specified in other Sections; and disposal of all excavated materials except as the placement of material is covered in other Sections.

2.2 DRAWING PRESENTATION

In addition to the required excavation lines for permanent structures, the borrow areas may be used as sources of construction materials; results of field explorations at the required excavation and borrow areas including selected sources and estimated quantities of materials for use in various zones of the Dams. The information regarding sources and estimated quantities of materials for use in embankment as presented on the Drawings is not intended as a representation or a warranty and is presented only for the information of the Contractor. The Employer assumes no responsibility for any deductions, interpretations or conclusions drawn there-from. The Contractor will be required to review all data in Contract Documents, make his own investigations and studies necessary for a proposed plan of sources and distribution of excavated materials, and shall perform the work using sources and distribution that will result in the optimum project economy to the Employer and optimum progress consistent with requirements of the Drawings and Specifications. The Contractor shall propose his plan of excavated materials utilization for approval of the engineer. After the plan proposed by the Contractor is approved, the contractor may propose alterations to his plan for further approval of the Engineer as may be found necessary during the course of the work.

2.3 CLASSIFICATION OF EXCAVATION MATERIALS

a) General

The terms Rock and Earth are hereby defined when used for the purpose of classifying excavated materials for payment under the various Items of BOQ.

b) Rock

Rock is defined as all materials which, in the opinion of the Engineer, require blasting, or the use of metal wedges and sledgehammers, or the use of compressed air drilling for its removal, and which cannot be extracted by ripping with a tractor of at least 150 brake hp with a single rear mounted heavy duty ripper. In case of doubt the Engineer's decision will be considered final.

c) Earth

Earth shall mean all material except hard rock as defined above in subsection (b). Earth shall include, but not necessarily be limited to soft rock river deposited material, all geologically recent materials such as alluvium and talus; all layers of earth which are cemented so that the earth becomes Conglomerate. Soft rock such as mudstone, siltstone, claystone, limestone, sandstone etc. shall be treated as Earth, if not covered under sub-section (b) above.

2.4 EXCAVATION OPEN CUT - GENERAL EXCAVATION METHODS

2.4.1 Excavation Methods

The Contractor shall perform all open cut excavation and grading to the final elevation lines and grades shown on the Drawings or approved by the Engineer. Excavation shall be performed by approved methods. The contractor shall make such trial excavations as are necessary to indicate the adequacy of the excavation methods. The rock excavation in the foundation of structures shall be done by excavation equipment and or such methods as Line Drilling, Pre Splitting or Cushion Blasting. The responsibility for the success of the excavation method shall rest with the contractor regardless of approval by the Engineer.

In general, for the earth and rock materials the Engineer will use his best endeavours to advise the Contractor at the loading areas regarding suitability of excavated materials for use in the embankment based on Engineer's examination prior to transportation to points of placement. Stock-Piling will not be paid for. The quality requirements of the materials are specified in Section 3.4 Materials.

2.4.2 Excavation Extent

Excess excavation performed by the Contractor for any purpose or reason other than that ordered in writing by the Engineer, shall be at the expense of contractor. All excavation for structures shall be carried to foundation satisfactory to the Engineer regardless of whether the elevation thereof is higher or lower than the elevation shown on the drawings. All necessary precautions shall be taken to preserve the material below and beyond the lines of all excavation in sound undisturbed condition. All over-excavation required by the Engineer to be backfilled shall be backfilled by the Contractor in accordance with instructions of the Engineer; over-excavation in rock shall be backfilled with concrete or as directed by the Engineer; if over-excavation is unauthorized it shall be backfilled at the Contractor's expense. Except where the use of other materials is specifically approved by the Engineer, unauthorized excessive excavation in rock and in earth where side forms are not used shall be Backfilled with concrete at the Contractor's expense. Materials for use in the work shall be carefully excavated to produce the material in form suitable for the work; additional measures such as secondary blasting, mixing, blending and sieving shall be used, if necessary, to make the excavated material suitable for the required use. Excavations through overburden into rock shall be performed in a manner to result in separation of the rock from the overburden so that the maximum practicable amount of suitable embankment and fill material will be produced.

2.4.3 Excavation Tolerances

Excavation shall be performed within the tolerances for excavation limits indicated on the Drawings. Where no tolerance is indicated, excavation shall be performed to tolerance established by the Engineer as acceptable for the design and type of work involved. In cases where the governing criteria permit, the Engineer may relax the tolerance to facilitate construction.

2.4.4 Excavation Line to Suit Field Condition

The character and desired dimensions of the proposed excavations are in general indicated on the Drawings. The Engineer, however, shall have the right to:

- (i) Vary the depth, width, and length of the excavations and to increase or decrease the slopes including berms of the excavations; and
- (ii) Require the use of berms of dimension as instructed in permanent slopes where none are shown on the Drawings, if conditions require or permit such modifications for the purpose of obtaining more stable or economical slopes and/or foundations. The Engineer shall have the right to vary the excavation lines after excavation has been commenced.

2.4.5 Support of Excavations

During the excavation work, the Contractor shall be responsible for providing stable interim excavation slopes and for the proper support of excavations (regardless of the method of support specified by the Engineer) is necessary to accomplish the final construction shown on the Drawings.

2.4.6 Dewatering of Foundations

Contractor shall maintain all foundation and other permanent work areas free of water as approved by the Engineer. The Contractor shall provide, install, operate and maintain approved Dewatering systems (including sufficient standby equipment) to dewater and keep dry all areas of construction during construction operations and as required keeping excavated foundation and side slopes stable. All fill material shall be placed in the dry place. The Contractor shall employ pumping methods in such a way as to prevent loss of fines from or other damage to foundations, maintain the stability of the excavated slopes permit construction operations, as required to be performed in the dry. The Contractor shall also install measurement and recording devices approved by the Engineer, for accurately measuring the quantities and rate of water pumped.

No separate payment will be made for dewatering of foundations. The cost shall be included in the Contract lump sum price for the care of water during construction (Section 1).

2.5 FOUNDATION PREPARATION

2.5.1 Clearing and Stripping for Embankment Foundations

All areas against which fill has to be placed directly shall be cleared of all vegetation as described in this Section. Clearing within the fill areas shall consist of the complete removal above ground of trees and all bushes, shrubs, weeds and vegetation and all debris and objectionable material. Cleared material shall be disposed of by the contractor by burning in open area the combustible materials and removal of the incombustible materials from the site of work in a waste area designated by the Engineer. In addition, the areas to receive embankments shall be stripped of all organic soils, loose rocks and loose talus as directed by the Engineer. The haulage involved in the operation is included in the BOQ.

2.5.2 Preparation of Foundations

- (a) Some of the foundation materials may deteriorate on exposure and get disturbed and remolded by construction traffic. The Contractor shall carry out his operations in such a manner that the risk of disturbance, deterioration and remolding is reduced to a minimum.
- (b) Rock out-crops and knobs shall be reduced to required slopes and the excavation for embankment base done accordingly to bring it to proper level and grade, as directed by the Engineer. The haulage for stock pile and disposal of un-useable material downstream of dam body is included in the BOQ.

2.5.3 Excavation for Core Trench

Beneath the foundation of the dam within limits as shown on the Drawings necessary earth materials shall be excavated, bed rock surfaces prepared and impervious fill material placed as required for the control of under - seepage. Excavation shall be carried to the specified depth in the river bed and to reasonably sound strata at the abutments. Contractor shall be responsible for the maintenance of stable slopes during the excavation and backfill of the core trench. The slopes shown on the Drawing are indicative and may be varied or supplemented with berms, if required, subject to the approval of the Engineer. The suitable material excavated from the core trench will be allowed to be placed in the main embankment or in cofferdam as directed by the Engineer and the Contractor may stockpile such suitable materials for further use. The payment for placement of suitable material will be made separately according to other materials in the dam. The unsuitable material will be disposed of in the designated spoil area, and no additional payment will be made for the stockpiling and disposal work. The portion of the excavation for the core trench below water table shall be dewatered subject to the requirements of Section 2.4.6. During the placing and compacting of the fill material in the core trench the water level at every point in the core trench shall be maintained below the bottom of trench. The haulage for stock pile and usable material is included in the BOQ,

2.5.4 Surface Dental Treatment

Exposed rock surface within the rock-cutoff contact areas shall be cleaned by brooming and compressed air injection. Surface treatment shall be performed if necessary, to ensure that no open or loosely filled fissures, joints or bedding planes are present which might permit concentrations along the rock-cutoff contact areas. Surface treatment shall consist of coating with asphalt emulsion or slush grouting, as directed by the Engineer. Slush grouting shall consist of treatment of cracks and fissures with a 1:6 cement water mixture under light pressure, as and where directed by the Engineer.

Unsatisfactory material in pockets, seams and fissures shall be removed, if so ordered by the Engineer. Fissures, seams and shear zones exposed in the cleaning process shall be immediately filled with dental concrete, as directed by the Engineer. Exposed surface of final grade excavation in rock cutoff contact area which cannot be immediately covered with impervious fill shall be coated with asphalt emulsion in order to prevent to atmosphere.

2.5.5 Excavation for Trenches

Unless otherwise directed or permitted by the Engineer not more than 10 m of any trench in advance of the end of the pipeline already laid shall be opened at any time. Trenches shall be excavated to the dimensions and depths shown on the Drawings or ordered by the Engineer or in such a position or to such dimensions and depths as shall allow for the proper construction of the relevant structure of proper execution of the relevant operation. Pipe trenches shall be excavated to give a clear width of 1/2 diameter of pipe with a minimum of 150 mm, on either side of the pipe. Additional excavation shall be carried out to give ample space for making joints and, where necessary, for concrete bedding or surround.

The banks of the pipe trench shall be as nearly vertical as practicable. Bell holes and depressions for joints shall be dug after the trench bottom has been prepared. The pipe, except for joints, shall rest on the prepared bottom for its full length. Bell holes and depressions shall be only of such length, depth, and width as required for properly making the particular type of joints. Stones above 15 cm size shall be removed to avoid point bearing. Whenever wet or otherwise unstable material that is incapable of properly supporting the pipe as determined by the Engineer is encountered in the bottom of the trench, such material shall be removed to the depth required and the trench backfilled to the proper grade with coarse sand, or other suitable approved granular material, such replacement of unsuitable material will be paid for at the contract unit price for that item of work.

Where the Contractor has excavated to depths in excess of the requirements, due to his negligence or from causes within his control, he shall refill and compact at his own expense the excess excavation with suitable material up to corrected level, as approved by the Engineer.

Excavation of appurtenances shall be sufficient to leave at least 300 mm but more than 600 mm between the outer surface and the embankment or timber that may be used to hold and protect the banks. Any over-depth excavation below such appurtenances that has not been directed by the Engineer, will be considered unauthorized and shall be refilled with compacted sand, gravel or concrete, as directed by the Engineer and at no additional cost to the Employer.

2.5.6 Excavation for Canals / Channels

The work to be done under Excavation for Channels consists of the construction of canals as shown on the Drawings or as designated by the Engineer. All excavations and embankments shall be made to lines and shown on the Drawings or established by the Engineer. Where practicable, the finishing operations of the channel sections shall be performed by the Contractor simultaneously with the channel excavation. During the progress of the work, it may be found necessary or desirable by the Engineer to vary the slopes or the dimensions of the excavations for channels and embankments from those shown on the Drawings or specified herein, and the Contractor shall perform the work to the revised and changed slopes and dimensions. All necessary precautions shall be taken to preserve the material below and beyond lines of nil excavation in the soundest possible condition. Runways for equipment shall not be cut into channels banks.

Excavated materials shall be disposed off in required embankments, backfill or in spoil banks, or shall be placed in approved waste areas or in other locations as directed by the Engineer. Where shown on the Drawings or directed by the Engineer, approved excavated materials shall be placed in compacted embankments along the channel. The approved materials shall be placed in approximately horizontal layers not more than 6 inch thick after being well compacted. Prior to and during placement operations, the material shall have the proper moisture content for compaction as determined by the Engineer. If the moisture content is less than that required for compaction, it shall be supplemented by sprinkling and reworking the material during placement. If the moisture content is greater than that required for compaction, the material shall be dried by reworking, mixing with dry materials or other approval means. Each layer of the embankment shall be compacted by properly routing the travel of the mechanical excavation, hauling and placing equipment over the filling during construction of the compacted embankment.

The Contractor shall not interrupt nor interfere with the natural flows in irrigation and drainage channels for any reason or purpose without the written approval of the Engineer. Should temporary works such as diversion channels and structures be required, the Contractor shall construct, maintain and remove when no longer required all such temporary works. Any damage to temporary and permanent works or the property of others due to improper operation or failure of the works constructed for maintaining flow in irrigation and drainage channels shall be corrected by the Contractor at his own expense.

Measurement for payment for Excavation for Channels will include all excavation within the channel prism. The channel prism is defined as the volume bonded by the designated bed level of channel, the specified side slopes of the channel projected to the natural surface level, and the natural surface level, all as shown on the Drawings for any particular reach of the channel.

2.5.7 Excavation for Structures

All earth excavation under this contract, which is not included under the classification "Earth excavation in Trenches and cut off trench" shall be classified and paid for as earth excavation for structures.

The Contractor shall provide adequate timbering or shoring for excavations. Should the sides and ends of any excavations give way the contractor shall, at no extra cost, remove all disturbed ground. Any excavation carried out side the limits shown on Drawings and specified herein as the payment limits, shall not be treated as excavated and shall not be paid for.

When foundation level is reached, the Engineer's representative will inspect the exposed ground and give directions as to what further excavation, if any, he considers necessary. The excavation should be done in such a manner as to ensure that the work rests on a solid and perfectly clean foundation. If the Contractor allows any portion of such foundations to deteriorate due to exposure he shall make good the foundation to the satisfaction of the Engineer without extra cost.

Except where otherwise specified in the Special Provision, excavation and backfill for culvert and drainage pipes, except granular backfill to under drains, will not be paid for separately but shall be considered as a subsidiary obligation of the Contractor covered under the contract price for the various classes of culvert pipe as provided.

2.6 PRECAUTIONARY AND REMEDIAL MEASURES

2.6.1 Protection of existing Facilities and Structures

The Contractor shall take every necessary precaution not to endanger the safety, occupation or operation of any property, structures, installations or services in the vicinity of his operations and shall observe any restrictions imposed by authority concerned /Engineer to this end. Any such property, structures, installations or services be endangered or damaged as a result of the Contractor's operations, he shall immediately report any such damage to the Engineer's Representative and the authority concerned and shall forthwith undertake remedial measures to the satisfaction of the Engineer or the appropriate authority.

2.6.2 Planking and Strutting

The Contractor shall provide at his own expense, to the satisfaction of the Engineer, all timbering, poling, shoring, strutting and other approved supports to the sides of all excavations, trenches and all other works in such a way as will be sufficient to secure them from falling and to prevent any movement. All responsibilities connected with this part of the work shall rest with the Contractor.

In removing timbering, shoring and strutting and all other supports from excavation and trenches, special care shall be taken to avoid pressure on fresh concrete or any other work until it is sufficiently safe to resist such pressure.

2.6.3 Removal of Water

The Contractor shall build all drains and do ditching, pumping, well pointing, bailing, and all other work necessary to keep the excavation clear of ground water, sewage and storm water during the progress of the work and until the finished work is safe from injury. All water pumped or drained from the work shall be disposed off in a manner satisfactory to the Engineer and necessary precautions against flooding shall be taken. The procedure for dewatering of subsoil water from excavation for the purpose of construction of Water Supply lines and other structures shall be in accordance with the method given below:

Dewatering of subsoil water from excavations of trenches and excavations for other structures shall be arranged by an adequate process of well pointing, bailing and /or pumping.

Well pointing shall consist of boreholes, provided with necessary strainers, blind pipes and pumping machinery and these shall be of suitable size and depth and shall be located on both sides of the trench and along the periphery of water level to a sufficient depth to keep the excavations clear of subsoil water during the process of construction.

As a part of the work, and at no extra cost, the Contractor shall provide all strainer pipes and other requisite material, and boring tools and plant, etc. for the well pointing and shall also provide pumping equipment as well as operating personnel, power, etc. Dewatering of subsoil water by well pointing, bailing and/ or pumping shall be continuous process round the clock during the progress of the work and until the finished work is safe, from injury to the complete satisfaction of the Engineer's representative and any interruption in continuous pumping and causing injury to the works done or under construction shall require the Contractor to repair or rebuild the works to the entire satisfaction of the Engineer's representative at no extra cost.

2.6.4 Maintenance of Excavation

All excavation shall be properly maintained while open and exposed. Sufficient suitable barricades, warning lights, flood lights, signs, and similar Items shall be provided by the Contractor, The Contractor shall be responsible for any damage due to his negligence.

No separate payment will be made for the removal of water. The cost thereof shall be included in the contract lump sum price for the care and handling of water during construction (**Section 1**).

2.6.5 Surplus and Unsuitable Materials

All surplus and unsuitable materials shall be removed and disposed of at locations approved by the Engineer. The disposal of aforesaid materials shall not interfere with other works and shall not damage or spoil other material. When it is necessary to haul earth or rock material over street or pavement, the Contractor shall prevent such material from falling on the street or pavement. No separate payment shall be made for removal and disposal of unsuitable or surplus materials.

2.6.6 Cutting Pavement

In cutting or breaking road surfacing, the Contractor shall not use equipment which will damage the adjacent pavement. Existing paved surfaces shall be cut back beyond the edge of trenches to form neat square cuts. The road ballast, brick pavement, and other materials shall be placed on one side and shall be preserved for re-installment when the trench is filled. Wherever necessary or required for the convenience of the public, the contractor shall provide suitable temporary bridges which shall be maintained in service until backfilling has been completed. The contractor shall keep the road crossings manned 24 hours per day. During night time, enough red lights shall be provided to warn the traffic. If detour is necessary, the Contractor shall make proper for the traffic and shall install signs 1 m x 1.2 m in size indicating the detour.

