



BIDDING DOCUMENT

for

THE PROCUREMENT OF

*Construction of Canal Works of Chaurasi
Salbot sinchai yojan, Isma-6, Gulmi*

Sealed Quotation (SQ)

Issued on

*Water Resource and Irrigation Development
Division Office, Gulmi*

Invitation for Quotations No.: IFQ/WRIDDO_GULMI/SQ-
07/2083-84

SQ No.: WRIDDO_GULMI/SQ-07/2083-84



Abbreviations

BD	Bidding Document
BDF	Bidding Forms
BDS	Bid Data Sheet
BOQ	Bill of Quantities
COF	Contract Forms
DP	Development Partners
e-GP.....	Electronic Government Procurement
ELI	Eligibility
GCC	General Conditions of Contract
GoN	Government of Nepal
ICC	International Chamber of Commerce
IFQ	Invitation for Quotations
ITB	Instructions to Bidders
NCB	National Competitive Bidding
NPR	Nepalese Rupees
PAN	Permanent Account Number
PPA	Public Procurement Act, 2063
PPMO.....	Public Procurement Monitoring Office
PPR	Public Procurement Regulations, 2064
PS	Provisional Sum
SQ.....	Sealed Quotation
SBD	Standard Bidding Document
SCC	Special Conditions of Contract
TS	Technical Specifications
VAT.....	Value Added Tax
WRQ	Works Requirement

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Invitation for Quotations

Water Resource and Irrigation Development Division Office, Gulmi

Invitation for Quotations for the *Construction of Canal Works of Chaurasi Salbot sinchai yojan, Isma-6, Gulmi*

Contract Identification No: **WRIDDO_GULMI/SQ-7/2083-84** Date of publication: B.S. **2083/06/12**

1. The *Water Resource and Irrigation development Division Office, Gulmi* invites “sealed” quotations from Nepalese eligible bidders for the construction of *Construction of Canal Works, Isma-6, Gulmi*. The estimated amount for the works is NPR. **9,05,304.81** (without VAT & Contingency but including PS).
2. Eligible Bidders may obtain further information and inspect the Bidding Documents at the office of *Water Resource and Irrigation development Division Office, Tamghas, Gulmi* (Ph: **9857064516**, Email: **irrigation.gulmi@gmail.com**) or may visit Office website **<https://wriddogulmi.lumbini.gov.np>**
3. A complete set of Bidding Documents may be download from office website : **<https://wriddogulmi.lumbini.gov.np>**
4. The eligible bidder shall submit voucher of non-refundable fee of Rs. 1000.00 at the time of bid submission in the following account:
Name of the Bank: **Rastriya Banijya Bank**
Name of Office: *Water Resource and Irrigation development Division Office, Gulmi*
Office Code no. : **3080052015**
Rajaswa (revenue) Shirshak no. : **14229**
5. “Sealed” quotation must be submitted to the office *Water Resource and Irrigation development Division Office, Tamghas, Gulmi* by “hand” or “through post office or through courier ” on or before **12:00 P.M.** on **B.S. 2083/06/19** Bids received after this deadline will be rejected.
6. The bids will be opened in the presence of Bidders' representatives who choose to attend at **13:00 P.M.** on **B.S. 2083/06/19** at the office of *Water Resource and Irrigation development Division Office, Tamghas, Gulmi* Bids must be valid for a period of 45 days from the bid submission deadline and must be accompanied by a bid security amounting to a minimum of **NPR. 23,000.00** which shall be valid for 30 days beyond the validity period of the bid (i.e. **75 days**) If bidder wishes to submit the Cash Security, the cash should be deposited in Deposit Account No.**3010100202030000** (AC Name: **Ko.le.ni.ka., Gulmi**) at **Rastriya Banijya Bank Tamghas** and submit the receipt of the deposited amount of cash along with the bid.
7. If the last date of submission falls on a government holiday, then the next working day shall be considered as the last date. In such case the validity period of the bid security shall remain the same as specified for the original last date of bid submission.



Section I: Instruction to Bidders (ITB)

1. Scope of Works	1.1 The Employer stated in the BDS for the construction of works as detailed in attached specifications, drawings and the bill of quantities provided herein. The name of <i>Employer, name of project and contract identification number of Contracts</i> are provided in the BDS .
2. Eligible Bidder	2.1 This Invitation for Bids is open to all registered contractors with evaluation and eligibility criteria specified in section III Eligibility Criteria. A bidder declared blacklisted and ineligible by the GoN, Public Procurement Monitoring Office (PPMO), by a competent authority under the prevailing law for failure to repay loan disbursed by bank or financial institution, and/or the DP in case of DP funded project, shall be ineligible to bid for a contract during the period of time determined by the GoN, PPMO, the competent authority and/or the DP. 2.2 In case of a natural person or firm/institution/company which is already declared blacklisted and ineligible by the GoN, any other new or existing firm/institution/company owned partially or fully by such Natural person or Owner or Board of director of blacklisted firm/institution/company; shall not be eligible bidder.
3. One Bid per Bidder	3.1 Each Bidder shall submit only one quotation. A Bidder who submits more than one quotation shall cause all the quotations with the Bidder's participation to be disqualified.
4. Cost of Bidding	4.1 The Bidder shall bear all costs associated with the preparation and submission of his bid and the Employer shall in no case be liable for those costs.
5. Site Visit	5.1 The Bidder at his own cost, responsibility and risk may visit the site of the works and acquire all necessary information for preparing the bid and entering into a contract for construction of the works.
6. Content of Quotation Form	6.1 The Quotation Form comprise the sections listed below: Section I: Instructions to Bidders Section II: Bid Data Sheet Section III: Eligibility Criteria Section IV: Bidding Forms Section V: Works Requirements Section VI: Bill of Quantities Section VII: General Conditions of Contract (GCC) Section VIII: Special Conditions of Contract (SCC) Section IX: Contract Forms
7. Clarification	7.1 A prospective Bidder may obtain clarification on the Quotation Form from the Employer on or before 5 days prior to the deadline for submission of quotation.

8. Language of Bid	8.1 All documents relating to the bid shall be in English /Nepali.
9. Documents Comprising Bid	9.1 The bid by the Bidder shall comprise the following: 1) Letter of Bid 2) Eligibility Information / Document as per Section III (Eligibility Criteria) 3) Bid Security (Cash Deposit Voucher or Bank Guarantee) 4) Priced Bill of Quantities 5) Power of Attorney of Bid Signatory and <u>The Letter of Bid form and Bill of Quantities must be completed without any alterations to the text, and no substitutes shall be accepted. All blank spaces shall be filled in with the information requested</u>
10. Bid Prices	10.1 The contract shall be for the whole works described in scope of works based on the priced Bill of Quantities submitted by the Bidder. The Bidder shall fill in rates and prices for all items of the works in Nepali Rupees. Items for which no rate or price is entered shall be deemed covered by the other rates and prices in the Bill of Quantities and shall not be paid separately by the Employer. All duties, taxes and other levies payable by the contractor under the contract shall be included in the rates, prices and total Bid Price submitted by the Bidder.
11. Bid Validity	11.1 Bids shall remain valid for the period specified in the BDS. after the bid submission deadline date prescribed by the Employer. <u>In the case of electronic bid submission, if any technical issue arises in the handling of the e-GP system, the PPMO may extend the deadline for bid submission. However, the validity period of the bids shall still be counted from the original bid submission deadline.</u> A bid valid for a shorter period shall be rejected by the Employer as nonresponsive.
12. Bid Security	12.1 The Bidder shall furnish as part of its bid, in original form, a bid security as specified in the BDS. In case of e-submission of bid, the Bidder shall upload scanned copy of Bid security letter at the time of electronic submission of the bid. The Bidder accepts that the scanned copy of the Bid security shall, for all purposes, be equal to the original. The details of original Bid Security and the scanned copy submitted with e-bid should be the same otherwise the bid shall be non-responsive. 12.2 The bid security shall be, at the Bidder's option, in any of the following forms: (a) an unconditional bank guarantee from Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law or; (b) a cash deposit voucher in the Employer's Account as specified in BDS. In the case of a bank guarantee, the bid security shall be submitted either using the Bid Security Form included in Section IV (Bidding Forms) or in another Form acceptable to the employer. The form must include the complete name of the Bidder. The bid security shall be valid for minimum thirty (30) days beyond the original validity period of the bid. <u>A bid security valid for a shorter period shall be rejected by the Employer as non-responsive.</u> 12.3 Any bid not accompanied by an enforceable and substantially compliant bid security shall be rejected by the Employer as nonresponsive. In case of e-Submission,

	if the scanned copy of an acceptable Bid Security letter is not uploaded with the electronic Bid, then Bid shall be rejected. 12.4 The bid security shall be forfeited if: (a) a Bidder requests for withdrawal during the period of bid validity specified by the Bidder on the Letter of Bid, after bid submission deadline. (b) a Bidder changes the prices or substance of the bid while providing information; (c) a Bidder involves in fraud and corruption pursuant to ITB 27; (d) the successful Bidder fails to: (i) furnish a performance security in accordance with ITB 25 and ITB 26; (ii) sign the Contract in accordance within the period stipulated in Letter of Acceptance; or (iii) accept the correction of arithmetical errors pursuant to ITB 21.1. 12.5 The public entity shall return the bid securities except those that are to be forfeited as per ITB 12.4 to the respective bidders within three (3) days after the successful bidder has furnished the required performance security and signed the Contract Agreement pursuant, to ITB 25.1 and ITB 24.2.
13. Format and Signing of Bids	13.1 The bid shall be typed or written in indelible ink and shall be signed by an authorized person. Any entries or amendments including alternations, additions or corrections made shall be initialed by the same authorized person.
14. Sealing and Marking of Bids	14.1 Bidders may submit their bids by hand copy or by electronically as specified in the BDS. When so specified in the BDS, bidders shall have the option of submitting their bids electronically. Procedures for submission, sealing and marking are as follows: (a) Bidders submitting bids by hand copy: The Bidder shall submit his bid in sealed envelopes. The envelope shall be addressed to the Employer specified in the Invitation for Quotation and shall bear the name and identification number of the quotation. (b) Bidders submitting Bids electronically shall follow the electronic bid submission procedure specified in the BDS
15. Deadline for Submission of Bids	15.1 Bids shall be delivered to the Employer at the address or submitted electronically no later than the time and date specified in BDS.
16. Late Bids	16.1 Any bid received by the Employer after the deadline shall not be accepted and shall be returned unopened to the Bidder upon request.
17. Modification And Withdrawal of Bids	17.1 Bids once submitted shall not be withdrawn or modified.
18. Bid Opening	18.1 The Employer shall open the bids in the presence of the Bidders' representatives who choose to attend at the time and in the place as specified in the BDS. The Employer shall prepare and provide minutes of the bid opening including the information disclosed to those present.

19. Process to be Confidential	19.1 Information relating to the examination, evaluation and comparison of bids and recommendations for the award of a contract shall not be disclosed to Bidders or any other persons not officially concerned with such process until the award to the successful Bidder has been announced.
20. Examination of Bids	20.1 Prior to the detailed evaluation of Bids, the Employer shall determine whether each bid (a) meets the eligibility criteria defined in Clause 2; (b) has been properly signed; (c) is accompanied by the required securities; and (d) is substantially responsive to the requirements of the Bidding documents.
21. Evaluation and Comparison of Bids	21.1 In evaluating the Bids, the Employer shall determine for each bid the evaluated Bid Price by adjusting any corrections for errors. Bids shall be checked by the Employer for any arithmetic errors. Errors shall be corrected by the Employer as follows: (a) only for unit price Contracts, if there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected, unless in the opinion of the Employer there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price shall be corrected; (b) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and (c) If there is a discrepancy between the bid price in the Summary of Bill of Quantities and the bid amount in item (c) of the Letter of Bid, the bid price in the Summary of Bill of Quantities will prevail and the bid amount in item (c) of the Letter of Bid will be corrected. (d) if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a),(b) and (c) above. 21.2 In case of e-submission of bid, upon notification from the employer, the bidder shall also submit the original of documents comprising the bid as per ITB 9 for verification of submitted documents for acceptance of the e-submitted bid. If a Bidder does not provide original of document of its bid by the date and time set in the Employer's request for clarification, its bid may be rejected. 21.3 If the Bidder that submitted the lowest evaluated bid does not accept the correction of errors, its bid shall be disqualified and its bid security shall be forfeited.
22. Award of Contract	22.1 The Employer shall decide the award of the contract to the Bidder whose bid is within the approved estimate and who has offered the lowest evaluated Bid Price within bid validity period provided that such Bidder has been determined to be eligible in accordance with the provisions of Clauses 2. 22.2 if the bid for a Unit Rate Contract, which results in the lowest Evaluated Bid Price is seriously unbalanced or front loaded or extremely low in the opinion of the Employer, the Employer may require the Bidder to produce detailed price analysis 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 analysis, taking into consideration the schedule of estimated Contract payments, the Employer may require that the amount of the performance security be increased at the expense of the Bidder as mentioned in BDS to protect the Employer