2.7 ROCK EXCAVATION

2.7.1 Rock Excavation for Foundations of Structures

(a) General

Hard Rock shall be excavated by systematic and such approved methods of drilling and blasting which will prevent damage to foundation/ barring and wedging, by ripping or directly by excavating equipment. Precautions shall be taken to preserve the material outside the lines of excavation in an undisturbed condition. Refilling of over excavation beyond lines and grades shown on Drawings shall be done with concrete or other materials approved by the Engineer at the Contractor's expense. The Contractor shall clean rock slope benches and shall maintain an inspection system in regard to hard rock slopes as necessary to provide safe working conditions. Requirements regarding the use of explosives are specified in sub-clause SP-14 Storage and Use of Explosives.

(b) Drilling and Blasting

Wherever blasting is approved by the Engineer, it will be carried out in the foundation area by methods like Line Drilling/ Pre Splitting or Cushion Blasting. The depth and spacing of holes for blasting with such methods during the work shall be determined by the Contractor and will be modified at the direction of the Engineer, based on observation of the manner in which the rock breaks as blasting operations progress and additional testing as shown to be necessary. Blasting patterns shall be varied as required to

produce the gradations required for the material to be placed in the permanent work. Whenever further blasting may injure the rock upon or against which concrete or fill is to be placed/ the use of explosives shall be discontinued and excavation shall be completed by wedging, barring and channeling or other suitable methods. Approval by the Engineer of the method of blasting shall not relieve the Contractor of his sole responsibility for the adequacy and safety of the blasting.

2.7.2 Dental and other below Grade Excavation

Zones of unsatisfactory material below the foundation levels which will require excavation/ may be encountered. All such material/ regardless of character, shall be removed and disposed of as directed by the Engineer. Dental excavation/ to be paid for as Day work/ shall consist of the removal of earth such as talus or alluvium or unsound rock such as soft/ friable or highly weathered rock (and sound rock incidental to such removals) from below the foundation or other base excavation lines directed by the Engineer for structures and for impervious earth-rock contacts/ and from locations such as joints and pockets and between rock beds where the use of power excavation equipment is not practicable. Dental excavation to be paid for as Day work shall not include removal of materials below the aforementioned excavation lines where in the opinion of the Engineer, a removal operation similar to that used for any portion of the excavation above such lines could be used. Dental excavation to be paid for as Day work shall not include removal of materials by pressure washing and shall not include excavation which is classified by the Engineer or paid for under another Contract Item. Excavated areas covered in this Sub-section shall be cleaned as specified and provided with dental treatment as provided in sub-section 2.5.4

2.7.3 Preparation of Contact Surface between Rock and Concrete

Exposed rock surface within the foundation against which concrete is to be placed shall be cleaned and broomed and the surface undulations shall be covered and filled with a layer of blinding concrete as directed by the Engineer. The blinding concrete shall be provided according to Specifications in **Section 5** for Concrete.

2.8 ROCK QUARRIES

2.8.1 General

The rock for riprap material and stone pitching shall be obtained from the rock borrow area as identified during the investigations or from other rock quarries near the dam site as directed by the Engineer. The Contractor shall exploit, develop and maintain the approved rock quarries and pits in a suitable condition for the extraction and removal of the required materials in a manner satisfactory to the Engineer, and so as to obtain at all times the greatest practicable yield of suitable material in the deposit. The fact that the Employer has approved the Site and location from which material for riprap and stone pitching may be obtained shall not be considered as constituting the approval for use of all material extracted from the

quarries and the Contractor shall be responsible for the specified quality and grading of such produced material. For quality and gradation of riprap material the Section 3.4 Materials shall be applicable.

The quantity of rock from rock borrow area is gross estimated quantity and there is no guarantee that this quarry will yield such quantities of suitable material. If the Contractor proposes to use any additional rock quarry, he shall do so with the written approval of the Engineer.

2.8.2 Blasting and Excavations

The methods of excavating, quarrying and size separation shall be subject to the approval of the Engineer. Selected areas in the rock source will be designated for the riprap material. The gradation of riprap is specified in Section 3.4.2 and Contractor shall plan his blasting and quarrying work in a manner to produce material according to the required gradation.

2.8.3 Measurement and Payment for Quarried Material

The processed material from the rock quarries shall be placed in the dam or spillway or in other areas as directed by the Engineer as per Section 3.7 to 3.10 which Items shall include the entire cost of processing, separating, grading, handling, transportation, stockpiling and placement of this material. No separate payment shall be made for the excavation of the material under this Section.

2.9 EARTH BORROW AREAS

2.9.1 General

Borrow areas for earth material in the permanent works shall be the borrow areas shown on the Drawings or as specified by the engineer, additional borrow areas selected by the Contractor subject to approval of the Engineer. Investigations in the borrow areas shown on the Drawings have shown that material suitable for use in the permanent work is found in these borrow areas. If the Contractor proposes to use borrow areas other than those investigated and suggested by the engineer, he shall make other investigations at his expense and furnish such evidence for approval of the Engineer, as will indicate that the borrow area can be used as a source of materials suitable for the embankments.

2.9.2 Operation of Borrow Areas

The Contractor shall perform all necessary clearing, stripping, selective excavation to necessary depth and extent, in the dry or below ground water, draining of borrow areas, pre-wetting of material in the borrow areas, dressing of borrow area during and after completion and disposition of materials to obtain and make the material suitable for use in the work. Excavation and transportation may be performed by any approved method and by the use of excavating and transporting equipment suited to accomplish the intended purpose in the work. The Contractor shall determine the conditions of the materials in each borrow area and provide proper means of handling the materials. Excavation in the borrow areas shall be accomplished to provide proper drainage at all times and to result in the efficient

recovery of the maximum amount of suitable materials from the area. Upon completion of the borrow operations the borrow areas outside the limits of the reservoir shall be left reasonably smooth, evenly dressed, and shaped to drain. The contractor may use borrow material in the temporary works, such as cofferdam haul and access roads. However, no measurement for payment will be made of such materials unless such materials are reused, as approved, under an Item in the Bill of Quantities for which measurement and payment of such materials is provided.

2.10 DISPOSITION OF MATERIALS

2.10.1 General

The disposition of all excavated materials including top soil in borrow areas and excess and over break excavation, shall be in accordance with the requirements of the Drawings and Specifications and as approved by the Engineer. Such approval shall supersede the indicated usage of any particular excavation source shown on the Drawings. The Contractor shall be permitted to use all suitable materials from required excavation in the work shown on the Drawings. Suitable materials from borrow areas and quarries shall be used in the works shown on the Drawings; materials from borrow areas and quarries that are designated by the Engineer as unsuitable shall be neatly disposed of in approved locations at no expense to the Employer.

The Contractor shall be responsible for making and maintaining all haul roads required for transport of the materials from the Borrow Areas and Quarries to their required destinations. No separate payment will be due to the Contractor for the haul roads and all costs related to this Item shall be included in the unit prices of the materials as provided in the Bill of Quantities.

2.10.2 Disposition of Suitable Material from Foundation Spillway.

All suitable material excavated from foundations of Dam, Spillway and other excavations, consisting of Rock, Earth as determined by the Engineer may be stockpiled by the Contractor in the designated stockpile areas in an approved manner. The Contractor will be permitted to re-handle and use the suitable material from the stockpiles in the suitable locations for the construction of fill. No extra payment will be made to the Contractor for stockpiling and all payments related to this Item will be covered by the Item related to Excavation.

2.10.3 Disposal at Spoil

Unsuitable materials from required excavations shall be disposed of in the spoil areas selected by the Contractor subject to approval of the Engineer. Spoil areas shall be left in satisfactory conditions, smoothly dressed and shaped to drain. No additional payment will be made to the Contractor for this work; all payments will be covered by the related Item for Excavation.

2.10.4 Boulders

Boulders shall be disposed of as follows or as otherwise approved by the Engineer. Boulders encountered in the borrow areas shall be disposed of in the borrow excavation. Boulders encountered in other open cut excavations shall be hauled to the directed areas; breaking if necessary shall be performed to make the material suitable for use in the works.

2.11 MEASUREMENT AND PAYMENT

2.11.1 General

The measurement for all excavations shall always be made for the final designed lines of the Structure unless specifically allowed otherwise by the Engineer. The Contractor shall himself make allowance for extra earthwork, spaces or areas required for working. Similarly, no separate measuring shall be made for supports, shoring, planking, strutting and dewatering which the Contractor may require to complete the job.

The measurement for excavations in borrow areas shall be made for the final acceptably placed fill without any allowance for bulking or otherwise. The Contractor shall be deemed to have made all such allowances in the unit rates quoted by him.

2.11.2 Clearing, Stripping and Grading of Foundations for Embankment Dam and its Abutments.

Measurement for clearing, stripping and grading of foundations of dam will be made in square meter projected vertically to a horizontal plane of the foundation area acceptably cleared, stripped and graded as per Section 2.5. No separate payment will be made for bushes and trees and their removal will be deemed to be included in the measurement for overburden and other unsuitable materials.

Payment will be made for the number of square meter as measured above for clearing, stripping and grading of foundations for dam and shall constitute full compensation for clearing, stripping and grading of all material related to this Item including disposal of the stripped material in the spoil areas as directed by the Engineer.

2.11.3 Excavation for Core Trench in Earth

Measurement will be made of the number of cubic meter of Earth as defined in Section 2.3 Classification in original position acceptably removed from within the lines and grades shown on the Drawing or directed by the Engineer for providing cutoff below the dam in core trench, abutments and toe drain.

Payment will be made for the number of cubic meter measured as provided above at the contract unit price of Excavation for core trench and shall constitute full compensation for excavating the Earth from foundations including disposal in the stockpiles or spoil area as directed by the Engineer.

2.11.4 Excavation for Core Trench in Rock

Measurement will be made for the number of cubic meter of Rock as defined in Section 2.3 Classification in original position acceptably excavated from core trench, abutments and toe dam within the lines and grades shown on the drawing or as directed by the Engineer.

Payment will be made for number of cubic meter measured as provided above at the Contract unit price for Excavation of Rock in the core trench and shall constitute full compensation for excavating the rock including breaking up rock, re-handling/ its disposal in the stockpiles or spoil area or as otherwise directed by the Engineer.

2.11.5 Excavation for Trenches

Measurement will be made of the number of cubic meter of Earth acceptably removed from within the lines and grades shown on the Drawings or as directed by the Engineer.

Payment will be made for the number of cubic meters measured as provided above at the contract unit price of Excavation for trenches and shall constitute full compensation for excavating the Earth from trenches including disposal in the stockpiles or spoil area as directed by the Engineer.

2.11.6 Excavation for Canals/Channels

Measurement for payment for Excavation for Channels will be made of the material in excavation only, regardless of the method of excavation or type of material excavated, and only of material excavated at the direction of the Engineer. Measurement for payment for Excavation for Channels will include all excavation within channel prism. No measurement for payment will be made of over-excavation of the Channel prism, except where done at the direction of the Engineer.

Payment for Excavation for Channels will be made at the contract unit-price per cubic meter for Excavation for Channels. The amount shall be full payment for the work specified herein as Excavation for Channels, including stripping and removal of debris from areas not designated to be paid for separately under Clearing.

2.11.7 Surface-Dental Treatment of Foundation-Dental Concrete

The measurement and payment for Dental Concrete shall be made under Section 5, "Plain and Reinforced Concrete.

2.11.8 Surface – Dental Treatment of foundation Dental Concrete

Measurement will be made for the number of liters of Asphalt emulsion sprayed in the acceptable manner to cover the prepared foundation as specified in Section 2.5.4

Payment will be made for the number of liters of Asphalt emulsion measured above for the Contract unit Item for Asphalt Emulsion Spray Coat and shall constitute full compensation for all the material and labour supplied for coating the foundation by spraying the asphalt emulsion over it and all other work related to the Item.

2.11.9 Surface-Dental Treatment of Foundation for Core Trench-Rock-Slush Grouting.

Measurement will be made of the number of square meter of area treated with slush grouting to cover the prepared foundation in the acceptable manner as specified in Section 2.5.4.

Payment will be made for the number of square meters of foundation area treated with slush grouting as measured above at contract unit rate for slush grouting and shall constitute full compensation for all the material and labour supplied for slush grouting of the foundation area and all other work related to the Item.

2.11.10 Dental and other Below Grade Excavation and Backfilling

Dental and other below grade excavation and backfilling ordered by the Engineer to be carried out as Day work shall be paid for at Day work rates entered against the appropriate Items in Day work Schedule, Appendix-D to Tender, Day work Rates for Labour, Plant and Materials.

2.11.11 Excavation of Earth and Rock in the Foundation of Structures

Measurement will be made for the number of cubic meter of Earth and Rock respectively as defined in Section 2.3 Classification, in original position acceptably excavated from the foundation of structures, within the lines and grades shown on the drawing or as directed by the Engineer.

Payment shall be made for number of cubic meter measured as provided above at the Contract unit price for Excavation of Earth and Rock respectively from the foundation of Structures and shall constitute full compensation for excavating the soil or rock including breaking up re-handling its disposal in the stockpiles or spoil area as directed by the Engineer.

2.11.12 Excavation for Disposal Drain in Earth

Measurement will be made of the number of cubic meter of Earth, in original position acceptably removed from within the lines and grades shown on the Drawings or as directed by the Engineer for the disposal drain.

Payment will be made for the number of cubic meter measured as provided above at the contract unit price of Excavation for Disposal Drain and shall constitute full compensation for excavating the Earth from foundations including disposal in the stockpiles or spoil area as directed by the Engineer.

2.11.13 Provide and install PVC Pipe in Water Measuring Structures

Measurement will be made for the number of linear meters of specified diameter of PVC Pipe acceptably installed in the Water measuring structures of best quality as approved by the Engineer.

Payment will be made for the number of linear meter acceptably measured at the contract unit price for providing and installing the PVC and shall constitute full compensation for all the related works in accordance with the drawings or as directed by the Engineer.

SECTION – 3

CONSTRUCTION OF EARTHFILL

3.1 SCOPE

The work covered by this Section consists of the construction of the Embankment Dam, earthfill and stone pitching for Spillway, earthfill for irrigation system, backfill for irrigation conduit and structures and other miscellaneous fills including the preparation of the foundation.

3.2 DEFINITIONS

The term "fill" as used in section 3 of these Specifications is defined as the earth fill portion of the dam including all other fills, riprap, filters and drain materials for the dam and as used in connection with other works. The terms dam and embankment used to devote all earthworks.

"Zone": that part of an embankment or fill, the material for which has specified characteristics such as particle size, moisture content, density and method of placing. Only that zone will be applicable which is mentioned in the drawings and BOQ of the project.

3.3 GENERAL PROVISIONS

3.3.1 Reference Standards

The numbers and subjects of reference standards are listed below:

Standard	Subject
USBR	Earth Manual, Second Edition
BS 1377:1967	Methods of testing soils for civil engineering purposes
ASTM C535	Test for resistance to abrasion for large size coarse aggregate by use of the Los Angeles machine
ASTM C88	Test for soundness of aggregates by use of Sodium Sulphate or Magnesium Sulphate

3.3.2 Submissions by the Contractor

Submission which the Contractor is required to make in relation to embankment other fills include the following:

(a) Drawings:

Contractor's record drawings of the agreed foundation level survey prior to the placement of fill in those areas.

Contractor's record drawings of all agreed level surveys taken for the purpose of measurement of quantities of fill.

Survey records as specified above shall be submitted to the engineer within 7 days of the completion of the survey work recorded on them.

(b) Test Results:

Laboratory tests and field tests results on agreed format.

(c) Samples:

Materials proposed for use as fill, where specifically required by the Engineer.

3.3.3 Equipment and Methods

Before proceeding with any of the work specified in this section, the Contractor shall furnish the construction sequence and material utilization scheme he proposes to use in fill construction, integrated with requirements of the approved construction schedule, to the Engineer as further information for approval under Clause 14 of the Conditions of the Contract, The Contractor's submission will include the following details:

Proposed method of placing and compacting fill including a schedule of plant and equipment to be used.

Programme for quality control of earthworks.

Proposed sources of all embankment and fill materials including riprap and method of selective excavation and processing

Proposed programme of embankment construction

3.3.4 Test Fills for Embankment

Test fill of 100ft minimum length will be constructed for embankment zones as directed by Engineer. The minimum compacted width shall be at least three rollers widths and for two specified fill thicknesses. No separate payment will be made for these test fills, and if approved, will form part of the permanent works.

3.3.5 Lines and Grades

Fills shall be constructed to the lines, grades, and cross-sections indicated on the Drawings unless otherwise directed by the Engineer. Materials conforming to the requirements specified in Section 3.4 Materials, shall be placed and compacted within the indicated zone limits. The Engineer reserves the right to increase or decrease the foundation widths, the embankment slopes or the zone limits or to

make such other changes in the embankment sections as may be deemed necessary to produce safe structures, or for efficient utilization of materials from required excavations. Settlements of foundation and dam for the post construction period will be provided for by increasing the height of the sections. Required height increases will be determined and specified by the Engineer from settlement observations made as the work progresses.

3.3.6 Backfilling of Excess Excavation

Unless indicated otherwise on the Drawings or allowed in accordance with the written permission issued by the Engineer, Excess. Excavation shall be backfilled.

The backfill shall comprise the material comprising the structure on fill material to be placed within the measured excavation, to the same standard as specified for that structure or fill.

Any additional excavation required to enable the backfill to be placed as specified shall also count as Excess Excavation. No additional payment will be made for backfill of Excess Excavation.

3.3.7 Placing of Fill on a Formation

Before the placing of any fill on a Formation all shattered loose and weathered material shall be removed from the excavation so as to ensure that the work rests on a sound and clean foundation or, where appropriate, abuts against undisturbed ground. The methods of cleaning the foundation for the impervious core of embankment shall include the use of compressed air jets where necessary, and the Engineer will inspect and record the geology of these parts of the formation before approving them.

No additional payment will be made for cleaning of the foundation or undisturbed ground as specified above.

3.3.8 Conduct of Work

a) Maintenance, Protection and Tests

The contractor shall maintain and protect the Dam in a satisfactory condition at all times until final completion of all work under the Contract including period of maintenance in accordance with the Clause 9 of the Conditions of Contract. Any approved fill material which is diverted from its use in construction of the dam, or rendered unsuitable after being placed in the dam before final acceptance of the work, shall be replaced by the Contractor in a satisfactory manner and no additional payment will be made

thereof. The Engineer will establish a programme of testing of in-place fill to ensure that the work is being performed in conformity with the requirements of these Specifications. The Engineer will also perform tests on material at their source and during their processing and handling as necessary for quality control and the Contractor shall adjust his methods as Specification requirements. Tests of material and embankment construction will be made at regular intervals and Engineer will notify Contractor of any deficiencies in materials and/or construction when results of tests are known. Deficiencies shall be remedied by such measures as the Engineer may direct. Remedies shall include the complete removal of portions of the fill if so directed by the Engineer. The contractor shall dispose of any unsuitable materials and refill the excavated area with suitable material as directed, at no cost to the Employer. The Contractor may be required to remove/ at his own expense, any fill placed outside of the prescribed slope lines where such placement is not authorized by the Engineer.