	against financial loss in the event of default of the successful Bidder under the Contract or may consider the bid as non-responsive.
23. Employer's Right to Accept or Reject	23.1 The Employer reserves the right to accept or reject any bid, and to annul the bidding process and reject all sealed quotations at any time prior to contract award, without thereby incurring any liability to Bidders. In case of annulment, all sealed quotations submitted and specifically, Sealed Quotation securities, shall be promptly returned to the Bidders.
	23.2 The public entity shall give notice of the rejection of bids or the cancellation of the procurement proceedings pursuant to ITB 23.1, along with the reasons for such rejection or cancellation, to all bidders participating in the bid.
	23.3 Where any bidder requests, within thirty (30) days of the communication of the notice pursuant to ITB 23.2, the grounds for the rejection of all bids or the cancellation of the procurement proceedings, the public entity shall provide such information to that bidder.
24. Notification of Award and Signing of Agreement	24.1 The Bidder whose bid is accepted and all other participating bidders shall be notified of the award by the Employer.
	24.2 The notification (hereafter called the "Letter of Acceptance") to the successful Bidder shall state the sum that the Employer shall pay the Bidder in consideration of the execution, completion, and maintenance of the works as described by the contract. Within 7 days of receipt of the Letter of Acceptance, the successful Bidder shall deliver the Performance Security pursuant ITB 25.1, ITB 26.1 and sign the Contract Agreement.
	24.3 Inability of the Bidder to make a Contract Agreement within the above stated period shall result in cancellation of the Contract Award and forfeiture of the Bidder's Bid Security, upon which the Contract shall then be awarded to the next successive successful Bidder.
25. Performance Security	25.1. Within seven (7) days of the receipt of Letter of Acceptance from the Employer, the successful Bidder shall furnish the performance security in an amount in NPR equal to 5 (five) percent of the Bid Price (without VAT but including PS) from Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law in Nepal in accordance with the conditions of Contract and subject to ITB 26.1 using Sample Form for the Performance Security included in Section IX (Contract Forms), or another form acceptable to the Employer.
	25.2 Failure of the successful Bidder to submit the Performance Security pursuant ITB 25.1, ITB 26.1 or to sign the Contract Agreement shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security.
26. Additional Securities	26.1 The Bidder may be required to provide additional Performance Security if the Employer determines that the rate quoted by the Bidder in the Bill of Quantities, is front loaded or unbalanced. In such case, the Employer shall instruct the Bidder to provide additional 8% security for signing of the Contract Agreement. Bidder's failure to do provide additional security shall result in forfeiture of the Bid Security and award of the Contract to the next lowest evaluated Bidder.

27. Corrupt or Fraudulent Practices	27.1 The Employer shall reject a bid for award if it determines that the Bidder recommended for award of contract has engaged in corrupt or fraudulent practices in competing for the contract in question.
28. Conduct of Bidders	28.1 The Bidder shall be responsible to fulfill his obligations as per the requirement of the Contract Agreement, Bidding documents, GoN's Procurement Act and Regulations. 28.2 The Bidder shall not carry out or cause to carry out the following acts with an intention to influence the implementation of the procurement process or the procurement agreement: a) give or propose improper inducement directly or indirectly, b) distortion or misrepresentation of facts c) engaging or being involved in corrupt or fraudulent practice d) interference in participation of other prospective bidders. e) coercion or threatening directly or indirectly to cause harm to the person or the property of any person to be involved in the procurement proceedings, f) collusive practice among bidders before or after submission of bids for distribution of works among bidders or fixing artificial/uncompetitive bid price with an intention to deprive the Employer the benefit of open competitive bid price. g) contacting the Employer with an intention to influence the Employer with regards to the bid or interference of any kind in examination and evaluation of the bids during the period after opening of bids up to the notification of award of contract
29. Blacklisting Bidder	29.1 Without prejudice to any other right of the Employer under this Contract, GoN, Public Procurement Monitoring Office may blacklist a bidder for his conduct up to three years on the following grounds and seriousness of the act committed by the bidder: a) if it is proved that the bidder committed acts pursuant to the ITB 28.2, b) if it is proved later that the bidder/contractor had committed substantial defect in implementation of the contract or had not substantially fulfilled his obligations under the contract or the completed work is not of the specified quality as per the contract, c) if convicted by a court of law in a criminal offence which disqualifies the bidder from participating in the contract. d) if it is proved that the contract agreement signed by the bidder was based on false or misrepresentation of bidder's qualification information, e) if the successful bidder fails to sign the contract. f) a Bidder requests for withdrawal or modification of its bid: (i) after the Bid Submission deadline and during the period of validity specified by the Bidder on the Letter of Bid, in case of electronic submission; (ii) from the period twenty-four hours prior to bid submission deadline up to the period of bid validity specified by the Bidder on the Letter of Bid, in case of hard copy submission. g) if the bidder does not provide clarifications of its Bid by the date and time set

	in the Employer's request for clarification as per ITB 21.2. h) a Bidder changes the prices or substance of the bid while providing information pursuant to ITB 21.2.
	29.2 A bidder declared blacklisted and ineligible by the GoN, Public Procurement Monitoring Office (PPMO), by a competent authority under the prevailing law for failure to repay a loan disbursed by a bank or financial institution, and/or the DP in case of DP funded project, shall be ineligible to bid for a contract during the period of time determined by the GoN, PPMO, the competent authority and/or the DP.
30. Provision of PPA and PPR	If any provision of this document is inconsistent with Public Procurement Act (PPA), 2063 or Public Procurement Regulations (PPR), 2064, the provision of this document shall be void to the extent of such inconsistency and the provision of PPA and PPR shall prevail.