(b) Haul Road

Haul roads shall be located and constructed as approved by the Engineer. They shall be designed to maintain the intended traffic safely, without endangering dam stability during the construction period and shall be constructed in a manner to preclude contamination or alteration of materials forming the dam section. All haul roads located on dam slopes shall be removed at the completion of dam construction. Roads on abutments, which would be unstable during reservoir operations shall be removed at the completion of the dam construction or stabilised to the satisfaction of the Engineer. Haul or construction roads shall not be measured for payments.

(c) Stockpiles

Whenever the Contractor for his own convenience excavates and stockpiles fill material for subsequent usage in the fill, no additional payment shall be made for such stockpiling nor for the reloading and hauling of this material to its final position in the embankment except where specifically provided in the Specifications and Bill of Quantities.

Any stockpile shall contain material suitable for use in one fill Zone only, unless otherwise authorized in writing by the Engineer, and the Contractor shall advise the Engineer of the intended use of the material contained in all such stockpiles.

3.4 MATERIALS

3.4.1 General

Fill materials shall be obtained primarily from the designated borrow areas. The Contractor may use the suitable materials for the fill from additional sources on any borrow areas investigated by him, with the approval of Engineer who will satisfy himself that the material conform to the specifications. Providing the material of the zoned embankment is mentioned in the drawings and the material with haulage is however, included in the B.O.Q. Material containing bush, roots, sod, organic material or other material not considered suitable shall be cleaned of such materials or shall be wasted in areas away from the work site, as approved by the Engineer. All materials shall not contain any clods and Jumps which cannot be broken up during compaction and shall conform to the requirements of the Specifications, their dispositions in the dam shall be as directed by the Engineer.

3.4.2 Riprap

Limestone materials for riprap slope protection of embankment, flexible riprap apron and stone pitching at other designated areas, shall be hard, angular, sound, durable, free from cracks, seams or other defects which would lend to increase unduly its deterioration from natural causes. Material for riprap shall be obtained from the designated areas and shall conform to the grading limits shown on the drawings.

Abrasion after 1000 revolution in a Los Angeles' machine in accordance with ASTM C535 shall not exceed a loss in weight of more than 40 %. The soundness shall be measured in Sodium Sulphate solution in accordance with ASTM CSS. The loss in weight after 5 cycles shall not exceed 5%.

3.4.3 Filter under upstream Riprap and Downstream slope protection

Material (Cobbles and gravel) for the filter under upstream riprap and downstream slope protection shall comprise hard, durable non-cohesive particles.

The material can be obtained from the overburden or quarried rock of the same quality as riprap but conforming to the specified gradation limits.

3.4.4 Impervious Core

Material for compacted impervious core shall be the clayey-silt or silty clay or other suitable material available in approved borrow areas or other sites and shall conform to the grading limits shown on the drawings.

3.4.5 Silty Sandy Gravel Fill

Material for compacted silty-sandy gravel fills, in both upstream and downstream shells, shall be obtained from the nullah bed and other approved borrow areas. The material shall be well graded shall conform to the grading limits shown on the drawings.

Excavated Sandy material from the spillway will also be used as downstream shell fill after approval of the Engineer. No screening or processing of the sandstone for grading control shall be desired except for the exclusion of lumps, bigger than the thickness of the compacted layers which can not be broken down by the compaction equipment.

3.4.6 Sandy Gravel Fill

Material for compacted sandy gravel fill as filter under downstream slope protection shall be obtained from the nullah bed at and near the dam site after screening the finer material. The material shall be well graded shall conform to the grading limits shown on the drawings.

3.4.7 Gravel Drainage Blanket

Material for compacted drainage blanket shall be angular, sound and durable gravels. This material shall be cohesion less and well graded, shall conform to the grading limits shown on the drawings.

3.4.8 Sand Filter

Material for compacted sand filter and chimney drain shall be obtained from the approved sources. The material shall be well graded and shall conform to the grading limits shown on the drawings.

3.4.9 Downstream Sandy Gravel Toe

Material for the downstream sandy gravel toe shall conform to the gradation and quality requirements for material as given in Section 3.4.6 above.

3.4.10 Slush Grout

Slush grout for scaling the rock surface of the core foundation after cleaning shall be made if required with clean well-ground sand conforming to ASTM concrete sand with ordinary Portland cement.

The slush grout shall contain between 2 parts and 3 parts of sand to one part of cement as part of cement as approved by the Engineer. Its water content shall be sufficient to produce a mixture, which can be poured to penetrate and fill open joints, fissures and fractures in the rock surface and can be broomed over and into the rock surface to fill minor surface discontinuities and irregularities.

3.5 CONTACT BETWEEN ROCK AND IMPERVIOUS CUTOFF

3.5.1 Rock Cutoff Contact

Requirement for contact between rock and impervious cutoff area are specified in Subsection 2.5.3. Excavation for Dam Core trench and Subsection 3.4.10 Slush grout.

3.6 PREPARATION OF DAM FOUNDATION FOR FILL GENERAL

Requirement for preparation of dam foundation are specified in Section 2.5. Foundation preparation and Subsection 3.3.7 Placing of Fill on a Formation.

Where fill is to be placed on an excavated and trimmed overburden surface, the area designated in writing by the Engineer, the Contractor shall roll the trimmed foundation surface as though it were part of fill, as each layer of fill is compacted.

Where fill is to be placed on the rock, the hollows shall be filled with fill concrete or compacted fill material as directed by the Engineer. Where ordered by the Engineer, the Contractor shall carry out Incidental Excavation and refill with compacted fill material or fill concrete.

After excavation and surface preparation has been completed in a particular area, the Contractor shall take all necessary steps to prevent deterioration of the surface before it is covered by fill. If, notwithstanding these requirements, any deterioration does take place, the Contractor shall carry out such remedial works as the Engineer considers to be reasonably necessary. Where required by the Engineer, the foundation shall be sprayed with water before fill material is placed, and standing or running water will not be allowed.

Where grouting has been carried out prior to fill, all excess grout and debris shall be cleared by the methods such the slush grout cap and underlying grout curtain shall not be damaged.

3.7 PLACEMENT

3.7.1 General

No fill material shall be placed on any part of the foundation until that part has been inspected and approved by the Engineer and agreed levels recorded. Any fill material placed before the foundation has been inspected and approved by the Engineer, shall be removed and the foundation prepared again at no additional cost to the Employer.

Material of the several type and qualities required shall be deposited and distributed within the zone limits shown on the Drawings and to the slopes indicated within the tolerance specified below. The gradation and distribution of materials in the Zones of dam shall be such as to produce in each Zone a reasonably well-graded mass. Fill material shall be handled and placed by such methods as will minimize

segregation, in lifts of depths as specified, and in general so that the smaller sizes of the material within the dam are placed towards the middle and the larger sizes towards the outer surfaces. Where Riprap slope protection is placed on permanently exposed embankment slopes, the placing of fill shall be supplemented by required methods to obtain surfaces within a tolerance of plus 4-inch (10 cm) and minus 2-inch (5 cm) except that the extreme minus or plus tolerance shall not be continuous over an area greater than 200 square meter (200 square meters). For all other Zones not specified above, or elsewhere, material shall be placed as close as practicable to the lines shown on the Drawings or as approved by the Engineer. Bridging in the fill, and all slabs and slabby rock shall be broken down.

If in the opinion of the Engineer the rolled surface on any layer of fill is too dry or smooth to bond properly with the material to be placed thereon, it shall be moistened and worked with a harrow or scarified in an approved manner to sufficient depth to provide a satisfactory bonding surface before the succeeding layer of fill material is placed. If in the opinion of the Engineer the rolled surface of any layer of in-place fill material is too wet for proper placement of the layer to be placed thereon, it shall be removed or scarified or harrowed to reduce the water content to the required amount before the succeeding layer is placed thereon.

The Contractor shall complete each layer of fill fully up to the abutment-contacts and against sloping foundations and ensure that the fill is compacted as specified throughout.

3.7.2 Deterioration of Fill Material

Should the material selected as fill, while acceptable at the time of selection, becomes unacceptable to the Engineer, for any reason, including exposure to weather conditions/ flooding, contamination by other materials or segregation during progress of works, the Contractor shall remove such damaged, softened or segregated material to a spoil tip and replace it with fresh approved material, at no additional cost to the Employer,

3.7.3 Protection of Completed Fill Surface

The Contractor shall be responsible for protecting completed fill surface against erosion. If it starts to rain, the surface of the fill shall be made smooth with a drainage slope to induce runoff from the filled areas and leave no areas that can retain water. Run off from heavy rain shall be controlled to prevent gully erosion of the placed fill. Any gully erosion shall be repaired with material compacted in accordance with these Specifications, and eroded surface shall be restored and graded to ensure a proper bond with new fill placed on them.

3.7.4 Unrestrained Edges of Fill

The unrestrained edges of fill for permanent slopes shall be overbuilt as necessary to allow full compaction to be achieved within the defined limits of the fill. The excess material shall be trimmed and removed to leave a regular compacted surface.

3.7.5 Rate of Placement

Unless other wise indicated or directed by the Engineer the top of each embankment Zone, including the riprap shall be maintained at the approximately the same level throughout each embankment construction stage regardless of the number and types of materials being placed, except; as may be required to prevent mixture of embankment materials. Materials shall be delivered in proper sequence and distributed over the surfaces of the fills at such a rate as will ensure the completion of each embankment Zone and stage thereof within the specified time.

3.7.6 Watering of Fill

During dry weather, whether fill is being placed or not, the surface of the fill shall be sprayed with water to prevent cracking of the surface. If cracking of the surface of fill occur, the Contractor shall remove such cracking material and replace it with fresh fill within the specified range of moisture content.

3.7.7 Riprap Protection Placement

Stone for riprap shall be hand placed on the Dam and elsewhere within the limits indicated for material in such manner as to produce a well graded mass of rock with the minimum practicable percentage of voids and shall be constructed within the specified tolerance to the lines and grades shown on the Drawings or Stacked in the field. A tolerance of plus 4-inch (70 cm) or minus 2-inch (5 cm) from the slope lines and grades shown on the Drawings will be allowed in the finished surface of the riprap, except that either extreme of such tolerance shall not be continuous over an area greater than 200 Square meter (200Sq meters). The larger stones shall be well distributed and the entire mass of stones in their final position shall be roughly graded to conform to the gradation specified in in the drawing. The finished riprap shall be free from objectionable pockets of small stones and clusters of larger stones. Unless otherwise authorized by the Engineer, riprap protection shall be placed in conjunction with the construction of the riprap as may be necessary to prevent mixture of embankment and stone protection materials.

3.7.8 Filter Under Upstream Riprap and Downstream Slope Protection Placement

Cobbles and gravel for filter layer and protective layer shall be hand placed within the limits shown on the Drawings. Riprap Protection, placement and as further directed by the Engineer. Care shall be taken that materials do not get mixed with or material.

3.7.9 Gravel Drainage Blanket Placement

The gravel in drainage blanket shall be placed in the Dam within the limits shown on the Drawings. Care shall be taken that material does not get mixed with other material. The loading from the stockpiles shall be done in such a manner that segregation is minimized. If considered necessary by the Engineer, some mixing or wetting of material before hauling shall be done.

3.7.10 Impervious Core Placement

Impervious core fill shall be placed in the embankment including cut off trench within the limits indicated for fill material. If in the opinion of the Engineer the rolled surface on any layer of fill is too dry or smooth to bond properly with the layer of material to be placed thereon it shall be moistened and worked with a harrow or scarifier in an approved manner to sufficient depth to provide a satisfactory bonding surface before the succeeding layer of fill material is placed. If in the opinion of the Engineer the rolled surface of any layer of in-place fill is too wet for proper placement of the layer to be placed thereon, it shall be removed or scarified or harrowed to reduce the water content to the required amount before the succeeding layer is placed thereon. No fill shall be placed below water. During placement and Compacting of cutoff trench material, the water level at every point in the cut off trench shall be maintained below the foundation of trench till entire cutoff trench has been completely filled and duly compacted.

3.7.11 Sand Filter Placement

The compacted sand filter shall be placed in the dam within the limits shown on the Drawings. The loading from stockpiles shall be done in such a manner that segregation will be minimized. The material shall be made wet at the source and in any stockpiles, and during transportation and placing, to prevent segregation. Care shall be taken that material does not get with other zone materials.

3.7.12 Sandy Gravel Fill Placement

The compacted sandy gravel fill at the filter under D/S stone protection, shall be placed in the dam within the limits shown on the Drawings.

3.7.13 Downstream Rock fill Toe placement

Stone in rock fill toe shall be placed at the random in the dam within the limits shown on Drawings. The finished Zone shall be free from objectionable pockets of small stones and clusters of larger stones.

3.7.14 Silty Sandy Gravel Placement

The compacted silty sandy gravel fill in upstream and downstream shells, shall be placed in the dam within the limits shown on the Drawings.

Individual lumps of sandstone rock Subsection 3.4.5 which cannot be broken down by compaction equipment will be acceptable within the fill Zone of Shell material, provided that their largest dimensions is smaller than the layer thickness, that such lumps are completely surrounded by compacted fill conforming to the specified requirement and that such lumps do not comprise more than 10 % of the fill in any layer.

3.7.15 Stone Apron - Placement

The areas designated for placement of stone apron shall be excavated to the lines and grades shown on the Drawings or as directed by the Engineer to form a trough. The revetment stone shall then be hand placed in the excavated trough in such a manner that open spaces between stone are avoided.

3.7.16 Stone Pitching - Placement

The areas designated for placement of stone pitching shall be excavated to the lines and grades shown on the Drawings or as directed by the Engineer.

Stone and rock spalls used in the stone pitching shall be placed and bedded in such a manner that the completed stone pitching is stable and without tendency to slide. Large open spaces between the stone shall be avoided. Care shall be taken to ensure that all stone is well bedded on its flattest surface. The stone shall be placed so as not to project above the neat lines shown on the Drawings or directed by the Engineer. All interstices in the stone pitching shall be well-filled with rock spalls. The amount of rock spalls used shall not be in excess of that required to fill the voids in the revetment stone.

Cement grouting shall be performed in stone pitching for the Toe Drain which shall consist of filling with 1:4 cement sand mixture as shown on the Drawings or as directed by the Engineer.

3.8 SPREADING

After depositing, the materials shall be spread by approved means in approximately horizontal and uniform layers of fill material, to ensure proper and uniform compaction. Except as otherwise directed by the Engineer as a result of the tests conducted during construction/ the maximum thickness of each compacted fill layer for different Zones shall be as follows:

Shell Material	12-inch (30 cm)
Clay Core Material	6-inch (15 cm)
Coarse Filter	8-inch (20 cm)
Fine Filter Material	8-inch (20 cm)

The riprap and stone protection layer materials shall be placed in accordance with Section 3.7.3 Riprap Protection.

The Contractor shall determine by making test sections, the loose lift thickness required in order to attain the compacted thickness specified herein. Where reduction or increase in lift thickness is ordered by the Engineer, the maximum particle size permitted shall not exceed the compacted lift thickness. During dumping and spreading the Contractor shall provide at all times adequate facilities for removal of all unsuitable and/or oversize material. Unsuitable materials shall be removed from the embankment and disposed of in an approved manner. The entire surface or any section of the embankment under construction shall be maintained in such a condition that construction equipment can travel on any part of the section. Ruts in the surface of any layer shall be filled satisfactorily before compacting.

3.9 MOISTURE CONTROL

3.9.1 General

Where necessary, the Contractor shall adjust the moisture content of fill, either by drying out or adding water, so that it is within the range of moisture content for the fill after the compaction as set out in the Compaction Table included hereto. The water and fill shall be thoroughly mixed to uniform moisture content.

The Contractor shall ensure that water being applied to adjust the moisture content of material in one Zone 6 does not drain off the surface on to another Zone.

3.9.2 Fill Material Zone 1

All processing of Zone 1 (Core) material, to produce rolled fill including the adjustment of moisture content and breaking of lumps, shall be done before the material is hauled to the area where it is to be placed and compacted. So far as practicable, the material shall be delivered and spread in moisture range of 2 % above Standard Proctor optimum to optimum by irrigation or drying within the borrow areas. On the basis of tests conducted during construction, the Engineer reserves the right to make modifications in the required range of moisture for this material. Only such moisture variation as is needed for minor adjustment of moisture changes caused by evaporation during handling and placement or rainfall shall be allowed on the fill. The moisture shall be distributed uniformly throughout each layer prior to compaction. Optimum moisture content shall be determined in the laboratory by the Engineer by making Standard Proctor compaction test. The optimum moisture contents for the materials in borrow area will be furnished by the Contractor to the Engineer at daily intervals or at significant changes of material being placed.

3.9.3 Other Zones

As determined by the Engineer, some addition of water will be required for compaction of materials in other Zones of the dam and to reduce segregation tendencies. The addition of water for this purpose shall be accomplished prior to handling, unless otherwise directed by the Engineer.

3.10 COMPACTION

3.10.1 General

The compaction of fill material placed in the various zones shall be carried out to the requirement set out in the Compaction Table included hereto. The requirements of the Compaction Table apply to each layer of fill after it has been compacted and before it is covered by a subsequent layer of fill. The following definitions shall apply with respect to Compaction Table:

- Moisture content/ shall be the moisture content immediately after compaction,

- Layer thickness, shall be the thickness after compaction.
- Relative compaction (rc) shall be measured as a percentage of the maximum dry density measured by BS 1377:1967, Test 12.
- Relative Density (rd.) of cohesion less soils shall be measured as described in USBR Earth Manual, Second Edition, Appendix E -12.

3.10.2 Equipment

Compaction equipment shall generally consist of vibratory rollers, temping rollers and other approved rollers and shall be used as prescribed in subsequent Sections and as determined and ordered by the Engineer as a result of the tests conducted during construction.

(a) Special Compactors

Compaction of materials in areas where it is impracticable to use a roller or tractor, as provided above, shall be performed by the use of compactors of the heavy-duty power driven type. They shall be capable of producing densities at least equal to those produced by the equipment specified in Sub-Clause (a) hereof. All such equipment will be subject to approval by the Engineer. Compactors, which do not obtain the required density with a reasonable amount of coverage of each layer and at a production rate consistent with the adjacent embankment, shall not be used in the work. Compacted layer thickness by this equipment shall not exceed 4-inch (10 cm).

(b) Sprinkling Equipment

Sprinkling Equipment shall consist of tank trucks, pressure - distributors, or other equipment designed to apply water uniformly and in controlled quantities to variable widths of surface. Tanks trucks shall be equipped with positive shutoff valve so that no leakage will result from the nozzles when equipment is not operating. Leaks shall be repaired immediately and any material rendered too wet because of faulty equipment shall be removed reconditioned and no additional payment will be made therefore.

COMPACTION TABLE

Material	Compacted Layer thickness (inches)	Relative compaction (r.c.) or Relative Density (r.d.)		Moisture content (%) (Related to optimum for relative compaction test as specified)	
		2/3 rds of Test Results to Exceed	All Test Results to Exceed	2/3 rds of Test Results to be	All Test Results to be
Impervious Core	6	r.c = 98%	r.c. = 95%	Between +1 and +3	Greater than 0
		(Standard Proctor)			
Upstream Shell	12	r.c = 98%	r.c. = 95%	Between -2 and +1	Between -3 and +2
		(Standard Proctor)			
Downstream shell	12	r.c = 95%	r.c. = 92%	Between -2 and +1	Between -3 and +2
		(Standard Proctor)			
Filter under upstream slope Riprap Layer	12	r.d = 75%	r.d. = 65%	--	--
Downstream Slope Protection	12	r.d = 75%	r.d. = 65%	--	--
Filter under downstream slope protection	12	r.d = 75%	r.d. = 65%	--	--
Fine Filter	8	r.d = 75%	r.d. = 65%	--	--
Coarse Filter	8	r.d = 75%	r.d. = 65%	--	--

Note:- The embankment zones are applicable which are mentioned in drawings and BOQ of the Project.

- * The relative compaction (r.c.): refer to BS 1377:1967, Test 12.
- * The relative density (r.d.): refer to USBR Earth Manual, Second Edition, Appendix-E 12.
- * A moisture content given in the Table as minus a number (x) is x% below the optimum moisture content (y %): i.e. the moisture content "-x" is (y-x) %. Similarly, the moisture content "+x" is (y+x) %.

3.10.3 Compaction General

After a layer of fill material has been deposited, it shall be scarified, bladed or otherwise treated as necessary to produce a uniform material with respect to moisture' content and grain size distribution, in accordance with Section 3.9 Moisture Control mixing shall be performed to the full depth of the layer if so required. When the moisture content and conditions of the layer is satisfactory the lift shall be compacted. Portions of the fill which are not accessible to the roller shall be placed in lifts consistent with the material size and compacted with power tempers to a degree equal to that obtained on the other portions of the compacted fill by rolling as specified Dumping, spreading, sprinkling and compacting may be performed at the same time at different points along a section of Embankment when there is sufficient area to permit these operations to proceed simultaneously.

Unless other wise approved by the Engineer, the direction of compaction rolling in the embankment shall be parallel to the axis of the embankment.

3.10.4 Subgrade Compaction

The Subgrade below the dam shall be scarified by harrows to a depth of 10 -inch (25 cm), the material shall then be moistened as per clause 3.9.3 and compacted with not less than ten passes of the specified vibratory roller.

3.10.5 Compaction of Fill Material

Except as otherwise determined and ordered by the Engineer fill materials shall be deposited in successive layers of thickness as specified and compacted as follows:

- (a) Each layer of fill material in the impervious Zone 3 and Zone 2, shall be compacted to a dry density not less than 98% Standard Proctor laboratory density.
- (b) In other zones, each layer of material except riprap slope protection shall be compacted to a dry density not less than 75% relative density.
- (c) Compaction of riprap layer will not be required.

3.11 SLIDES

- (a) In the event of slides in any part of the embankment prior to final acceptance of the work, the Contractor shall remove material from the slide area, as directed, and shall rebuild such portion of the embankment. In case it is determined that the slide was caused through the fault of the Contractor, the removal and disposal of material and the rebuilding of the embankment shall be performed without cost to the Employer; other wise this work will be paid for the applicable Contract unit prices for the compacted fill or backfill.

(b) Lightly Compacted Fills

Fills and backfills designated on the Drawings or directed by the Engineer to be lightly compacted shall be such as to produce a dry density not less than 90% Standard Proctor laboratory density for cohesive materials and a dry density of not less than 65% relative density for granular materials. Compaction equipment shall conform to the general requirements of Section 3.10 Compaction.

3.12 MISCELLANEOUS FILLS AND BACKFILLS

3.12.1 General

In addition to the embankment fill for the dam certain miscellaneous fills and backfills will be required for Spillway, irrigation system, irrigation conduit and other structures and near the abutment areas. Material requirements for these backfills shall be specified on the Drawings and the type of material for these fills will be as specified in Section 3.4 Materials or as directed by the Engineer.

3.12.2 Operations Adjacent to Existing Structures

In general, no fill or backfill or other load shall be placed on or against the surface of any concrete structure earlier than is permissible with regard to the protection of the structure. At locations where the safety of structure might be endangered, such operations shall not proceed until the construction has attained sufficient strength to withstand any stresses that might develop incidental to the operations required; provided that no fill or backfill will be placed without the prior approval of the Engineer. If so required the Contractor shall submit details of the methods of placement, spreading and compaction he proposes to use for the protection of structures at such locations for the approval of the Engineer. Within areas where rollers cannot be used, the material shall be compacted by means of power tampers. Drainage openings through walls shall be kept open at all times.

3.12.3 Compaction

Subject to the limitations on compaction of fill and backfill material adjacent to structures and/or drainage features specified in the Subsection 3/12.2. Operations Adjacent to Existing Structures above, compaction of fills and backfills shall conform to the following except if specified as dump fill.

(a) Well Compacted Fill

Fills and backfills designated on the Drawings or directed by the Engineer to be well compacted shall be as such as to produce a dry density of not less than 98% Standard Proctor laboratory density for cohesive materials and a dry density of not less than 75% relative density for granular materials. Compaction equipment and procedures shall conform to the general requirements of Section 3.10 Compaction.

3.13 BACKFILLING OF TRENCHES

3.13.1 General

The trenches shall not be completely backfilled until all required pressure tests are performed and until the irrigation conduit as placed conforms to the requirements of Specification. Where in the opinion of the Engineer, damage is likely to result from withdrawing sheeting and shoring, the same shall be left in place and cut off at a place level 3.0 meter (1.0 m) below ground surface. Sheeting left in place shall be paid for at the approved rate for that item of work. Trenches shall be backfilled to the ground surface with selected excavated material or other for proper compaction. Trenches improperly backfilled shall be reopened to the depth required for proper compaction, then refilled and compacted to the required density as given in Subsections 3.13.2 and 3.13.3. The surface shall be restored to its original or better condition. Any road shall be replaced and restored.

3.13.2 Lower Portion of Trench

Backfill material shall be deposited in 6-inch (15 cm) maximum thickness layers and compacted with suitable hand tempers to produce a dry density of not less than 95% Standard Proctor laboratory density for cohesive materials or as directed by the Engineer until there is a cover of not less than 12 inch (30 cm) over the pipe. The backfill material in this portion of trench shall consist of approved materials free from stones and lumps.

3.13.3 Remainder of Trench

The remainder of the trench shall be backfilled with material that is free from stones larger than 6-inch (15 cm) in any dimension. Backfill material shall be compacted to 90% Standard Proctor laboratory density for cohesive or equivalent for other materials or as directed by the Engineer.

3.13.4 Borrow Area for Trenches

In case of insufficiency of excavated material and unsuitability of earth for backfilling, conforming to the above Specifications, such material shall be brought from the approved source, by the Contractor.

3.14 EMBANKMENT FOR CANALS / CHANNELS

Embankment for canals / channels shall be constructed as specified in clause 2.5.6 as shown on the Drawings. Maintenance berms and inspection road along the canals shall also be constructed of well compacted approved material in accordance with clause 2.5.6.

3.15 TESTING

3.15.1 Testing by the Contractor

The Contractor shall be responsible for carrying out all field and laboratory tests required to ensure that all fill material placed complies with the Specifications, and that the material is compacted so as to conform to the requirements stated in the Compaction Table over the full depth of each layer. Testing shall be to I3S 1377: 1967 or USBR Earth Manual, Second Edition unless otherwise specified or approved by the Engineer.

Laboratory tests of maximum and minimum dry densities and optimum moisture contents shall be on samples taken adjacent to and including in-situ density test samples.

Maximum dry densities and optimum moisture contents for compaction control by relative compaction shall be derived using Test 12 of BS 1377:1967 as specified in the Compaction Table and maximum and minimum dry densities for compaction control by relative density shall be derived using the test described in Appendix E12 of USBR Earth Manual, second Edition.

Particle size distribution (grading) shall be determined by the appropriate variation of Test 7 of BS 1377: 1967. Tests 7 (A) or 7 (D) shall be used unless otherwise agreed by the Engineer.

Fill density in the field will be determined as follows:

- (a) In fine and medium grained soils, the Contractor shall propose a suitable method which will consist of a large-scale replacement method and it must give consistent and correct results, to the satisfaction of the Engineer.
- (b) In rock fill, filter and drainage layers, water replacement shall be employed using a plastic lining film in a test hole. The hole shall be not less than 10 cubic meter in volume for rock-fill and not less than 1.0 cubic meter in volume for filter and drainage layer.

The location of each field test or sampling point shall be to the approval of the Engineer. The minimum frequency of testing for Control Tests shall be as approved by the Engineer.

The Contractor shall inform the Engineer at least one hour before he proposes to carry out any field test or take a sample so that the Engineer may supervise the test or the taking of the sample. Tests shall be carried out in groups of two or more all in the same layer. The Contractor shall carry out an additional group of tests, designated "Repeat Test", in any fresh layer as designated by the Engineer, after any group of tests, including a group of tests carried out by or on behalf of the Engineer, designated "Engineer's Test", has failed to meet the specified requirements. The acceptability of that layer shall then be determined by the results of the new groups of tests.

The numbering system to be used for recording tests and test results shall be subject to the Engineer's approval and shall clearly differentiate between Control, Repeat, Engineer's and Extra Tests.

Test results and copies of calculations shall be submitted to the Engineer promptly upon completion of the tests.

3.15.2 Engineer's Tests

The Carrying out of any tests by or on behalf of the Engineer shall not relieve the Contractor of any of his responsibilities for testing in accordance with the Specifications. The Contractor shall inform the Engineer of his programme for placement and compaction of fill in sufficient time to allow the Engineer to make arrangements for Engineer's tests to be carried out without delaying the Construction programme.

3.16 MEASUREMENT AND PAYMENT

3.16.1 General: Equipment Fill, Trench Backfill and Stone Apron / Pitching

Measurement under these items will be computed by actual measurements methods and will be made of the number of cubic meter of each material Zone in place and accepted in the embankment fill to the lines, grades and cross sections shown on the Drawings or established by the Engineer.

Payment shall constitute full compensation for constructing the embankment from required borrow areas, quarries and stockpiles including excavating, loading, unloading, rehandling, hauling, processing, moistening, placing and compacting the materials and all other work related to the item.

3.16.2 Riprap Stone Protection for Embankment

Payment will be made for the number of cubic meter measured as provided above at the Contract unit price per cubic meter for Riprap smaller and larger stone protection respectively for embankments.

3.16.3 Stone Protective Layer and Filter under Riprap

Payment will be made for the number of cubic meter measured as provided above at the Contract unit price per cubic meter for Slope Protective Layer and Filter and Riprap.

3.16.4 Gravel Drainage Blanket

Payment will be made for the number of cubic meter measured as provided above at the Contract unit price per cubic meter for Gravel Drainage Blanket.

3.16.5 Impervious Core Fill

Payment will be made for the number of cubic meter measured as provided above at the Contract unit price per cubic meter for Impervious Core Fill.

3.16.6 Sand Filter

Payment will be made for the number of cubic meter measured as provided above at the Contract unit price per cubic meter for Sand Filter.

3.16.7 Sandy Gravel Fill and Filter Under Slope Protection

Payment will be made for the number of cubic meter measured as provided above at the Contract unit price per cubic meter for Sandy Gravel Fill and Filter under Slope Protection.

3.16.8 Sandy Gravel Toe

Payment will be made for the number of cubic meter measured as provided above at the Contract unit price per cubic meter for Sandy Gravel Toe.

3.16.9 Slush Grout

Payment will be made for the number of cubic meter measured as provided above at the Contract unit price per cubic meter for Slush Grout.

3.16.10 Stone Apron

Measurement for payment of Stone Apron at the locations specified will be made to the outlines of the stone in place and accepted according to the thickness of the stone apron shown on the Drawings or establish by the Engineer.

Payment will be made for the number of cubic meter as provided above at the Contract unit price per cubic meter for the Stone Apron at specified locations and shall constitute full compensation for materials and placement of the stone apron including preparation of foundation and all other works related to the item.

3.16.11 Miscellaneous Fills and Backfills around Structures

Measurement will be made of the number of cubic meter of well compacted or lightly compacted fills and backfills in accordance with Subsection 3.12.3 as specified on the Drawings or directed by the Engineer, in place and accepted around the Structures according to the lines and grades as shown on the Drawings.

Payment will be made for the number of cubic meter measured as provided above at the Contract unit price per cubic meter for the respective items as indicated in BOQ and shall constitute full compensation for constructing the fill with the materials obtained from the specified stockpiles or borrow areas including hauling, placing, moistening and compacting the material and all other work related to the item.

3.16.12 Compaction and Backfilling of Trenches

Measurement shall be made of the number of cubic meter of earth acceptably backfilled with well-compacted earth for trenches within the lines and grades shown on the Drawings or as directed by the Engineer.

Payment for compaction and backfilling of trenches shall be made at unit price per cubic meter as stated in the BOQ and shall constitute full compensation for backfilling with the materials obtained from the specified stockpiles or borrow areas including hauling, placing, moistening and compacting the material and all other works related to the item.

3.16.13 Stone Pitching

Measurement for payment for stone pitching at specified locations will be made to the outlines of the stone pitching on the basis of the accepted thickness of the stone pitching as shown on the Drawing and as directed by the Engineer. No extra payment will be made for increased thickness of stone pitching.

Payment for furnishing, transporting and placing stone pitching will be made at the unit price bid per cubic meter in the Bill of Quantities for Stone Pitching. The amount bid shall be full payment for the work specified herein as stone pitching, including preparation of the foundation, placing of the stone pitching and all other works related to the item.

The payment shall be deemed to include the costs of cement grouting at Toe Drain for providing, cement, performing grouting and all the related activities in connection to complete the work as per specifications and drawings to the satisfaction of the Engineer.

3.16.14 Construction of Embankment for Canals/ Channels

Measurement will be made of the number of cubic meter of canal embankment constructed as per Specification and Drawings, and as directed by the Engineer.

Payment will be made of the number of cubic meter of canal embankment as measured above and shall constitute full compensation for the materials from required borrow areas, quarries and stockpiles including loading, unloading, rehandling, hauling, processing, moistening, placing, well compacting the materials and all the works stated in the above BOQ items including preparation of maintenance berms and inspection roads.

SECTION – 4

EMBANKMENT INSTRUMENTATION

4.1 GENERAL

Embankment instrumentation shall be provided according to the provisions herein specified or as directed by the Engineer.

Instrumentation will be required for measurement of hydrostatic pressure, settlements and seismicity in the embankment. In general, two types of instruments will be installed. However additional instruments may be proposed if required.

The standpipe piezometers (Casagrande type) will be installed for pore pressure measurements and surface markers for measurement of settlements at the surface. The Contractor shall furnish and install all apparatus in accordance with the detailed specifications outlined herein or shown on the Drawing and as directed by the Engineer.

4.2 INSTALLATION OF INSTRUMENTATION

(a) General

Instrumentation shall be installed by the Contractor as construction progresses to the lines and elevations shown on the Drawings, under the supervision of the Engineer. Apparatus and associated tubes and other transmitting media shall be installed during the daylight hours or at night only if adequate lighting is provided as approved by the Engineer. No portion of any instrumentation shall be covered until tested and approved by the Engineer. Open ends of all incomplete lines of tubing shall be sealed to exclude foreign matter. It shall be the Contractor's responsibility to protect the apparatus from damage or displacement during the execution of the Works. Any damage or displacement of the apparatus or facilities by the Contractor's operations shall be repaired and / or replaced by the Contractor at his own cost. Foundation and embankment piezometers shall be installed at the locations and elevations shown on the Drawings, or as established by the Engineer, as the work progresses. The term piezometer as used herein shall mean the piezometer tip assembly and connecting tubing, and/or other media required for measuring pore pressure.

(b) Foundation

The Contractor shall drill holes as approved by the Engineer, of size as specified to accommodate equipment of the size to be used for foundation piezometers to depths as indicated on the Drawings. The boreholes shall be thoroughly cleaned before placing instrument. In each hole the Contractor shall install piezometers, complete with tip assembly and connecting tubing as shown on the Drawings or as directed by the Engineer. Clean, saturated well graded sand shall be placed in the hole around each piezometer tip, extending at least 30 cm below and 60 cm above the tip. The hole shall then be backfilled to the bottom of embankment fill with an impervious plug of cement grout as shown on the Drawings.

c) Embankment Piezometer

The embankment piezometer shall be installed in the open pits or trenches at locations shown on the Drawings. Excavation of pits or trenches shall be done by manual methods so as to disturb the adjacent embankment as little as possible. Prior to installation of piezometers and tubing, selected sand shall be placed upon the selected material in accordance with the details shown on the drawings or as directed by the Engineer. No pockets of loose material will be permitted adjacent to the piezometer tips or tubing. Tubing shall be kept in proper orientation; spacing and each riser tube shall be properly tagged. The backfill, compaction of soil in the pits shall be performed by manual methods as directed by the Engineer. Soil tests shall be made by the Contractor to ensure that compaction obtained is at least-equal to that of adjacent embankment. The sand shall be firmly placed to preclude any movement of piezometer within the bedding. Piezometer tubing shall be extended to successively higher elevation as embankment construction proceeds by means of vertical split casing pipe. Splicing of riser pipes will not be permitted and any joint shall have to be authorized by the Engineer in writing only.

d) Surface Settlement Points

The Contractor shall construct surface settlement points as close as practicable to the locations shown on the Drawings, as soon as practicable after embankment has been constructed to the elevation of each such point. Surface settlement points shall be constructed by installing lengths of reinforcement bar vertically into the dam as shown on the Drawings or as directed by the Engineer.