SECTION II: Bid Data Sheet

ITB 1	The scope of work is Construction of Canal Works of Chaurasi Salbot sinchai yojan, Isma-6, Gulmi The number of the Invitation for SQ is : IFQ/WRIDDO_GULMI/SQ-07/2083-84 The Employer is: Water Resource and Irrigation Development Division Office, Gulmi The name of the Project is: Construction of Canal Works of Chaurasi Salbot sinchai yojana, Isma-6, Gulmi																								
ITB 11	The bid validity period shall be: 45 (Forty Five) Days.																								
ITB 12.1	The Bidder shall furnish a bid security, from Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law in Nepal with a minimum of NPR. 23,000.00 which shall be valid for 30 days beyond the validity period of the bid.																								
ITB 12.2 (b)	Cash Deposit Account for Bid Security: Account Name:Ko.le.ni.ka., Gulmi Bank Name: Rastriya Banijya Bank Bank Address:Tamghas, Gulmi Account Number:3010100202030000																								
ITB 14.1	Bidders shall have the option of submitting their bids : " by hand" or "through post office" or "through courier"																								
ITB 14.1 (b)	Electronic submission procedure shall be : <i>N/A</i> "Bidders shall follow the electronic bid submission procedures specified below: i. The bidder is required to register in the e-GPsystem https://www.bolpatra.gov.np/egp following the procedure specified in e-GP guideline. ii. Interested bidders may either purchase the bidding document from the employer's office as specified in the Invitation for Bid (IFB) or bidders may download the IFB and bidding document from e-GP system. iii. The registered bidders need to maintain their profile data required during preparation of bids. iv. The bidder can prepare their bids using data and documents maintained in bidder's profile and forms/format provided in bidding document by Employer. The bidder may submit bids as a single entity. v. Bidders should update their profile data and documents required during preparation and submission of their bids. The required forms and documents shall be part of bids. <table><tr><th>No.</th><th>Document</th><th>Requirement</th><th>Remarks</th></tr><tr><td></td><td>Letter of Bid</td><td>Mandatory</td><td>PDF</td></tr><tr><td></td><td>Bid Security / Bank Guarantee</td><td>Mandatory</td><td>PDF</td></tr><tr><td></td><td>Firm, Organization or Company registration</td><td>Mandatory</td><td>PDF</td></tr><tr><td></td><td>Business Registration Certificate/ Licence</td><td>Mandatory</td><td>PDF</td></tr><tr><td></td><td>VAT registration Certificate</td><td>Mandatory</td><td>PDF</td></tr></table>	No.	Document	Requirement	Remarks		Letter of Bid	Mandatory	PDF		Bid Security / Bank Guarantee	Mandatory	PDF		Firm, Organization or Company registration	Mandatory	PDF		Business Registration Certificate/ Licence	Mandatory	PDF		VAT registration Certificate	Mandatory	PDF
No.	Document	Requirement	Remarks																						
	Letter of Bid	Mandatory	PDF																						
	Bid Security / Bank Guarantee	Mandatory	PDF																						
	Firm, Organization or Company registration	Mandatory	PDF																						
	Business Registration Certificate/ Licence	Mandatory	PDF																						
	VAT registration Certificate	Mandatory	PDF																						



			Tax Clearance Certificate / Tax return submission evidence / evidence of time extension	Mandatory	PDF
			Power of Attorney of Bid signatory	Mandatory	PDF
			Completed BoQ	Mandatory	PDF
			Additional documents specified in Bidding Document	If applicable	PDF
	vi.	After providing all the details and documents, bid response documents will be generated from the system. Bidders are advised to download and verify the response documents prior to bid submission.			
	vii.	For verifying the authentic user, the system will send one time password in the registered email address of the bidder. System will validate the OTP and allow bidder to submit their bid			
	viii.	Once bid is submitted, bidders won't able to modify/withdrawal their bid.			
	ix.	The Bidder / Bid shall meet the following requirements and conditions for e-submission of bids;			
	The e-submitted bids must be readable through PDF reader.				
	The facility for submission of bid electronically through e-submission is to promote transparency, non-discrimination, equality of access, and open competition in the bidding process. The Bidders are fully responsible to use the e- submission facility properly in e-GP system as per specified procedures and in no case the Employer shall be held liable for Bidder's inability to use this facility.				
	When a bidder submits electronic bid through the PPMO e-GP portal, it is assumed that the bidder has prepared the bid by studying and examining the complete set of the Bidding documents including specifications, drawings and conditions of contract."				
ITB 15	The deadline for bid submission is: Address: Water Resource and Irrigation Development Division Office, Gulmi Date: B.S. 2083/06/19 Time : 12:00 P.M.				
ITB 18	The bid opening shall take place at : Address : Water Resource and Irrigation Development Division Office, Gulmi Date: B.S. 2083/06/19 Time : 12:00 P.M. i) e-GP system allows to download the bid response document only after bid opening date and time are met. Simultaneous login of two members of the opening committee is required for bid opening. ii) The Employer shall conduct the opening of bid at the address on the same date and time as specified in bidding document in the presence of Bidders' representatives who choose to attend.				

Section III: Eligibility Criteria

Eligibility Information

Eligibility Requirements:

All Bidders shall submit following documents as pre- requisites for eligibility:

- a. Firm, Organization or Company Registration Certificate
- b. Renewal of Business Registration Certificate
- c. PAN/VAT Registration Certificate
- d. Tax Clearance Certificate or Evidence of Time Extension or Tax return submission evidence for the F/Y 2081/82**
- e. Power of Attorney
- f. Letter of Bid

Notes to Bidders

The information to be filled in by Bidders in the following pages shall be used for purposes of eligibility as provided for in Clause 2 of the Instructions to Bidders. This information shall not be incorporated in the Contract. Attach additional pages as necessary.



Section IV: Bidding Forms

Letter of Bid

The Bidder must accomplish the Letter of Bid in its letterhead clearly showing the Bidder's complete name and address.

Date:

Name of the contract:

Invitation for SQ No.:

To:

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Documents.
- (b) We offer to execute in conformity with the Bidding Documents the following Works:
- (c) The total price of our Bid, excluding any discounts offered in item (d) below is:.....
- (d) The discounts offered and the methodology for their application are:.....
- (e) Our bid shall be valid for a period of 45 days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- (f) If our bid is accepted, we commit to obtain a performance security in accordance with the Bidding Document;
- (g) We understand that this bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed;
- (h) We declare that, we have not been black listed and no conflict of interest in the proposed procurement proceedings and we have not been punished for an offense relating to the concerned profession or business.
- (i) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive; and
- (j) If awarded the contract, the person named below shall act as Contractor's Representative:
- (k) We agree to permit the Employer/DP or its representative to inspect our accounts and records and other documents relating to the bid submission and to have them audited by auditors appointed by the Employer.

Name:

In the capacity of

Signed

Duly authorized to sign the Bid for and on behalf of

Date



Bid Security

Bank Guarantee

Bank's Name, and Address of Issuing Branch or Office

(On Letter head of the Commercial bank or any Financial Institution eligible to issue Bank Guarantee as per prevailing Law)

Beneficiary: name and address of Employer.....

Date:.....

Bid Security No.:.....

We have been informed that ***[insert name of the Bidder]*** (hereinafter called “the Bidder”) intends to submit its bid (hereinafter called “the Bid”) to you for the execution of name of Contract under Invitation for Quotations No. (“the IFQ”).

Furthermore, we understand that, according to your conditions, bids must be supported by a bid guarantee.

At the request of the Bidder, we..... . name of Bank.hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of.amount in figures (. amount in words) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Bidder is in breach of its obligation(s) under the bid conditions, because the Bidder:

- (a) does not accept the correction of errors in accordance with the Instructions to Bidders (hereinafter “the ITB”); or
- (b) having been notified of the acceptance of its Bid by the Employer during the period of bid validity, (i) fails or refuses to execute the Contract Agreement, or (ii) fails or refuses to furnish the performance security, in accordance with the ITB.
- (c) is involved in fraud and corruption in accordance with the ITB

This guarantee will remain in force up to and including the datenumber.....days after the deadline for submission of Bids as such deadline is stated in the instructions to Bidders or as it may be extended by the Employer, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this guarantee should reach the Bank not later than the above date.

This Bank guarantee shall not be withdrawn or released merely upon return of the original guarantee by the Bidder unless notified by you for the release of the guarantee.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 758.

... Bank's seal and authorized signature(s) . . .

Note:

The bid security of has been counter guaranteed by the Bankon
..... (Applicable for Bid Security of Foreign Banks).



Part - II Employer's Requirements

Section V Works Requirements

Section VI. Bill of Quantities



SECTION V: Works Requirements

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

Scope of Work

Construction of Canal Works of Chaurasi Salbot sinchai yojan, Isma-6, Gulmi

Specifications

Notes on the Specifications

A set of precise and clear specifications is a prerequisite for Bidders to respond realistically and competitively to the requirements of the Employer without qualifying or conditioning their Bids. The specifications must be drafted to permit the widest possible competition and, at the same time, present a clear statement of the required standards of workmanship, materials, and performance of the goods and services to be procured. Only if this is done will the objectives of economy, efficiency and fairness in procurement be realized, responsiveness of Bids be ensured, and the subsequent task of bid evaluation facilitated. The specifications should require that all goods and materials to be incorporated in the Works be new, unused, of the most recent or current models, and incorporate all recent improvements in design and materials unless provided otherwise in the Contract.

Samples of specifications from previous similar projects are useful in this respect. The use of metric units is encouraged by the Funding Agency in case of funding assisted projects. Most specifications are normally written specially by the Employer or Project Manager to suit the Contract Works in hand. The available standard specification of works of **Ministry of Infrastructure Development, other line Ministries and concerned departments** can be adopted for respective civil construction works.

There are considerable advantages in standardizing General Specifications for repetitive Works in recognized public sectors, such as highways, urban housing, irrigation, and water supply, in the same country or region where similar conditions prevail. The General Specifications should cover all classes of workmanship, materials, and equipment commonly involved in construction; however it may not necessarily be adequate to be used in a particular Works Contract and may necessitate preparation of Particular (Special) Specifications to amend and or supplement the provision of the General Specifications to meet the requirement of the particular Works.

Care must be taken in drafting specifications to ensure that they are not restrictive. In the specification of standards for goods, materials, and workmanship, recognized international standards should be used as much as possible. Where other particular standards are used, whether national standards of Nepal or other standards, the specifications should state that goods, materials, and workmanship that meet other authoritative standards, and which ensure substantially equal or higher quality than the standards mentioned, will also be acceptable.

Employers should decide whether technical solutions to specified parts of the Works are to be permitted. Alternatives are appropriate in cases where obvious (and potentially less costly) alternatives are possible to the technical solutions indicated in the Procurement Documents for certain elements of the Works, taking into consideration the comparative specialized advantage of potential bidders. For example:



The Employer should provide a description of the selected parts of the Works with appropriate references to Drawings, Specifications, Bill of Quantities, and Design or Performance criteria, stating that the alternative solutions if applicable shall be at least structurally and functionally equivalent to the basic design parameters and specifications.

Such alternative solutions shall be accompanied by all information necessary for a complete evaluation by the Employer, including drawings, design calculations, technical specifications, breakdown of prices, proposed construction methodology, and other relevant details.

Sample Clause: Equivalency of Standards and Codes Wherever reference is made in the Contract to specific standards and codes to be met by the goods and materials to be furnished, and work performed or tested, the provisions of the latest current edition or revision of the relevant standards and codes in effect shall apply, unless otherwise expressly stated in the Contract. Where such standards and codes are national, or relate to a particular country or region other authoritative standards that ensure a substantially equal or higher quality than the standards and codes specified will be accepted subject to the Project Manager's prior review and written consent. Differences between the standards specified and the proposed alternative standards shall be fully described in writing by the Contractor and submitted to the Project Manager at least 30 days prior to the date when the Contractor desires the Project Manager's consent. In the event the Project Manager determines that such proposed deviations do not ensure substantially equal or higher quality, the Contractor shall comply with the standards specified in the documents.

These Notes for Preparing Specifications are intended only as information for the Employer or the person drafting the Procurement Documents. They should not be included in the final documents.

Specifications

1. General

The works covered by this technical specification shall comprise of general type of civil works.

2. Clearing of Site

The Contractor shall remove all trees, shrubs, bushes and vegetation standing above the ground surface. The root of all trees and other vegetation shall be removed as approved by the Engineer.

3. Ground Leveling

The site of the works shall be leveled by cutting and filling as the case may require. The exact location and elevation of each of the works sites shall be indicated by the Engineer.

4. Materials

a. General

Materials used in the work shall be new and conforming to the qualities and kinds specified herein or equal to the approved samples. All materials used in the works should be in conformity practiced with relevant standard specification.

b. Inspection and Testing

All materials used in the works shall be subject to inspection and tested as the Engineer may direct from time



to time as the work proceed. Only material, which the Engineer considers satisfactory, shall be used and materials condemned or not approved by the Engineer shall be removed from the works at the contractor's cost.

5. Cement

Quality and Type

The cement to be used in the Works shall be ordinary Portland cement complying in all respects with BS 12. For the purposes of cement testing under BS 12, the Site shall be deemed to have a tropical climate.

Tests on Cement

Before any cement is ordered in quantity or brought on to the site, the Contractor shall submit to the Engineer a detailed list of the sources, country or countries of origin and manufacturer's brand names of the types of cement which he proposes to use. The Contractor shall submit to the Engineer, without charge, test certificates relating to each consignment of cement. Each certificate shall show that a sample of the consignment has been tested by the manufacturer or by an approved laboratory and that it complies in all respects with the requirements of the Technical Specifications. The cement will be tested in accordance with and shall meet the requirements of the NS Code. When required by the Engineer the Contractor shall supply to the Engineer samples of cement taken on delivery to, or during storage on the Site, for testing at the Contractor's laboratory without extra charge. No cement from any consignment shall be used without the approval of the Engineer and the Contractor shall maintain a record of the locations of the concrete made from each consignment which record shall be available for inspection by the Engineer. If for any reason the Contractor wishes to vary the source, country or manufacturer in respect of any type of cement at any time during the Contract, he shall give adequate notice of every such variation and shall carry out all tests called for by the Engineer on the proposed substitute cement, and shall obtain written approval of the variation before ordering any substitute material. The Engineer may call for new tests, at the Contractor's expense, in particular if the cement has been stored for a long time, to check the cement is still conforming to the requirements.