4.3 MEASUREMENT AND PAYMENT

(a) Measurement and Payment

All work under this Section, Instrumentation of Embankments and their Foundations, will be paid for under the following Provisional and Prime Cost Items in accordance with Clause 58 of the Conditions of Contract. No increase in Contract price of any kind will be made due to interference of the work under this Section with the embankment construction or any other work under this Contract.

(b) Install, Operate and Maintain Embankment and other Miscellaneous Instrumentation, Equipment and Appurtenances

The provisional sum for this item will cover installing the approved instrumentation including supplementary instrumentation placed by boring, instrumentation houses and observation stations including earthwork incidental thereto, and such operations incidental to the instrumentation that the Engineer may require, except that construction of buildings and furnishing and installing of electrical work will be covered under the applicable items of the Bill of Quantities.

(c) Furnish Embankment and other Miscellaneous Instrumentation Equipment

The Prime Cost sum will cover furnishing and delivering the approved embankment and other miscellaneous instrumentation to the site of the work.

(d) Construction and Maintain Seepage Measuring Chamber with V Notch

Measurement will be made on lump sum basis to the Contractor for constructing and maintaining seepage measuring chamber with V notch as shown on the drawing and as directed by the Engineer.

Payment shall be deemed to include all expenditures incurred on the related works for the construction and maintenance of seepage measuring chamber with V-notch.

4.4 RAIN GAUGE

Data Logging Rain Gauge shall be fully self-contained battery-powered rainfall data collection and recording system which shall include an event data logger integrated into a tipping-bucket rain gauge. The instrument shall automatically record up to 160 inches of rainfall data that can be used to determine rainfall rates, times, duration and temperature.

The instrument shall record up to 160 in. of rainfall at rates up to 12.7 cm (5 in.) per hour. The Data Logging Rain Gauge system shall be battery powered and includes a Pendant Event data logger, Base Station and a tipping-bucket rain gauge. Easily collect rainfall, time, and duration data, as well as temperature.

SECTION – 5

PLAIN AND REINFORCED CONCRETE

5.1 SCOPE

This section covers the manufacturing, forming, transporting, placing, stripping of forms, finishing and curing of plain and reinforced normal concrete in the structures included herein and as shown in the drawings. The relevant reference standards are listed in sub-sections 5.31 at the end of this section.

5.2 SPECIFICATIONS

The following codes shall be used.

5.2.1 Reinforced Concrete

Reinforced Concrete will be designed in accordance with the applicable provisions of "Building Code Requirements for Reinforced Concrete (ACI 318-89) and commentary ACI (318-89) of American Concrete Institute.

5.2.2 Plain Concrete

Design of Structural Plain Concrete will be based upon the relevant provisions of "Building Code Requirements for Structural Plain Concrete (ACI 318 - 89) and commentary ACI 318 89, of American Concrete Institute.

5.3 COMPOSITION AND QUALITY

Concrete shall be composed of Portland cement, water, fine and coarse aggregates and any admixtures as and when specified. The concrete mixes will be designed by the Contractor under the supervision of the Engineer who will determine the required quality of the concrete for the structures covered by these Specifications. The design strengths of concrete for various parts of the structures shall be as shown on the Drawings.

5.4 CEMENT

5.4.1 General

Generally, Portland cement shall be used for the construction of this Contract.

Cement shall be furnished in sacks or in bulk form as approved by the Engineer. Unless otherwise permitted, cement from not more than two plants shall be used and in general, the product from only one plant shall be used in any particular section of the work. No cement recovered through cleaning sacks shall be used.

5.4.2 Portland Cement

Portland cement shall be Pakistani manufactured, unless otherwise approved by the Engineer. Portland cement shall conform to Pakistan Standard 232 or British Standard BS-12 1978 or later "Specifications for Ordinary and Rapid Hardening Portland Cement" or to ASTM Designation C150-86, "Standard Specifications for Portland Cement".

5-4.3 Tests

Cement shall be sampled at storage site and tested from time to time at the discretion of the Engineer in accordance with the ASTM Designation C150-86 or its equivalent latest British Standards. Expenses for such tests shall be borne by the Contractor. If the tests prove that the cement has become unsatisfactory, it shall be removed from the site immediately. Cement which has been in storage at the project site longer than four months, shall not be used until re testing proves it to be satisfactory.

5.4.4 Transportation of Cement

Transportation of the cement from the factory to the site stores and to the point of use shall be accomplished in such a manner that the cement is completely protected from exposure to moisture. Cement which has been adversely affected by moisture, as determined by the Engineer, shall be rejected. Cement shall be delivered in strong and well made paper and cloth sacks, each plainly marked with the manufacturer's name, brand, type of cement and the weight of cement contained therein. Packages varying more than 3 percent cement from the weight marked thereon may be rejected and if the average weight of packages in any consignment as shown by weighing fifty packages taken at random, is less than that marked on the packages, the entire consignment may be rejected. Packages received in broken or damaged condition shall be rejected or may be accepted only as fractional packages as determined by the Engineer.

5.4.5 Storage

Cement shall be stored in dry, weather tight and properly ventilated structure. All storage facilities shall be subject to approval and shall be such as to permit easy access for inspection and Identification of each consignment. Sufficient cement from a single source shall be in storage at the work site to complete any lift of concrete started. Adequate storage capacity shall be furnished to provide sufficient cement to meet the peak needs of the project. Cement in sacks shall be stored on a damp-proof floor and shall not be piled to a height exceeding 2m (6.5 ft.).

The Contractor shall use cement in the approximate chronological order in which it is received at the site. All empty sacks shall be promptly disposed of as approved by the Engineer.

Cement storage facilities shall be emptied and cleaned by the Contractor when so directed, however, the interval between required cleanings will normally not be less than four months.

Suitable accurate scale shall be provided by the Contractor for weighing the cement in stores and elsewhere on the work if required, and he shall also furnish all necessary test weights.

5.4.6 Delivery and Usage Record

Accurate records of deliveries of cement and its use in the work shall be kept by the Contractor. Copies of these records shall be supplied to the Engineer in such a form as he may require.

5.5 AGGREGATES

Materials used as aggregates shall conform to ASTM C33-86 "Specifications for Concrete Aggregates" and shall be obtained from sources known to produce satisfactory results for the different specified grades of concrete. The use of aggregates from sources which have not been approved by the Engineer shall not be permitted. The following tests shall be carried out by the Contractor at his own expense to determine the suitability of the material for the intended use:

- Mechanical properties
- Porosity
- Organic impurities
- Clay and Silt contents
- Abrasion and Soundness
- Alkali Reactivity Potential
- Water Soluble Chloride Content

5.5.1 Fine Aggregate for Concrete

Fine aggregate shall conform to provisions of ASTM C33-86 to ensure water lightness and chemical resistance where required.

Fine aggregate for grade A, B and C of concrete shall be well graded natural sand, stone screenings or other inert material of similar characteristics or a combination of these. The whole of it shall be perfectly clean, free from coagulated lumps, soft and flaky particles, shale alkali, organic matter, loam mica and injurious amount of other deleterious substances. Maximum allowable content of silt and other deleterious inert-substances is 5 percent. Material derived from stone unsuitable for coarse aggregate shall not be used as fine aggregate. Fine aggregate derived from stone screenings shall be well shaped, cubical, hard, dense and durable and shall be stacked on a platform so as to adequately protect it from dust and other admixtures.

Grading for the above specified fine aggregate shall be within the following limits, when tested in accordance with ASTM C136 - 84a.

Sieve Size		Percentage Passing (Dry Weight)
9.5	mm (3/8 in)	100
4.75	mm (No. 4)	95 to 100
2.36	mm (No. 8)	80 to 100
1.18	mm (No. 16)	50 to 85
0.60	mm (No. 30)	25 to 60
0.30	mm (No. 50)	10 to 30
0.15	mm (No. 100)	2 to 10

Fineness Modulus shall range between 2.3 and 2.60.

5.5.2 Coarse Aggregate for Concrete

Coarse aggregate for grades A, B and C of concrete shall consist of quarried or crushed stone/river run gravel or inert material or a combination of these, durable, sound, cubical and well shaped, free from soft or friable matter or thin elongated pieces, alkali, organic matter or injurious amounts of other deleterious substances. Deleterious inert matter shall not exceed 3 percent.

5.5.3 Storage of Aggregate

Each class of aggregate is to be stored separately and the Contractor is to provide means of ensuring that aggregates are stored on a suitable hard clean surface or platform to prevent contamination from the ground or any other source.

5.5.4 Proportions of Coarse and Fine Aggregates

The nominal ratio of the volume of coarse aggregate to the volume of fine aggregate shall be decided by compression test of concrete cylinders to be furnished by the Contractor. The Engineer may order these ratios to be varied slightly according to the grading of the aggregates by weight, if necessary, so as to produce required grading for the mixtures of coarse and fine aggregate. The Engineer shall get the tests carried out at the Contractor's cost.

At the beginning of the Works and where there is any change in the coarse or fine aggregates or in their source of supply, the Contractor is to have a series of tests on cylinders made representative of and marked as to the aggregates and their grading and mix of concrete. Such cylinders are to be tested in the laboratory under identical conditions, except for small variations in the relative proportions of the coarse and fine aggregates up and down from the best proportions derived from the sieve analysis. The cylinders are to be tested at 3, 7 and 28 days.

5.5.5 Water

Water for washing aggregates, mixing concrete and curing shall be clean and free from harmful matter and shall satisfy the recommendations contained in the Appendix of BS 3148-80 or ASTM D596-83 or equivalent. The concentration of sulphates and chlorides shall be such that the concrete mix as a whole complies with the limits of salts content recommended in the Appendix of BS 3148-80 or ASTM D596-83 or equivalent. The Contractor shall make arrangements to protect water from direct Sun and contamination by wind-blown materials, The Engineer shall order re-testing of water whenever deemed necessary. Water shall meet the following requirements:

Chlorides such as Sodium chloride	Max.	500	ppm
Sulphate such as Sodium Sulphate	Max.	1000	ppm
Impurities	Max.	2000	ppm
Alkali Carbonate and Bicarbonates	Max.	1000	ppm

Water for curing concrete shall have a pH value not lower than 6 or greater than 9 and shall not contain impurities which cause discoloration of concrete,

5.6 CONCRETE MIX STRENGTH

5.6.1 Strength

In addition to the mix design parameters pursuant to structural characteristics, chemical resistance and durability requirements, the concrete mixes shall also conform to the placing systems employed.

The concrete shall be one of the following three different grades to be paid for at their respective unit prices designated.

Grade of Concrete	Type of Concrete	Minimum Compressive Strength	Max. size of Aggregate (in)
		Tested at 28 days	
A	Normal Structural Steel	3000 - psi	3/4-1.5
B	Massive	3000 - psi	3
C	Plain	1500-2000 - psi	3

However, the actual concrete mix requirement shall consist of proportioning and mixing for the following strengths when tested in the form of cylinders; test shall be made for each grade of concrete. The cylinders are to be made, cured, stored, transported and tested in accordance with ASTM C 39 - 86. The tests are to be carried out at a testing laboratory approved by the Engineer. All such tests shall be carried out at the expense of the Contractor.

5.6.2 Water Cement Ratio

In general, the Engineer 's design will provide for water cement ratios by weight (exclusive of water absorbed by the aggregates), which will be determined on the basis of producing concrete having suitable workability, density, impermeability, durability and the required strength without the use of excessive amounts of cement.

5.6.3 Consistency

Proportions of ingredients shall vary to achieve the desired concrete consistencies when tested, conforming to the following slump requirements or as desired by the Engineer. The slump shall be determined in accordance with ASTM C143-78.

Use of Concrete	Minimum & Maximum Slump (mm)
Columns, Beams, Slabs and Slabs on ground.	25 to 75 (1" to 3")
Plain or Reinforced Foundations, Footings.	25 to 100 (1" to 4")

In all cases, the proportions of aggregates for concrete shall be such as to produce mixtures which will work readily into the corners and angles of the forms and around the reinforcement without permitting the segregation of materials or laitance formation. Uniformity in concrete consistency from batch to batch shall be ensured.

5.7 MEASUREMENT OF MATERIALS

The coarse and fine aggregate are to be weighed or accurately measured to the Engineer's satisfaction. In no event they are to be measured by the shovel or barrow.

5.8 MIXING METHODS

The concrete shall be mixed in an approved mechanically operated Batching Plant, followed by transportation through Transit mixer up to site of work within the specified time.

The aggregates and cement shall be mixed together before adding water until the concrete is of even colour and consistency throughout. Dirt and other undesirable substances shall be excluded. Water shall not be added indiscriminately from a hose or can. The Batching Plant and Transit Mixer shall be operated and maintained in accordance with relevant specifications and operating manuals through trained/experienced operators.

No concrete shall be mixed by hand/Mobile concrete mixer without the Engineer's written consent, and such consent shall be given only for small quantities in special circumstances.

5.9 TEST OF CONCRETE

5.9.1 Strength Test during the Work

Strength tests of the concrete placed during the course of the work will be made by the Engineer in an approved laboratory at the Contractor's expense. The Contractor shall assist the Engineer in obtaining, for control purposes, such number of cylinders and/or beams as the Engineer may direct, but in general, three cylinders and/or beams, taken from each 10 to 50 cu.m or fraction thereof, or from each days pour, whichever is less of each grade of concrete placed, shall govern. Test specimen will be made and cured in accordance with the applicable requirements of ASTM Designation C31-87, "Practices for Making and Curing Concrete Compressive and Flexural Test Specimens in the Field". Cylinders and beams will be tested in accordance with the applicable requirements of ASTM Designation C39-86, "Standard Method of Test for Compressive Strength of Cylindrical Concrete Specimens" and ASTM Designation C78-81, "Standard Method of Test for Flexural Strength of Concrete (Using Simple Beam with Third Point Loading)". The test result will be based on the average of the strength of the test specimens except that if one specimen in a set of three shows manifest evidence of improper sampling, moulding, or testing, the test result will be based on the average of the remaining two specimens. If two specimens out of a set of three show such defects, the results of the set will be discarded and average strength determined from test results of the other two sets. The standard age of test will be 28 days. If the average of the strength test of the specimen cured under laboratory controls, for any portion of the work, falls below the minimum allowable compressive or flexural strength at 28 days required for the grade of concrete used in that portion, the Engineer may change the proportions of the constituents of the concrete, as necessary to secure the required strength for the remaining portions of the work. If the average strength of

the specimens cured under actual field conditions as specified herein before falls below the minimum allowable strength, the Engineer will make such changes in the conditions for temperature and moisture under which the concrete work is being placed and cured as may be necessary to secure the required strength.

5.9.2 Tests of Hardened Concrete In or Removed from the Structure

Where the results of the strength tests of the control specimens indicate the concrete as placed does not meet Specification requirements or where there is other evidence that the quality of the concrete is below specification requirements, core-boring tests will be made by the Engineer in accordance with ASTM Designation C42-84a Standard Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete. In the event that the core-boring test indicates that the concrete placed does not conform to the Drawings and Specifications, the Contractors shall take measures as prescribed by the Engineer to correct the deficiency. If a strength deficiency is found and is due to the Contractor's fault or negligence, the entire cost of replacing faulty concrete shall be borne by the Contractor who shall also reimburse the Employer for the cost of making tests. Otherwise, payment for removing and replacing faulty concrete will be made under applicable Items of the Bill of Quantities insofar as they are applicable and as Day Work where not classifiable under the Items of the Bill of Quantities.

5.10 TRANSPORTATION OF CONCRETE

Concrete shall be conveyed from plant to the place of final deposit as rapidly as practicable, by methods which will prevent segregation or loss of ingredients and in accordance with the latest edition of ACI 304" Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete".

Any wet batch hopper through which the concrete passes shall be conical in shape. There shall be no vertical drop greater than 1.50 m except where suitable equipment is provided to prevent segregation and where specifically authorized belt conveyers, chutes, or other similar equipment shall not be permitted for Conveying concrete except where the use of this equipment is approved in writing by the Engineer, in advance of any use. Each type or grade of concrete shall be visually identified by placing a coloured tag or marker on the bucket may be positively identified and placed in the structure forms in the desired position.

5.11 PLACING

5.11.1 General

Concrete placing shall follow the Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete, latest ACI 304 requirement. No concrete shall be placed until all formwork, reinforcement, installation of parts to be embedded, bracing of forms and preparation of surface involved in the placing and the method

of placement have been approved by the Engineer. Approval of the method of placement proposed will not relieve the Contractor of his responsibility for its adequacy and he shall remain solely responsible for the satisfactory construction of all work under the Concrete.

Before concrete is placed, all surfaces upon or against which concrete is to be placed, shall be free from standing water, mud, debris or loose material. All surfaces of form and embedded material that have become encrusted with dried mortar or grout from concrete previously placed shall be cleaned of all such mortar or grout before the surrounding or adjacent concrete is placed. The surfaces of absorptive material against or upon which concrete is placed shall be moistened thoroughly so that moisture will not be drawn from the freshly placed concrete. The depositing of concrete shall be regulated so that the concrete may be effectively compacted with a minimum of lateral movement in to horizontal layers approximately 0.40 m in thickness. No concrete that has partially been hardened or contaminated by foreign materials shall be deposited in the structure, nor shall re-tampered concrete be used unless approved by the Engineer. The surfaces of construction joints shall be kept continuously wet for at least eighteen hours during the twenty four hours period prior to placing concrete except as otherwise directed by the Engineer. All free water shall be removed and the construction joint shall be completely surface dry prior to placement of concrete. All concrete placing equipment and methods shall be subject to approval. Concrete placement will not be permitted, when in the opinion of the Engineer weather conditions prevent proper placement and consolidation.

5.11.2 Placing Concrete under Water

Concrete shall not be placed under water except where inevitable in which case approval must be sought from the Engineer and the work carried out under his immediate supervision. In this case the method of placing shall be as hereinafter specified.

Concrete deposited under water shall be of the strength as specified on drawings with a minimum cement content of 400 kg per cubic meter of concrete.

The slump of the concrete shall be maintained between 10 and 20 cm. To prevent segregation, it shall be carefully placed in a compact mass, in its final position, by means of a tremie, a bottom-dump bucket, or other approved means, and it shall not be disturbed after being placed, Water must not be allowed to flow past the fresh concrete surface.

A tremie shall consist of a tube having a diameter of not less than 25 cm constructed in sections having flanged couplings fitted with gaskets with a hopper at the top. The tremie shall be supported so as to permit free movement of the discharge end over the entire top surface of the work and so as to permit rapid lowering when necessary to retard or stop the flow of concrete. The discharge end shall be closed at the start of work so as to prevent water entering the tube and shall be completely submerged in concrete at all times; the tremie tube shall be kept

full to the bottom of the hopper. When a batch is dumped into the hopper, the flow of concrete shall be induced by slightly raising the discharge end, but always keeping it in the placed concrete. The flow shall be continuous until the work is completed.

When the concrete is placed with a bottom-dump bucket, the top of the bucket shall be open. The bottom doors shall open freely downward and outward when tripped. The bucket shall be completely filled and slowly lowered to avoid backwash. It shall not be dumped until it rests on the surface upon which the concrete is to be deposited and when discharged ' shall be withdrawn slowly until well above the concrete.

Dewatering may proceed when the concrete seal is sufficiently hard and strong. All laitance or other unsatisfactory material shall be removed from the exposed surface by scraping, chipping or other means which will not injure the surface of the concrete.

5.12 COMPACTING CONCRETE

All concrete, except that in blinding layers and in-situ-concrete in very small sections, shall be compacted by vibration. After any necessary hand spading, working and ramming into place, each layer of concrete shall be compacted with mechanical immersion vibrators of types approved by the Engineer.

The immersion vibrators shall produce vibration of a frequency not less than 6000 impulses per minute. Under no circumstances shall be immersion vibrators be allowed to come into contact with reinforcement or shuttering. Immersion vibrators shall penetrate vertically for a few inches into any previous unset layer in order to establish a satisfactory bond, but no concrete shall be vibrated in such a manner as to cause injury to concrete (already set or otherwise) in other parts of works. Care shall be taken to keep the vibrators vertical, to insert them at regular intervals and withdraw them slowly to prevent the formation of voids, so that the entire mass of the concrete is properly compacted. Haphazard or random penetration of the vibrators without sufficient depth of insertion shall be avoided. A sufficient number of vibrators shall be used to ensure compaction of each batch of concrete before the next batch is delivered. At least one extra vibrator shall be in hand for emergency use.

Vibration shall be supplemented by hand punning with approved small diameter smooth steel rods with rounded ends in order to achieve complete compaction around reinforcement and other embedded fittings and a completely dense mortar finish against the shuttering.

Excessive vibration shall be avoided and on no account shall vibration be continued after a good surface finish, without free water, has been achieved. Vibration and punning shall be just sufficient to produce a dense, homogenous concrete properly filling the moulds and free from air voids, segregation, bleeding, honeycombing and other imperfections. Only highly skilled operators and workmen, subject to constant supervision, shall be employed in vibrating and punning concrete.

5.12.1 Time Interval between Mixing and Placing

Concrete mixed in stationary mixers and transported by non-agitating equipment shall be placed within thirty minutes after it has been mixed, unless otherwise authorized. When a truck mixer or agitator is used for transporting concrete, the concrete shall be delivered to the site of the work and discharge shall be completed within 1.5 hours after introduction of the cement to the aggregates. The concrete shall be placed within 20 minutes after it has been discharged. In all cases, concrete shall be placed and compacted well within the initial setting time.

5.13 CONCRETE FINISHES

Concrete finishes shall be made in accordance with the provision of ACI 301-84 or as directed by the Engineer. Workmanship in shuttering and concreting shall be such that concrete work shall normally require retouching and the surfaces being dense, watertight and, where steel shuttering has been used, perfect and smooth. Should there be faults in these respects, the Contractor shall cut out and replace the whole of the lift-concerned or such amount as the Engineer decides, or make good if permitted by the Engineer and to his approval. Concrete which is honeycombed or otherwise shows voids shall invariably be cut out and replaced in an approved manner as directed by the Engineer.

Any making good shall be carried out immediately after striking the shuttering and shall be restricted to light rubbing down with wet carborundum or the approved correction of minor blemishes. In no circumstances shall surfaces be made good with cement or washes or rendering.

Exposed concrete surfacing not requiring shuttering and not subsequently to be given extra finishes shall be given perfectly dense smooth finish with a wooden float.

Where concrete slabs, ducts, bases or machine plinths will themselves form the finished floor surface the concrete shall be towelled immediately after the first laying process only just sufficiently to give a level surface. Thereafter, when the concrete has stiffened to a condition such that a hard compacted surface can be obtained without bringing up laitance, a final surface towelling shall be given with a steel float to produce a smooth finish.

5.14 PLACING TEMPERATURE

The temperature of concrete when it is being placed shall conform to the requirements herein specified for thin, moderate and heavy concrete sections and mass concrete. The Engineer's determination as to the type of section and applicable placing temperatures shall govern. Concrete shall be placed at temperature as follows;

Concrete for delivery to the forms at the coolest temperature which is practicable to produce under current conditions, but in no case in excess of 32 C⁰. Except as otherwise determined by the Engineer, Section to which this provision will apply, shall be considered to be sections ten feet and less in thickness when screened and/or formed on both faces, and five feet and less in thickness when one face is placed against earth, rock or previously placed concrete.

If concrete is placed when the weather is such that the temperature of the concrete would exceed the limits herein specified, as determined by the Engineer, the Contractor shall employ effective means, such as preceding of aggregates and mixing water and placing at night, as necessary, to maintain the temperature of the concrete, as it is placed, below the maximum limits specified herein.

5.15 CURING OF CONCRETE

5.15.1 General

Curing of all concrete including repair work concrete shall conform to the recommendation given in ACI 308 "Standard Practice for Curing Concrete". Unless otherwise specified or ordered by the Engineer all concrete shall be cured by water. It shall be kept wet continuously for at least fourteen (14) days after placement. It shall be covered with water saturated material like gunny bags, canvas/ clean sand, matting etc. or any other improved method duly approved by the Engineer.

Shuttering and exposed faces of concrete and mortar shall be covered by at least 3 thicknesses of approved stout hessian kept continuously cool and wet by an efficient and comprehensive system of sprinklers and diffused jets of water, with appropriate temporary drainage arrangements, for at least 14 days after placing,

As an alternative to continuous curing with water after stripping of shuttering a proprietary membrane method of curing may be used provided that it is used strictly in accordance with the manufacturer's instructions, is colored to show its presence, contains no bituminous substance, does not prejudice the appearance of permanently exposed concrete surfaces and is in all other respects to the approval of the Engineer. Wherever practicable, both faces of concrete structures shall be appropriately treated in order to prevent tensile stresses due to differential shrinkage or temperature across the section. Furthermore, the Contractor shall continue to provide facilities for covering and/or keeping wet such exposed surfaces of the Work as are in the opinion of the Engineer liable at any time to be damaged by weather.

At no time shall any further work involving concrete proceed until the Contractor has satisfied the Engineer that all such work previously carried out is being protected and cured in accordance with this clause.

5.15.2 Curing Pre-cast Concrete Members

Pre-cast concrete members shall be cured for not less than 7 days by the water method or by steam curing, at the option of the Contractor. Steam curing for pre-cast members shall conform to the following provisions:

- After placement of the concrete/ members shall be held for a minimum 4 hours pre-casting period.
- To prevent moisture loss on exposed surfaces during the pre-steaming period, members shall be covered immediately after casting or the exposed surfaces shall be kept wet by fog spray or wet blankets.
- Enclosures for steam curing shall allow free circulation of steam about the member and shall be constructed to contain the live steam with a minimum moisture loss. The use of tarpaulins or similar flexible covers will be permitted, provided they are kept in good repair and secured in such a manner to prevent the loss of steam and moisture.
- Steam at jets shall be low pressure and in a saturated condition. Steam at jets shall not impinge directly on the concrete, test-cylinders, or forms.

During application of the steam, the temperature rise within the enclosure shall not exceed 20 degrees C per hour. The curing temperature throughout the enclosure shall not exceed 65°C and shall be maintained at a constant level for a sufficient time necessary to develop the required compressive strength. Control cylinders shall be covered to prevent moisture loss and shall be placed in a location where temperature is representative of the average temperature of the enclosure.

- Temperature recording devices that will provide an accurate continuous permanent record of the curing temperature shall be provided. A minimum of one temperature recording device per 60 meters of continuous bed length will be required for checking temperature,
- Curing of pre-cast concrete will be considered completed after a termination of the steam curing cycle

5.16 PREPARATION OF EARTH SURFACES

Before concrete is placed in or against any excavation or filling, the surface of such earthwork shall have been compacted and shall be free from running and standing water, oil and other deleterious matter. Loose earth and other material shall be removed. The excavation or filling shall be damp but not wet and special precautions shall be taken to prevent groundwater from damaging green concrete or causing movement of the concrete.

Immediately after the excavation or filling has been trimmed and prepared as above, the exposed foundation shall be protected by a blinding layer or "No-fines" concrete or of cement mortar or other protection as show on the Drawings or ordered by the Engineer. Such blinding layers and coatings shall be thoroughly cleaned and moistened before further concrete work is placed thereon.

Reinforced concrete shall not be cast against an unprotected face of earth or any other material liable to become loose or to slip; the greatest possible care shall be taken to avoid falls of material on to the concrete, by leaving the timbering in place (if permitted) or by recovering the timbering in small depths and lengths at a time and by any other approved means. If any such falls occur, all soiled concrete shall be removed and replaced at Contractor's own cost.

5.17 CASTING SECTIONS AND CONSTRUCTION JOINTS

(a) General

The concrete in each integral part of a structure shall be placed continuously, and the Contractor will not be allowed to commence work on any such part unless sufficiently inspected and approved material for the concrete is at hand, and his forces and equipment are sufficient to complete the part without interruption in the placing of the concrete. Construction joints shall be made only where located on the plans or shown in the pouring schedule, unless otherwise approved.

If not detailed on the plans, or in the case of emergency, construction joints shall be placed as directed. Shear keys or inclined reinforcement shall be used where necessary to transmit shear or bond the two sections together. When shear keys or inclined reinforcement are not provided, the concrete shall be roughened as directed. Joints in the concrete due to stopping work shall be avoided as far as possible. Such joints, when necessary, shall be constructed to meet the approval of the Engineer.

When the placing of concrete is temporarily discontinued the concrete, after becoming firm enough to retain its shape, shall be cleaned of laitance and other objectionable material to a sufficient depth to expose sound concrete. Where a "feathered edge" might be produced at a construction joint, as in the sloped top surfaces of a wing wall, an inset formwork shall be used to produce an edge thickness of not less than 15 centimeters in the succeeding layer. Work shall not be discontinued with 50 centimeters of the top of any face, unless provision has been made for a coping less than 50 centimeters thick, in which case, if permitted by the Engineer, the construction joint may be made at the underside of coping.

Immediately following the discontinuance of placing concrete all accumulations of mortar splashed upon the reinforcing steel and the surfaces of forms shall be removed. Dried mortar chips and dust shall not be puddle into the unset concrete. Care shall be exercised, during the cleaning of the reinforcing steel, not to injure or break the concrete steel bond at and near the surface of the concrete.

(b) Box Culverts

Vertical construction joints shall be at right angles to the axis of the culvert.

In general, the base slab or footings of box culverts shall be placed and allowed to set before the remainder of the culvert is constructed. In this case, suitable provision shall be made for bonding the sidewalls to the culvert base, preferably by means of raised longitudinal keys so constructed as to prevent, as far as possible, the percolation of water through the construction joint.

In the construction of box culverts 1.25 meters or less in height, the sidewalls and top slab may be constructed as a monolith. When this method of construction is used, necessary construction joints shall be vertical and at right angles to the axis of the culvert.

In the construction of box culverts more than 1.25 meters in height the concrete in the walls shall be placed and allowed to set before the top slab is placed. In this case, appropriate keys shall be left in the side walls for anchoring the cover slab.

If possible, each wing-wall shall be constructed as a monolith. Construction joints, where unavoidable, shall be horizontal and so located that no joint will be visible in the exposed face of the wing wall above the ground line.

(c) Construction Joints

Construction joints shall be made only where shown on the Drawings or called for in the pouring schedule, unless otherwise approved by the Engineer. If not detailed on the Drawings, construction joints, also in case of emergency shall be placed to meet the approval of the Engineer. Shear keys or reinforcement shall be used, unless otherwise specified, to transmit shear or to bond the two sections together.

Before depositing new concrete on or against concrete which has hardened, the forms shall be retightened. The surface of the hardened concrete shall be roughened as required by the Engineer, in a manner that will not leave loose particles of aggregate or damage concrete at the surface- It shall be thoroughly cleaned of foreign matter and laitance. When directed by the Engineer the surface of the hardened concrete which will be in contact with new concrete shall be washed with water to his satisfaction, and to ensure an excess of mortar at the juncture of the hardened and the newly deposited concrete, the cleaned and watered surfaces, including vertical and inclined surface, shall first be thoroughly covered with a coating of mortar of the same proportion of sand and cement as the class of concrete used against which the new concrete shall be placed before the grout or mortar has attained its final set.

The placing of concrete shall be carried continuously from joint to joint. The face edges of all joints which are exposed to view shall be carefully finished true to line and elevation.

5.18 FORM WORK

The Contractor shall submit, for the approval of the Engineer full proposals and design calculations for all form work and proposals for the period of time to elapse before each item of the shuttering is struck. Notwithstanding the approval of the Engineer to any actual shuttering or proposals for its striking, the Contractor shall retain complete responsibility for its adequacy as to the provisions of this clause and for any consequences of the striking being premature or harmful. In general, the minimum time for the removal of form work shall be as under:

	Form Work	Normal Weather
a)	Form work of vertical surface such as walls and columns faces.	3 * days
b)	Beams and slabs	14 * days
c)	Sides of Beams Caps and other parts	5 * days
d)	Mass Concrete	3 * days

* Notional values of time span to the point of striking forms are subject to change depending on the results of concrete age versus strength tests.

Form work shall be designed with easily sealed access hatches for inspection purposes and

for removal of water and deleterious materials, and with connections to facilitate striking without damaging the concrete. Form work for soffits of slabs shall be erected with an upward camber of 6 mm for each 3 m. of span. When props are to be left in position under slabs the shuttering shall be made and removed in such a way that the props are not disturbed in any way.

A tolerance of plus or minus 3 mm inline or level will normally be permitted after erection of the shuttering which shall nevertheless be sufficiently strong, stiff and rigidly braced against loads due to the wet concrete and vibration and against constructional loads, to remain true to the line and level accepted before concreting. It shall be sufficiently watertight ensure that there shall occur no "fine" or escape of mortar at joints or of liquid from the concrete.

All exterior angles for concrete work no permanently buried in the ground shall be given 19mm x 19mm chamfers unless otherwise indicated on the Drawings.

Timber for shuttering shall be well seasoned, free from loose knots, splits, projecting nails and the like and from any adhering foreign matter.

Steel shuttering shall be used to produce a fair face concrete with only a faint but consistent pattern of plate marks on exposed concrete surfaces. The shuttering shall be assembled from wrought tongued and grooved boarding, true and tightly fitted with joints as necessary, the whole surface and all edges being rendered smooth before and after oiling. Bearing in mind the quality of the finish required, wrought, plain-edged and butt-joint boarding may replace the tongued and grooved boarding or purpose-made steel - faced shutters of first-class quality solely at the discretion of the Engineer.

Rough shuttering shall be used for surfaces to be buried in the ground and shall be assembled from sawn boards with smooth and true edges or from approved steel shutters. In either case all joints shall be suitably filled.

The inside faces of all shuttering shall be treated with an approved material to prevent adhesion of the concrete, all such materials being kept clear of the reinforcement and other items to be embedded.

Shuttering shall be struck by static force alone without shock, vibration or damage to the concrete. Shuttering being reused shall be thoroughly repaired and cleaned before re-assembly.

5.19 TOLERANCES

The Contractor is to complete all works including formwork, placement, curing, etc, so as to ensure the concrete surfaces will conform to the specified tolerance limits given in ACI 316 and 347. Where tolerances are not stated in the specifications or the drawings, maximum permissible deviations from established lines, grades and dimensions shall conform to the tolerances given hereinafter:

These tolerances are not cumulative.

Concrete work not meeting the tolerance requirements will be rejected unless an acceptable repair work is allowed by the Engineer.

5.19.1 Cast in Place Concrete

- (a) Variation from plumb (or the specified better for inclined walls).
- i) In the lines and surfaces of piers, walls and in arises.
- | | | |
|---|---|-------|
| - | In any 3m length or height | 6 mm |
| - | In any 6m height | 10 mm |
| - | Maximum for the entire length or height | 25 mm |
- ii) For exposed corner piers, control - joint grooves and other conspicuous lines
- | | | |
|---|---|-------|
| - | In any bay or 6 m length or height | 6 mm |
| - | Maximum for the entire length or height | 12 mm |
- (b) Variation from the level or from the grades specified on the drawings.
- i) In slab soffits, beam soffits and in arises measured before removal of supporting shores.
- | | | |
|---|-------------------------------|-------|
| - | In any 3m height | 6 mm |
| - | In any bay or 6 m length | 10 mm |
| - | Maximum for the entire length | 19 mm |
- ii) In exposed lintels, sills, parapets, horizontals grooves and other conspicuous lines.
- | | | |
|---|-------------------------------|-------|
| - | In any bay or 7 m length | 6 mm |
| - | Maximum for the entire length | 12 mm |
- (c) Variation of the linear structure lines from established position in plan and related position of piers and walls.
- | | | |
|---|-------------------------------|-------|
| - | In any bay or 6 m length | 12 mm |
| - | Maximum for the entire length | 25 mm |
- (d) Variation in the sizes and locations of sleeves, floor openings, and wall openings
- | | | |
|--|--|------|
| | | 6 mm |
|--|--|------|
- (e) Variation in cross-sectional dimensions of columns and beams and in the thickness of slabs and walls.
- | | | |
|---|-------|-------|
| - | Minus | 6 mm |
| - | Plus | 12 mm |
- (f) Footings
- (Tolerances apply to concrete dimensions only, not to positioning of vertical reinforcing steel, dowels, or embedded items).