Delivery and Storage of Cement

Cement shall be delivered to the site in properly sealed bags or other approved containers, stamped with date of delivery and marked sound. Cement from abroad, except from India, shall be packed in sealed plastic bags inside the paper bag. Cement shall be delivered in quantities sufficient to ensure the proper progress of the Works and the quantities held in stock on site shall be to the approval of the Engineer. Each consignment of cement shall be stored separately so as to provide easy access for inspection and testing. After they have been approved by the Engineer, consignments shall be used in the order in which they were delivered. Any cement which shall prove to have been exposed to damage by water will be rejected upon delivery. Cement delivered in bags shall be stored in a weather proof, waterproof and reasonably airtight building provided solely for that purpose. The floors of the building shall be raised at least 30 cm above the ground level to prevent the absorption of moisture. It is not permitted to store bags to a greater height than 2 metres. Storage in the open may be permitted on small works by the written authority of the Engineer, in which case the cement shall be placed on a raised platform and amply protected by waterproof coverings to the approval of the Engineer. Cement, when being conveyed to the site in lorries or other vehicles, shall be adequately protected from the weather and from contamination by dust, sand or any organic materials. In the case of delivery of cement in bulk, the cement shall be stored in a properly designed silo. The silo must be provided with walls properly insulated against sun radiation. No cement shall be taken from the storage, unless it is needed for immediate use.

Cement Measured by Weight

All cement used in the Works shall be measured by weight or volume. Cement from partly filled or unsealed bags shall not be used.

Rejection of Cement

Notwithstanding the receipt of the test certificate and the approval of the Engineer, the Engineer may reject any cement as a result of further tests on compressive strength and chemical composition. The Engineer may also reject cement which has deteriorated owing to inadequate protection or other causes, or in any other case where the cement is not to his satisfaction. Re-tests, if required, are at the Contractor's expense. The Contractor shall remove all rejected cement from the site without delay and at the Contractor's expense.



6. Aggregates

Supply and Classification

The Contractor shall make his own arrangements for procuring, crushing, grading and delivering aggregate for the Works, as required from sources to be approved by the Engineer. Separate fine and coarse aggregate shall be used for the manufacture of concrete. Aggregates shall be graded to produce a workable dense concrete.

(a) Coarse Aggregates

The term “coarse aggregate” is used to designate well graded aggregate mainly retained on a 5.00 mm, NS: 305-2050 or IS:460 test sieve and mainly passing a 40 mm, NS:305-2050 or IS:460 test sieve. Coarse aggregate shall be supplied in the following primary sizes:

Size designation	Normal size range
10 mm	5 mm to 10 mm
20 mm	5 mm to 20 mm
40 mm	5 mm to 40 mm

Coarse aggregate shall consist of natural gravel or crushed rock. Friable and flaky pieces such as mica and shale shall not be present. Coarse aggregates shall be well graded within grading given in Table 5.1 and to the satisfaction of the Engineer.

Table 5.1: Percentage by Weight Passing Standard Sieves

Sieve Size (mm)	Size Designation		
	5 mm to 10 mm	5 mm to 20 mm	5 mm to 40 mm
50.0	-	-	100
37.5	-	100	95 - 100
20.0	100	95 - 100	37 - 70
10.0	85 - 100	30 - 60	10 - 40
5.0	0 - 25	0 - 10	0 - 5

The aggregate shall be free from adherent coatings and shall, if necessary, be washed for this purpose and shall be free from sulphates. Clay or silt lumps shall not exceed 0.25 per cent and material passing a BS sieve No. 200 shall not exceed 1.0 per cent, both by weight. The content of coal and lignite shall not exceed 0.5 per cent by weight.

(b) Fine Aggregates

The term “fine aggregates” is used to designate aggregate mainly passing a 0.075 mm, NS:305-2050 or IS:460 test sieve and containing only that much coarser material as is permitted for the various grading zones. Fine aggregate shall consist of natural sand, or a mixture of natural sand and crushed gravel or crushed rock. The aggregate shall not contain any flint, chert or lime. The quantity of silt, clay and dust, determined in accordance with the decantation method given in NS:305-2050 or IS:460, shall not exceed 3% by weight of the sample. The content of mica shall not exceed 3% by weight of the sample. The aggregate shall not contain any deleterious material in such form or in sufficient quantity as to affect adversely the quality of concrete. The Engineer shall permit the addition of crushed gravel or crushed rock fine aggregates to the natural sand only where, in his opinion, it is impracticable to obtain the required fine aggregate grading other than by such addition. The grading of the fine aggregates shall lie within one of the grading zones as set out in Table 5.2 and specified in BS 882.

Table 5.2 Percentage by Weight Passing Standard Sieves

BS 410 Standard Mesh	Grading Zone 1	Grading Zone 2	Grading Zone 3	Grading Zone 4
10.0 mm	100	100	100	100



5.0 mm	90 - 100	90 - 100	90 - 100	95 - 100
2.36 mm	60 - 95	75 - 100	85 - 100	95 - 100
1.18 mm	30 - 70	55 - 90	75 - 100	90 - 100
600 µm	15 - 35	35 - 60	60 - 80	80 - 100
300 µm	5 - 20	8 - 30	12 - 40	15 - 50
150 µm	0 - 10	0 - 10	0 - 10	0 - 15

Quality

All aggregates to be used in concrete shall be clean, hard, dense, sound, chemically inert, or limited porosity and uncoated particles free from clayey or organic matter. Aggregates for concrete shall comply with related codes and the following:

Grading: in accordance with Tables 5.1 and 5.2 herein.

Mechanical Properties: when tested, the “Ten per cent Fines Value” shall be not less than 50 KN.

mica content test

Silt, Clay and Dust Fraction: when determined in accordance with the decantation method given in BS 882:1992 Fines.

Water Absorption: when tested in accordance with BS 812 Part 2 the water absorption after 24 hours shall not exceed 4%.

Soundness: when tested in accordance with the sodium sulphate soundness test specified in ASTM C88 the aggregate shall have a percentage loss of less than 15.

Alkali-Aggregate Reactivity: when tested in accordance with ASTM C 289 aggregates exhibiting evidence of alkali-aggregate reactivity will not be acceptable unless the Contractor can show that the proposed cement aggregate combination, when tested in accordance with ASTM C227 or other tests, will not produce deleterious alkali-aggregate reactivity, as to which the Engineer shall be the sole judge.

Shrinkage: when determined in accordance with the BRE Digest 35 test the drying shrinkage shall not exceed 0.065%.

Flaking Index shall not exceed 40.

Elongation shall not exceed 40.

Aggregate Crushing Value (ACV) shall not be more than 30%.