(i)	Variation in dimension in plan	
	- Minus	12 mm
	- Plus	50 mm
(ii)	Misplacement or eccentricity 2% of the footing width in the direction of misplacement but no more than 50 mm	
(iii)	Thickness	
	- Decrease in specified thickness	5%
	- Increase in specified thickness	No limit

5.20 CONCRETE FOR SECOND STAGE AND BLOCKOUTS

Blockouts for equipment and fittings and for such other works as indicated or directed shall be provided as indicated on the Drawings. After the said equipment and fittings have been installed and adjusted in their final location, the block out recesses shall be filled with concrete. Before installing the components to be embedded in block out concrete, and before depositing any block out concrete, the concrete surfaces of the block out shall be cleaned in the manner specified for cleaning construction joints.

Second stage concrete for filling the openings left for the installation of equipment and fittings shall be anchored to the first stage concrete. The size and spacing of the concrete fixing sockets, if any, to be embedded in the first stage concrete shall be subject to the approval of the Engineer. Different components of structures to be built from second stage concrete indicated on Drawing as second stage shall be connected to the first-stage through dowels. Dowels not shown in first stage concrete Drawings shall be placed and fixed in position by drilling hole in concrete as approved by the Engineer.

5.21 REPAIR OF CONCRETE GENERAL

5.21.1 General

Concrete that is damaged from any cause; concrete that is honeycombed/ fractured, or otherwise defective; because of excessive surface depressions, must be excavated and built up to bring the surface to the prescribed lines; shall be removed and replaced with dry pack mortar, or concrete, as hereinafter specified. Repair of concrete shall be performed only by skilled workmen and within 24 hours of removal of forms. The Contractor shall keep the Engineer advised as to when repair of concrete will be performed. Unless an inspection is waived in each specific case, repair of concrete shall be performed only in the presence of the Engineer. Repairs shall be made in accordance with the procedures approved by the Engineer.

5.21.2 Materials

All materials used in the repair of concrete shall conform to the applicable requirements of the Specifications.

5.21.3 Protrusions

Where bulges and abrupt irregularities protrude outside the specified limits on formed surfaces not to be concealed permanently, the protrusions shall be reduced by bush-hammering and grinding so that the surfaces are within the specified limits.

5.21.4 Depressions

a) General

All fillings for depressions shall be bonded tightly to the surfaces of holes and shall be sound and free from shrinkage cracks and drummy areas after the fillings have been cured and have dried. All fillings in surfaces of structures prominently exposed to public view shall contain sufficient white Portland cement to produce the same colour as that of the adjoining concrete. Repairs shall be made with concrete filling, mortar filling or dry-pack filling except where repairs with epoxy concrete and/or epoxy mortar are directed to be made by the Engineer. Concrete, mortar or dry pack filling shall each be mixed in proportions approved by the Engineer to produce a repair at least equivalent in strength, density and durability to the concrete in which the repair is required.

b) Concrete Filling

Concrete filling shall be used for holes extending entirely through concrete sections; for holes in which no reinforcement is encountered and which are greater in area than 0.1 square meter and deeper than 10 cm; and for holes in reinforced concrete which are greater in areas than 0.05 square meter in area and which extend beyond the reinforcement.

c) Mortar Filling

Mortar filling, placed under impact by use of a mortar gun, may be used for repairing defects on surfaces, not exposed to public view where the defects are too wide for dry-pack filling and too shallow for concrete filling and no deeper than the far side of the reinforcement that is nearest to the surface.

d) Dry pack Mortar Filling

Dry pack mortar fillings shall be used for filling holes having a depth nearly equal to, or greater than, the least surface dimension; for narrow slots cut for repair of cracks; for grout pipe recesses; and for tie rod fastener recesses as specified. Dry pack mortar shall not be used for filling behind reinforcement or for filling holes that extend completely through a concrete section. If removal of the ends of form ties results in recesses, the recesses shall be filled with dry pack mortar provided that filling of recesses in surfaces upon or against which fill material or concrete is to be placed will

be required only where the recesses are deeper than 25 mm in walls less than 305 mm thick.

e) Surface Finishes of Repaired Areas

The Contractor shall correct all imperfections on the concrete surfaces as necessary to produce surfaces that conform to the requirements specified for the adjacent area Sub-section "Finishes and Finishing". Fins and encrustations shall be neatly removed from the surfaces.

5.22 EPOXY CONCRETE AND MORTAR

5.22.1 Mixing and Batching

a) Epoxy Binder

Prior to mixing, the two components of the epoxy resin binder shall be conditioned to 15°C to 21°C. The two components shall be combined with constant stirring, and the stirring shall be continued until a uniform mixture is obtained. The rate of mixing should be such that entrained air is held to a minimum. A power-driven (air or spark proof) mixer with propeller-type blade operating at a maximum of 500 rpm shall be used for mixing the two components of the epoxy resin binder and a hemispherical bottomed polyethylene or metal container shall be used for the mixing.

b) Epoxy Concrete

Epoxy binder shall be prepared as specified above, and after the two components have been thoroughly mixed, shall be transferred to large metal pans and the aggregates added in recommended and approved proportion as directed by the Engineer.

General: The fine aggregate shall be added to the epoxy resin binder and the material shall be mixed until a rich mortar consistency is attained. The coarse aggregate shall then be added and the epoxy concrete thoroughly mixed.

c) Epoxy Mortar

Epoxy binder shall be prepared as specified above in para (a) above Epoxy binder, and after the two components have been thoroughly mixed, shall be transferred to large metal pans and the fine aggregate added in recommended and approved proportions as directed by the Engineer. The fine aggregate shall be added to the binder gradually and mixing continued until all particles are coated.

5.22.2 Temperature, Moisture Protection for Epoxy Mortars and Concrete

Epoxy concrete and mortar shall be placed and repairs shall be made when the atmospheric and concrete temperature are above 5°C and less than 35°C and remain in this range for a period of at least 24 hours. If the work is required to be

done at temperatures lower or higher than those specified; approved means as recommended by the manufacturer of the epoxy binder and approved by Engineer shall be provided to raise or lower the ambient and concrete temperatures as required for satisfactory work. Such means will include heating or cooling equipment and necessary shelters. If temperatures below 5°C are anticipated during the cure-out or hardening period of the epoxy-concrete or mortar, heated enclosures shall be maintained over the repair area with care taken to avoid localized heating or hot-spots. Circulating air shall be used to ensure the surface temperatures do not exceed 35°C, during curing. Epoxy resin concrete and mortar shall be placed only on sound, clean dry surfaces. Suitable methods shall be used to dry and to maintain dry the contact surfaces of the concrete to which the epoxy concrete or mortar is to be applied. All repairs shall be protected from rain or seepage water for at least 24 hours and from all types of traffic for a period of 72 hours.

5.22.3 Preparation and Placing

a) Epoxy Concrete

All fines, dust, and other loose material on the contact surface shall be removed by scrubbing with a stiff bristle brush followed by washing. The dry, cleaned surfaces shall receive a prime coat of epoxy resin. The prime coat shall be applied in a thin coat and briskly scrubbed into the dry concrete surface with a stiff bristle brush. Placement of the epoxy resin concrete shall be delayed until the prime coat becomes tacky. The epoxy resin concrete shall be placed in layers not over 100 mm in thickness. The thickness of courses and time interval between courses, shall be such that the temperature of the epoxy concrete does not exceed at any time during hardening. Mechanical plate, screed, or float vibrators or hand tampers shall be used to consolidate the epoxy concrete. Excess epoxy concrete which becomes spread on the adjacent surfaces of hardened concrete shall be removed before it hardens.

b) Epoxy Mortar

Defective concrete in areas as determined by the Engineer shall be repaired with the aid of a saw cut at least 25 mm outside the faulty area. The concrete between the saw cut and the edge of the faulty area and the concrete throughout the area shall be chipped out to solid concrete. The cavity thus formed shall be thoroughly cleaned with compressed air, sand blasting or other method to remove all loose material. The dry, cleaned surfaces of the cavity shall receive a prime coat of epoxy resin binder of composition as recommended by the manufacturer of the epoxy. The prime coat shall be applied in a thin coating and scrubbed into the surface with a stiff bristle brush. Placement of epoxy resin mortar shall be delayed until the prime coat becomes tacky. The epoxy mortar shall then be placed in the cavity in layers not exceeding 25 mm in thickness. The time interval

between placements of additional layers shall be such that the temperature of the epoxy resin mortar does not exceed 60°C at any time during hardening. Mechanical plate, screed or float vibrators or hand tampers shall be used to consolidate the epoxy resin mortar. Excess epoxy resin mortar, which becomes spread on the adjacent surfaces of the hardened concrete, shall be removed before it hardens.

5.22.4 Health and Safety Precautions

- Full face shields shall be used during all mixing and blending operations and for placing operations as required.
- Protective skin creams of a suitable nature for the operations shall be used.
- Portable eye washing facilities shall be maintained at mixing, batching and placing operations.
- Adequate fire protection shall be maintained at all mixing and placing operations.
- Smoking or the use of spark or flame producing devices is prohibited within 15 meters of mixing and placing operations.
- The mixing, placing, or storage of solvent is prohibited within 15 meters of any vehicle, equipment, or machinery which could be damaged from fire or could ignite vapors from the material.
- Contaminated clothing which cannot be decontaminated shall be burned at an approved burning area at the end of each working day.
- Facilities shall be provided for decontamination of clothing and equipment at the job site.
- Care should be taken in handling solvent for cleaning equipment to avoid problems of toxicity, fires, and possible explosions.
- Adequate ventilation shall be provided.

5.23 FINISHES AND FINISHING

5.23.1 General

Allowable deviations from plumb or level and from the alignment, profile grades, and dimensions shown on the Drawings or specified by the Engineer. Tolerances are defined as tolerances and are to be distinguished from irregularities in finish as described herein. The classes of finish and the requirements for finishing of concrete surfaces shall be generally specified in this sub-sections and as indicated on the Drawings. Finishing of concrete surfaces shall be performed only by workmen who are skilled concrete finishers.

The Contractor shall keep the Engineer informed as to when finishing of concrete will be performed. Unless inspection is waived in each specific case, finishing of

concrete shall be performed only in the presence of the Engineer. Concrete surfaces will be tested by the Engineer where necessary to determine whether surface irregularities are within the limits hereinafter specified. Surface irregularities are classified as abrupt or gradual. Off-sets caused by displaced or misplaced form sheathing or lining or form sections, or otherwise defective form lumber will be considered as abrupt irregularities, and will be tested by direct measurements. All other irregularities will be considered as gradual irregularities/ and will be tested by the use of a template, consisting of a straight edge or the equivalent thereof for curved surfaces. The length of the template will be 1.5 meters.

The classes of finish for concrete surfaces shall be as shown on the Drawings or as directed by the Engineer. Interior surfaces shall be sloped for drainage where shown on the Drawings or directed. Surfaces which will be exposed to the weather shall be sloped for drainage. Unless the use of other slopes or level surfaces is indicated on the Drawings or directed. Surfaces which will be exposed to the weather shall be sloped for drainage. Unless the use of other slopes or level surfaces is indicated on the Drawings or directed, narrow surfaces, such as tops of walls shall be sloped approximately 10 mm per 30 cm. No grinding will be required on such formed surfaces other than that necessary for repair of surface imperfections as specified herein.

5.24 POLYVINYL CHLORIDE WATER STOP

5.24.1 Scope

The work to be done under this item consists of providing and installing PVC water stops as shown on the Drawings or as directed by the Engineer.

5.24.2 General

Polyvinylchloride waterstops shall be extruded from an elastomeric plastic compound, the basic resin of which shall be polyvinyl chloride (PVC). The compound shall contain such additional resins, plasticizers, stabilizers or other materials needed to ensure that when the material is compounded and extruded to the shapes and dimensions shown, it will have physical characteristics when tested by the U.S. Corps of Engineers Test Method specified below:

Physical Characteristics	No. of Specimens Tested	Requirement	USACE Test Method
Tensile strength using die III, not less than	5	12 N/Sq.mm (1750 psi)	568
Ultimate elongation using die III, not less than	5	350%	573

Low temperature brittleness, no sign of failure such as	5	-37°C	570
Stiffness in flexure, 13 mm span, not less than	3	2.75 N/sq.mm (400 psi)	571

5.24.3 Installation

Installation of waterstops shall be in accordance with the provision of AC1 504 R. The PVC Water stops shall be laid in continuous lengths. Splices in the continuity or at the intersections of runs of PVC water stops shall be performed by heat sealing the adjacent surfaces in accordance with the manufacturer's recommendations or as directed by the Engineer. A thermostatically controlled electric source of heat shall be used to make all splices. The correct temperature at which splices should be made will differ with the material used but should be sufficient to melt but not char the plastic. After splicing, a remoulding iron with ribs and corrugations to match the pattern of the water stop shall be used to reform the ribs at the splice. The continuity of the characteristics components of the cross-section of the water stop design (ribs, tubular center axis, protrusions, and the like) shall be maintained across the splice.

5.25 ADMIXTURES

5.25.1 General

Admixtures, including air-entraining admixtures, foaming chemicals and water-reducing admixtures, shall not be used except with the prior approval of the Engineer. All tests for the evaluation and approval of an admixture shall be made by the Contractor at his cost.

5.25.2 Air-Entraining Admixtures

The source and brand of air-entraining admixture, required shall be proposed by the Contractor and approved by the Engineer. The air entraining admixture will be an approved substance or compound conforming to the requirements of ASTM C260-77, "Standard Specifications for Air-Entraining Admixtures for Concrete," which will produce entrained air in the concrete as hereinafter specified. The air-entraining admixture shall be added to the batch in solution in a portion of the mixing water. This solution shall be batched by means or a mechanical batcher capable of accurate measurement and in such a manner as to ensure uniform distribution of the admixture throughout the batch during the specified mixing period.

5.25.3 Water-Reducing Admixtures

The source, brand, types of suitable water reducing cement dispersing admixtures,

if required, shall be proposed by the Contractor and approved by the Engineer. The water entraining admixture will be compatible with the air entraining admixture specified above and shall be batched and added to the concrete in the manner specified for the adding of air-entraining admixture but separate from the portion of the mixing water containing the air-entraining admixture. The quantities of water-reducing, cement dispersing admixture to be used shall be in accordance with the instructions of the Manufacturers as approved by the Engineer. Water reducing admixture shall conform to the requirements of ASTM C494-81 "Standard Specification for Chemical Admixtures for Concrete".

5.25.4 Foaming Chemicals

The source, brand and types of suitable foaming chemicals, if required, shall be as approved by the Engineer. The foaming agent shall conform to ASTM C869 "Standard Specifications for Foaming Agents used in Making Preformed Foam for Cellular Concrete."

5.26 EXPANSION JOINTS

5.26.1 Material

Expansion joint material shall be pre-moulded asphalt impregnated fiber board, to be applied over the full joint width, except otherwise indicated on the drawings and shall conform to ASTM D1751-83.

5.26.2 Filler

Expansion joint filler shall consist of sponge rubber, self expanding cork or any other material and type as designated by ASTM D1752-84.

5.27 STEEL REINFORCEMENT

5.27.1 Scope

The work to be done under these items shall include furnishing, cutting, bending, and placing all steel reinforcement as indicated on the Drawings or otherwise required. All reinforcement when surrounding concrete is placed, shall be free from loose, flaky rust, and scale, and free from oil, grease or other coating which might destroy or reduce its bond with the concrete. All placing shall be in accordance with Drawings furnished or approved. The use of reinforcement for the transmission of current for welding will not be permitted. All reinforcement, including dowels, remaining exposed in the work shall be suitably protected until embedded in concrete.

5.27.2 Cutting and Bending

Steel reinforcement may be mill or field cut and bent. All bending shall be in accordance with standard approved practice and by approved machine methods.

When bending is required, it shall be performed prior embedding the bars in the concrete. In all such cases, the bars shall be cold bent. Bending or straightening of bars partially embedded in set concrete shall not be permitted except in isolated cases where corrective action or a field change is required and is specifically approved by the Engineer.

5.27.3 Quality

Concrete reinforcement bars shall be of following quality:

Intermediate grade Steel:

It shall be deformed bar conforming to ASTM 615-86 grade 40 and 60 or equivalent having minimum yield strengths of 40 ksi and 60 ksi respectively. The Contractor shall provide labour, materials, arrange measuring and testing facilities to ascertain quality, weight or quantity of steel at his own expense. No steel shall be incorporated in the Works without prior approval of the Engineer.

5.27.4 Spacing of Bars

The spacing of bars shall be as shown on the Drawings or as directed by the Engineer. The variation from indicated spacing, provided that the total area of reinforcement is in accordance with the Drawings, shall not be more than 25 mm (1 inch).

5.27.5 Relation of Bars to Concrete Surface

The cover of all main reinforcement shall conform to the dimensions shown on the Drawings. The protective covering shall not be less than, and shall not exceed more than 6 mm from the values specified on the Drawings to indicate the clear distance from the edge of the main reinforcement to the concrete surface. The concrete covering of stirrups spacer bars and similar secondary reinforcement may be reduced by the diameter of such bars.

5.27.6 Splicing

Except as otherwise shown on the Drawings or specified herein, all splices, lengths of laps, splice locations, placement and embedment of latest reinforcement shall conform to the applicable requirements of American Concrete Institute 318-83, Building Code Requirements for Reinforcement Concrete. All splices and locations of laps in reinforcement shall be as shown on the Drawings or as directed by the Engineer. Additional bar splices shall be provided as required, subject to approval of the Engineer. Lapped ends of bars may be placed in contact and securely wired or may be separated sufficiently to permit the embedment of the entire surface of each bars by butt-welding or by approved mechanical methods such as the Cadweld splice or other type splice using positive connectors where indicated or directed by the Engineer. Butt welding of reinforcing bars, where indicated or directed shall conform to the requirements of American Welding Society's Recommended Practice

for Welding Reinforcing Steel Metal Inserts and Connections. Concrete shall be protected from heat during welding operations.