Testing

Testing of aggregates is to be in accordance with NS:305-2050 or as specified herein. For each source of aggregate, and at least six weeks prior to the preparation of trial mixes, samples of aggregates together with the results of the test requirements shall be submitted to the Engineer for approval of the sources of aggregate and quality. To check whether the aggregates contain lime, the particles shall be immersed in a 5 per cent HCL solution after crushing. The aggregate shall be rejected if the particles dissolve in the solution. After approval has been given for any particular aggregate, a sample weighing at least 50 kg of the approved aggregate shall be retained by the Engineer as a standard against which all future samples can be compared. Approval of a source of aggregate by the Engineer shall not be construed as constituting the approval of all materials to be taken from that source, and the Contractor shall be responsible for the specified quality of all such materials used in the Works. The Contractor shall not obtain aggregates from sources which have not been approved by the Engineer. During the course of the Contract, the Contractor shall supply to the Engineer samples of aggregates taken in accordance with NS 305/IS 383 at a frequency of at least once a week, or as directed by the Engineer from each aggregate stockpile. The samples shall be delivered to the Site laboratory for testing under the supervision of the Engineer. If the routine tests carried out by the Engineer show the aggregate to be not to the same standard as originally approved, then subsequent testing to obtain acceptable aggregates shall be undertaken by the Contractor at his own cost.

Washing and Screening

Aggregates shall be washed and screened as necessary, to produce aggregates meeting the specified requirements. All such washing and screening shall be to the satisfaction of the Engineer. Should mica be present in unacceptable quantities, its removal shall be effected by techniques approved by the Engineer. The costs of all washing and screening shall be included in the unit rates for concrete in the Bill of Quantities.

Storage



Aggregates shall be stored in separate stockpiles in such a manner that the intermingling of materials from separate stockpiles or bins is not possible, and so as to prevent contamination by mud, rubbish, windblown dust or vegetation. Aggregate stockpiles shall be provided with adequate drainage to ensure rapid drainage of the aggregates. The storage arrangements shall be to the approval of the Engineer.

7. Water

Water for concrete, mortar and curing shall be subjected to the approval of the Engineer. It shall be clean, fresh and free oil, acid, alkali etc. Water used in mixing and curing of concrete shall be subject to approval, and shall be reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable or other substances injurious to the finished project. In no case shall the water contain an amount of impurities which will cause a change in the time of initial or final set of the cement of more than 30 minutes, nor a reduction in the compressive strength of mortar of more than 10 per cent at any time of testing, when compared to the results obtained with distilled water. Water for mixing, washing aggregates, curing and rinsing shall not contain:

- More than 500 mg/l of chlorides as Cl;
- More than 1000 mg/l of sulphates as SO₃;
- More than 2,000 parts per million of insoluble residues;
- An acid degree of pH > 5.

Furthermore, the chloride content in mixing water must be such that in no case, the total amount of chlorides in water, cement, aggregates and additives of the fresh concrete, shall exceed 0.3 per cent of the weight of cement. The Contractor shall deliver to the Engineer, without charge, samples of the water proposed for use in the Works, for the Engineer to carry out such tests as he may require to confirm its suitability. Samples will be delivered sufficiently in advance of the Works for completion of the tests before the water is required for use, and at such other times during the course of the Contract as the Engineer may direct. If required by the Engineer, the Contractor shall, without extra charge, treat the water taken from any other source to such a degree as may be necessary in order to render it suitable for mixing and mortar.

8. Reinforcement Steel

Material and Tests

Reinforcement steel shall include the steel bars in reinforced concrete structures as well as the steel bar supports, and shall be laid in accordance with the approved Drawings. Steel reinforcement shall consist of hot rolled round deformed (high bond) high yield stress bars and shall comply with the requirements of NS:191-2046. The bars shall be from new stock. A cross section of any bar to be delivered shall be of the exact shape and have the specified diameter at any point of the bar. When required by the Engineer, the Contractor shall submit three copies of mill sheets of steel bars for the approval of the Engineer before each shipment, and inspection at site will be made by the Engineer in accordance with the Specifications and the above mill sheets. The Contractor shall prepare test specimens of steel reinforcement to be used in the works. Test specimens shall be taken in the presence of the Engineer and shall be of a size sufficient to carry out the specified test. The test specimens shall be tested in an approved laboratory and the certified copies of the results of the tests shall be submitted to the Engineer. The specimen shall be tested for bending and tensile properties. The methods and requirements for testing shall be carried out in accordance with the applicable specifications of NS-333-2050. If necessary, other equivalent National Standards may be substituted after obtaining the approval of the Engineer. If ordered by the Engineer, test procedures shall be repeated at the Contractor's own expense for any new supply of steel reinforcement.

Storage of Steel Reinforcement

Steel reinforcement shall be stored above the ground on platforms, skids or other approved supports, and shall be protected from mechanical injury and surface deterioration caused by exposure to conditions producing rust. Different types and dimensions of reinforcement shall be kept separately.

Preparation of Reinforcement Drawings

The Contractor shall prepare, at his own expense, all detailed reinforcement and bending drawings. The drawings shall include all bar-placing drawings, bar-bending schedules, bar lists, and any other reinforcement drawings as may be required to facilitate fabrication and placement of reinforcement



bars. Reinforcement drawings shall be submitted to the Engineer for approval. Reinforcement drawings and bar lists prepared by the Contractor shall conform to the standard practices of the industry.

Bending of Steel Reinforcement

Steel reinforcement shall be cut from straight bars, free from kinks and bends or other damage, and bent cold by experienced competent workmen. Bar diameters greater than 19 mm shall be bent in a bending machine designed for the purpose and approved by the Engineer. Any steel that has already been bent shall not be re-bent at the place of the previously made bend. Dimensions for bending shall be in accordance with the requirements as set out in IS, SF 24.

Placing Reinforcement Steel

The number, size, form and position of all reinforcement steel bars, fabric, ties, links, stirrups and other parts of the reinforcement shall be placed in exact position in accordance with the Drawings and kept in the correct position in the forms without displacement during the process of vibrating, tamping and ramming the concrete in place. The Contractor shall provide all necessary distance pieces and space bars at his own cost to maintain the reinforcement in the correct position. Correct positioning will be achieved with the use of stays, blocks, ties, hangers or other approved supports. Blocks for holding the reinforcement from contact with the forms of adjacent reinforcement shall be precast concrete mortar blocks of approved shapes and dimension consisting of 1:2 cement/sand mortar. The Contractor shall provide evidence that mortar is of the same quality and density as the surrounding concrete. The water tightness of the mortar blocks shall be at least similar to the concrete into which they are concreted. The blocks shall be fitted with a semi-circular hollowing and double bent poured-in 16 gauge annealed steel wire. The use of pebbles, pieces of broken stone or brick, or other materials shall not be permitted. Any ties, links or stirrups connecting the bars shall be taut, so that the bars are properly braced; the inside of their curved parts shall be in actual contact with the bars around which they are intended to fit. Bars shall be bound together with the best black annealed mild steel wire which is subject to the Engineer's approval, and the binding shall be twisted tight with proper pliers. The free ends of the binding wire shall be bent inwards. Before any steel reinforcement is embedded in the concrete, any scale, loose rust, oil, grease or other deleterious matter shall be removed. Partially set concrete which may have adhered to the exposed bars during concreting operations shall likewise be removed. When the reinforcement has been placed and is ready for concreting, it will be inspected by the Engineer, and no concrete shall be placed until the reinforcement has been approved by him. The Contractor shall inform the Engineer at least 24 hours in advance of his intention to have the reinforcement ready for inspection.