5.27.7 Supports

All reinforcement shall be secured in place by use of metal or concrete supports, spacers, or ties, as approved by the Engineer. Such supports shall be of sufficient strength as to maintain the reinforcement in place throughout the concreting operation. The supports shall be used in such a manner that they will prevent discoloration or deterioration of the concrete. Concrete supports shall be manufactured of the same concrete mix as used in the structure to be concreted.

5.28 ANCHORS IN SPILLWAY FLOOR SLABS

The Spillway floor slabs shall be anchored into underlying bedrock in the areas shown on the Drawings. Holes drilled for anchor bars shall be kept plugged until just prior to commencement of grouting operation. Immediately before setting the anchor bars, each hole shall be thoroughly flushed with water and cleaned with compressed air to remove all water. Grouting of anchor bars shall be completed not less than six days in advance of related concreting operations.

The anchors shall consist of reinforcing steel as shown on the Drawings. The grout shall be a cement grout designed to provide the greatest possible bond with the bedrock and the reinforcing steel.

The bars after, installation, shall be protected in such a manner as to prevent any movement until the grout is hardened.

5.29 MEASUREMENT AND PAYMENT

Measurement and payment for concrete, reinforcement steel and precast concrete will be made in accordance with the provisions of this clause specified hereinafter.

5.29.1 Method of Measurement

Concrete will be measured for the number of unit cubic meter of different grades acceptably placed complete in all respects as per Drawings and in strict accordance with this section of Specification.

Pre-cast members will be measured for the number of unit cubic meter acceptably cast, placed complete in all respects as per Drawings and as directed by the Engineer.

Measurement will be made for the tons (2240 lbs) of reinforcing steel acceptably placed on the basis of the lengths of bars installed in accordance with the approved Drawings or bar schedules or as directed, converted to weight for the "size of bars listed by the use of unit weights per linear meter as follows:

Bar Size	Unit Weight Kg/m	Unit Weight lbs/ft
6 mm	0.249	0.167

Bar Size	Unit Weight Kg/m	Unit Weight lbs/ft
9 mm	0.560	0.376
13 mm	0.994	0.668
15 mm	1.552	1.043
18 mm	2.235	1.502
21 mm	3.042	2.044
25 mm	3.973	2.670
28 mm	5.059	3.775
31 mm	6.403	4.172
34 mm	7.906	5.049

Steel in laps and embedment indicated on the Drawings or as required by the Engineer will be paid for at the steel unit price. No measurement for payment will be made for the steel consumed in providing supports and for the additional steel in laps which are authorized for the convenience of the Contractor.

Measurement for holes and grout for dowel - anchors will be based on the number of linear meter of hole drilled to the lengths shown on the drawings or as approved or directed by the Engineer. No measurement will be made for dowel or anchor holes drilled solely to accommodate the Contractor's construction procedure. The dowels will be measured as reinforcing steel.

Measurement will be made of the number of unit square meter of trash rack and weir blades of 12 gauge steel plate provided and acceptably fixed at the specified locations as shown on the drawings.

Measurement will be made of the number of mild steel plates with standard markings, steel flumes and M.S. shutter plates provided and acceptably fixed as specified on the Drawings and as directed by the Engineer.

Measurement will be made on lump sum basis for providing and installing vertical slide gates of sizes specified in the Bill of Quantities and details shown on the Drawings, and as directed by the Engineer.

5.29.2 Basis of Payment

Payment will be made in accordance with the unit prices in the Bill of Quantities for the various items in accordance with the Specifications and shall constitute full compensation for furnishing all materials, casting, fixing, installing, splicing, shuttering, drilling, grouting, equipment and labour and for performing all operations necessary to complete the work.

5.30 CODES AND STANDARDS

The work shall conform to the requirements of the following codes and Standards, unless otherwise specified.

*PS	419	Properties and Specifications of Blocks
ASTM	C31-87	Practices for Making and Curing Concrete Test Specimens in the Field.
ASTM	C33-86	Standard Specification for Concrete Aggregates.
ASTM	C39-86	Standard Test Methods for Compressive Strength of Cylindrical Concrete Specimens.
ASTM	C42-84a	Standard Methods of Obtaining and Testing Drilling Cores and Sawed Beams of Concrete.
ASTM	C78-84	Standard Test Methods of Test for Flexural strength of Concrete (using Simple Beam with Third Point Loading)
ASTM	C136-84a	Standard Method of Test for Sieve or Screen Analysis of Fine and Coarse Aggregates.
ASTM	C143-78	Standard Method of Test for Slump of Portland cement Concrete.
ASTM	C150-86	Standard specifications for Portland Cement.
ASTM	C404-85	Standard Specifications for Aggregate for Masonry Grout.
ASTM	C566-84	Standard Test Method for Total Moisture Content of Aggregate by Drying.
ASTM	D596-83	Methods of Reporting Results of Water Analysis
ASTM	A615-86	Standard Specifications for Deformed and Plain Billet – Steel Bars for Concrete Reinforcement.
ASTM	D1190-80	Standard Specifications for Concrete Joint Sealer, Hot Poured Elastic Types.
ASTM	D1751-83	Standard Specifications for Preformed Joint Fillers for concrete paving and Structural Construction (Non-extruding and Resilient Bituminous types)
ASTM	D1752-84	Standard Specifications for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
ASTM	D185-79	Standard Specifications for Concrete Joint sealer, Cold – Application Type.
BS	12-78	Specifications for ordinary and Rapid hardening Portland Cement.

BS	146-58	Specifications for Portland-blast furnace cement.
BS	3148-80	Methods of Tests for water for Making Concrete.
BS	4027-80	Specifications for sulphate Resisting Cement.
ACI	301-84 (Revised 1985)	Specifications for structural concrete for buildings.
ACI	304R-85	Guide for Measuring, mixing, transporting and placing concrete.
ACI	308-81 (Revised 1986)	Standard Practice for curing of concrete.
ACI	309-72 (Revised 1982)	Standard practice for Consolidation of Concrete.
ACI	316R-82	Recommendation for construction of concrete pavements and concrete bases.
ACI	318-89 & 318R-89	Building Code Requirements for Reinforced concrete and Commentary by ACI
ACI	318.1-89	Building Code Requirements for structural Plain Concrete.
ACI	318.1R-89	Commentary by ACI
ACI	347-78 (Re-approved 1984)	Recommended Practice for Concrete Formwork.

*PS -PAKISTAN STANDARDS

*BS -BRITISH STANDARDS

SECTION – 6

BRICK WORK

6.1 SCOPE

This section consists of construction of brick-walls of any thickness with first class hand-mould and/or machine pressed bricks with the specified ratio of cement mortar in foundation, plinth, super structure or for any other structure as directed by the Engineer, or shown in the Bid Schedule. The Contractor shall furnish all materials and all other requirements to produce finished brick work. Brick work and materials for brick work shall be in strict accordance with this section of the specifications and applicable drawings and subject to the terms and conditions of the Contract.

6.2 MATERIALS

6.2.1 Bricks

The bricks used shall be of standard size (9"x4.5"x3") first class well burnt, uniform in shape, size, texture, colour and should produce a ringing sound when struck. The bricks shall be free from flaws, cracks, chips, stone nodules of lime or kankar or any other blemishes. The brick shall not absorb more than one sixth of its weight when soaked in water for one hour. Compressive strength shall not be less than 2000 lbs per square inch, Bricks over burnt, under burnt vitrified and irregular shall not be used. Bricks of uniform size shall be used throughout the work and source shall not be diversified.

6.2.2 Portland Cement

Portland cement shall conform to the stipulations and requirements set forth in Section for "Plan and Reinforced Concrete".

6.2.3 Mortar Sand

Sand for mortar used in construction of brickwork required under these Specifications shall be furnished by the Contractor in accordance with the provisions and in conformity with the stipulations and requirements of ASTM Designation C144-70 or latest revision and shall have a fineness modulus between 1.6 and 2.5.

6.2.4 Water

The water used in the preparation of mortar shall be free from objectionable quantities of silt, organic matter, alkali salts and other impurities and it will be tested and approved by the Engineer at the Contractor's cost.

6.3 MORTAR COMPOSITION

Mortar for all brickwork requiring mortar shall, except when otherwise specified by these Specifications or as directed by the Engineer, consist of one part of Portland cement to 3 parts of damp loose mortar sand by volume and sufficient water to produce the proper consistence for the intended use. Mortar shall not be retained for more than 30 minutes and shall be constantly worked over with hoc or shovel until used.

6.4 MORTAR BATCHING

Methods or equipment used for mixing mortar shall be such as will accurately determine and control the amount of each separate ingredient entering into the mortar and shall be subject to the approval of the Engineer. If a mixer is used it shall be of approved design and the mixing time after the ingredients are in the mixer, except for the full amount of water, shall not be less than two minutes.

Mortar shall be mixed only in sufficient quantities for immediate use and all mortar not used within 30 minutes after addition of water to the mix shall be wasted. Retempering of mortar shall not be allowed. Mixing pans and troughs shall be thoroughly cleaned and washed at the end of each day's work.

6.5 SOAKING

Before use all bricks shall be soaked in clean water in tanks or pits for at least two hours.

6.6 LAYING OF BRICKS

All brickwork shall be skillfully laid with level courses, uniform joints, square corners, plumb verticals and true surfaces except when otherwise shown on the Drawings or directed by the Engineer. Brickwork will be of best standard of workmanship obtainable and objectionable offsets in the brickwork shall be avoided. Smoothest practicable finished surface of the brickwork shall be ensured. Unless otherwise specified, bricks shall be laid in English Bond with frogs (Manufacturer's marks) upward.

All horizontal joints shall be parallel and truly level. Vertical joints in alternate courses shall come directly over one another. Thickness of joints unless otherwise specified shall not be less than $\frac{1}{4}$ of an inch and not more than $\frac{3}{8}$ of an inch. The height of 4 courses and 3 joints as laid shall not exceed by *more* than 1 inch the height of 4 bricks as piled one upon the other.

6.7 CURING

All brickwork involving use of cement shall be cured by water curing or other acceptable methods. The Engineer shall approve all methods and operations of the Contractor in curing different portions of work.

When curing by water, brickwork shall be kept wet for at least ten days by covering with water saturated materials or by a system of perforated pipes, mechanical sprinklers, porous hose, ponding or by any other approved method which will keep all surfaces to be cured continuously wet. Water used for curing shall meet the requirements Clause 7.2.4 of these specifications.

6.8 MEASUREMENT AND PAYMENT**6.8.1 Method of Measurement**

Measurement for brickwork shall be in unit cubic meter of brick work provided within the limits as shown on the Drawings or as directed by the Engineer.

6.8.2 Basis of Payment

Payment for brickwork shall be made at the contract unit price for unit cubic meter. Payment shall constitute full compensation for furnishing all materials, equipment and labor including all incidentals necessary to complete the work.

SECTION – 7

REINFORCED CEMENT CONCRETE PIPE

7.1 SCOPE OF WORK

The work to be done under this section consists of furnishing, laying, jointing and testing pre-cast RCC Pipe Line in the excavated trenches on the bedding material for conveyance of water complete in all respects as shown on the Drawings and elsewhere and as directed by the Engineer.

7.2 GENERAL

- 1) All RCC Pipe shall be furnished and installed in complete conformity with the stipulations and requirements specified herein and elsewhere in these specifications and on the Drawings.
- 2) All excavation required in placing RCC Pipe under these specifications shall be performed by the Contractor in accordance with the provisions of, and in complete conformity with the stipulations and requirements specified in Section-2, "Excavation".

7.3 CLASSIFICATIONS

- 1) The RCC Pipe shall be manufactured in accordance with the Specifications of ASTM C-361 or as specified on the drawing of internal dia.

7.4 MATERIALS

- 1) All materials, methods of manufacture and strength requirements for the RCC Pipe shall conform to the requirements of ASTM Designation C-361 and shall be subject to inspection and approval of the Engineer.
- 2) Cement - Portland cement shall conform to the requirements of specifications set forth in Section for "Plain and Reinforced Concrete".
- 3) Sand - All sand shall conform to the Specifications for sand set forth in Section for "Plain and Reinforced Concrete".
- 4) Aggregates - Aggregates shall conform to ASTM Specification C-33 except that the requirements for gradation shall not apply.
- 5) Steel reinforcement - Reinforcement shall consist of wire conforming to ASTM Specification A-82 or A-496 or wire fabric conforming to Specifications A-185 or Specifications A-497 or bars of Grade 40 steel conforming to Specifications A-615 or bars of Grade 80 steel conforming to Specification A-306.

7.5 MIXTURE

The aggregate shall be so sized, graded, proportioned and thoroughly mixed in a batch mixer with such proportions of cement and water as will produce a homogeneous concrete mixture of such quality that pipe will conform to the classification specified above. In no case shall the proportion of Portland Cement in the mixture be less than six U.S. Standard bags (94 lbs) per cubic yard (56 kg/cu.m) of the concrete.

7.6 JOINTS

- 1) The ends of reinforced concrete pipe sections shall be so formed that when the pipes are laid together they will make a continuous and uniform line of pipe. The joints shall be such as will permit effective jointing and to permit placement without irregularities in the flow line. The joint shall be bell and spigot joint with rubber gasket of ½ inch thickness of inside diameter equal to the inside diameter of the concrete pipe and approved by the Engineer.

7.7 MANUFACTURE

- 1) Placement of Concrete - The transporting and placement of concrete shall be by methods that will prevent the segregation of the concrete materials and the displacement of the reinforcement steel from its proper position in the form.
- 2) Curing - Pipes shall be cured by any one of the following methods.
 - i) Steam Curing
 - ii) Water Curing

The pipe shall be cured for a sufficient length of time so that the concrete will develop the specified strength at 28 days or less.

- 3) Pipes shall be substantially free of fractures, large or deep cracks, and surface roughness. The ends of the pipe shall be normal to the walls and centre of the pipe.

7.8 TESTING AND INSPECTION

- 1) Pipe shall be tested by the method covered in the standard specifications ASTM Designations: C-76 and each manufacturer furnishing pipe under these specifications shall be fully equipped to carry out the test herein designated. Upon the demand of the Engineer and under his supervision, the manufacturer shall perform such number of tests as the Engineer may deem necessary to establish the quality of the pipe manufactured. Failure of any pipe to meet the test requirements shall be sufficient cause for rejection of all pipes which the test specimen represents. All pipes shall be subjected to inspection by the Engineer at the factory and point of delivery. The purpose of the inspection shall be to cull and reject pipes which independent of the physical tests herein specified, fail to meet the requirements of these specifications.

7.9 REJECTION

- (1) Rejection may be made on account of any of the following:
 - a) Fracture or cracks passing through the shell, except for a single end crack that does not exceed the depth of the joint.
 - b) Defects that indicate imperfect proportioning, mixing and molding.
 - c) Surface defects indicating honeycombed or open texture.
 - d) Damaged ends, where such damage would prevent the making of a satisfactory joint.

- e) Failure to give a clear ringing sound when tapped with a light hammer.
- f) Exposure of the reinforcement where such exposure indicates that the reinforcement was misplaced.
- g) Pipe damaged during shipment or handling may be rejected even if previously approved.

7.10 REPAIR

Pipe may be repaired if necessary because of occasional imperfections in manufacture or accidental injury during handling and will be acceptable if in the opinion of the Engineer, the repairs are sound, properly finished, cured and the repaired pipe conforms to the requirements of these specifications.

7.11 INSTALLATION

- 1) All concrete pipes shall be set to the alignment and grades shown on the Drawings or established by the Engineer. Concrete pipe installed in the ground shall be laid on a compact and properly shaped bedding material of natural gravel or crushed rock as per specifications in Section for "Construction of Earthfill" and approved by the Engineer, and compacted in such a manner as will not disturb the alignment or grade of the pipe. Payment for natural gravel or crushed rock shall be made under "Bedding Material". Concrete pipe installed in concrete or masonry structures shall be secured, in a manner satisfactory to the Engineer, against any misalignment during concrete or masonry placement.
- 2) The Contractor shall furnish all materials required and shall construct water-tight joints between concrete pipe sections. Ends of pipe sections shall be thoroughly cleaned and the section being placed drawn up tightly to correct line and grade. Mortar for finishing joints in concrete pipe shall consist of one part Portland cement to three parts sand by volume with sufficient water to obtain a suitable consistency. All operations of the Contractor in jointing the pipe sections shall be approved by the Engineer.

7.12 MEASUREMENT AND PAYMENT

7.12.1 Reinforced Cement Concrete Pipe

Measurement for payment for reinforced cement concrete pipe will be made of the number of linear meters of pre-cast concrete pipe of each size actually furnished and installed as shown on the Drawings or directed by the Engineer, measured along the centre line of the pipe from end to end of the pipe in place without allowance for laps at joints or for excess material which may be trimmed off to fit the required installation.

No direct payment will be made for cement and reinforcement used in manufacturing of RCC Pipe and the cost of furnishing all materials required for manufacturing RCC Pipe shall be included in the unit rate tendered in the Bill of Quantities for the item of reinforced cement concrete pipe in which the materials are used.

Payment for furnishing and installing reinforced cement concrete pipe will be made for the number of linear meter of pipe acceptably installed at the contract unit price in the Bill of Quantities. The amount of bid for the item shall be full payment for the work specified herein and on the Drawings for Reinforced Cement Concrete Pipe, including spigots, socket ends, rubber ring and cement mortar for jointing concrete pipe installed complete in all respects and approved by the Engineer.

7.12.2 T-Joints and Control Valves for R.C.C Pipes

Measurement for payment will be made for the number of T-Joints and Control Valves of specified sizes provided and fixed according to the details given on Drawings and as directed by the Engineer.

Payment will be made for the number of T-Joints and Control Valves measured at the contract unit price and shall constitute full compensation for providing, fixing and all the related works in accordance with the Drawings and as directed by the Engineer.