Splicing of Reinforcement Steel

All steel reinforcement shall be furnished in full length as indicated on the Drawings. Splicing of bars, except where shown on the Drawings, shall not be permitted without the written approval of the Engineer. Splices shall be staggered. Welding of steel reinforcement or connections of steel reinforcement by means of mechanical splices shall be done only if detailed on the duly approved Drawings or if such authorisation is made by the Engineer. When it is necessary to splice reinforcement bars at points other than any shown on the Drawings, position and methods of splicing shall be determined based on strength calculations and approved by the Engineer. In lapped splices, the bars shall be lapped 20 times the diameter of the bar or the following, whichever is larger. No hooks shall be required for lap joints, unless otherwise specified. The lap length shall be calculated as follows:

- (i) For tension reinforcement bars

$$l = \frac{f_y}{4 \tau_{bd}} \phi$$

where, f_y = Yield strength of reinforcement steel.
 τ_{bd} = Bond strength of concrete.
 ϕ = Diameter of reinforcement bar
 l = Lap length

- (ii) For compressive reinforcement bars



80 per cent of “1” calculated by the above formula.

When gas pressure welding of joints is used, the operation shall be made by conforming to the following requirements:

- a. The welding equipment shall be so designed as to hold both bars to be jointed in a straight line, applying pressure of more than 3 kg/sq.mm to the contact surface of the bars.
- b. The blowpipe shall emit a constant flow of gas, and its diameter shall be suitable for the diameter of the bars to be welded.
- c. Oil, rust, paint, and dust shall be completely removed, by a grinder, from the surfaces to be jointed.
- d. The edge surface of bars to be jointed shall be inclined to the axis of the bar at more than 80 degrees, and shall be so planed that the clearance between bars being in contact shall not be more than 4 mm.
- e. Bars to be jointed shall be butted with pressure of more than 1 kg/sq mm. The pressure shall be increased gradually with heating, until the diameter of the joint portion increases to 1.2 times the original diameter of the bars.
- f. The joint portion shall be heated uniformly with more than two blowpipes. Flames shall always completely cover the heated portion.
- g. After jointing, the joint shall not be cooled rapidly by rain, etc. Re-jointing shall be made, when inflation of the joint portion is insufficient.

Cover to Reinforcement Steel

The concrete cover to reinforcement shall be as shown on the Drawings, or as directed by the Engineer. Unless otherwise specified on the Drawings, the concrete cover on the steel reinforcement shall be at least 50 mm, if the concrete is subject to exposure to soil or water. In other cases a cover of 40 mm shall be acceptable. The Contractor shall provide any necessary cement pads for ensuring that the cover is attained, and in no case may the use of pebble, pieces of broken stone or brick, or other packing materials be permitted.

9. Earth work (Excavation and Embankment)

All trees, bushes, stumps, roots and rubbish shall be removed from the area designated by the Engineer for earthwork. All the cleared material shall be disposed off in designated areas only. All excavation shall be made in accordance with the general standard specification or as directed by the Engineer and to the grades shown on the drawing or as established by the Engineer the rate for the excavation shall include the cost of excavation, prevention and diversion of flowing water if any hauling and disposal of the excavated material as per instruction. No extra payment shall be made on account of above items unless and otherwise specified. The embankment shall be constructed by taking selected earth materials which shall not contain clay clods larger than 5cm in size, root grass and other rubbish or organic or perishable matter. Lumps of clay shall be broken down to such a size that they do not interfere with the compaction of material. Embankment shall be built in layer not exceeding 25 cm in thickness (loose layer) and to full width of embankments. The embankment shall be properly compacted to achieve 90% of the maximum dry density as determined by the compaction test approved by the Engineer. The distribution of materials shall be such that the compacted material will be homogeneous and free from loose pocket streaks, or other imperfections. The excavation and placing operations shall be such that materials when compacted will be blended sufficiently to secure the best practicable degree of compaction impermeability and stability. After the site clearance the foundation on which embankments are to be built shall be stripped of unsuitable surface soil to a depth of 15 cm or as directed by the Engineer. The trenches and cavities made of removal of unsound foundation materials, deep roots of trees if any, or for inspection of sub-surface materials should be properly compacted. Foundation materials which do not have the prescribed density in undisturbed condition shall be moistened and compacted or shall be removed and replaced as directed. Embankment shall be built to the height and slope as instructed and indicated in the drawing. The finished surfaces of the top and sides shall present an even and neat appearance to the satisfaction of the Engineer. Back filling shall unless otherwise specified be carried out with approved materials and shall be well compacted in 15cm layers to



the satisfaction of the Engineer. The contractor shall make arrangements for obtaining fill materials from borrow pits approved by the Engineer. No borrow pits shall be dug within the restricted distance i.e. 25m to 30m. Borrow pits shall not be more than 1m in depth and 25m in length. A clear distance of 1m shall be left between the pits. Backfill/Embankments about any structures shall be considered incidental to the embankment construction and shall be placed to the lines shown on the Drawings, as prescribed in this Paragraph, or as directed by the Engineer. The type of material used for backfill, the amount thereof, the manner of deposition of the material shall be subject to approval. In so far as practicable back fill material shall be obtained from material removed in excavating for structures, but when sufficient materials are not available from this source or from adjacent excavation additional material shall be obtained from approved borrow pits. Backfill around or on sides of any structures or Portion of structures, shall be compacted to slopes shown on the drawings from the top of the wall, Provided that where the structure is located in compacted embankment, the backfill shall be compacted to the elevation prescribed for the adjacent compacted embankments. To avoid interference with the construction of abutment, wing wall or turn wall the contractor shall at points to be determined by the Engineer, suspend work on embankments forming approaches to such structures, until such times as the construction of the latter is sufficiently advanced to permit the completion of approaches without the risk of interference or damage to the works. Unless directed otherwise, the filling around the structures shall be carried out independent of the work on the main embankment. The fill material shall not be placed against any abutment or wing wall unless permission has been given by the Engineer but in any case not until concrete or masonry has been given by the Engineer but in any case not until concrete or masonry has been in position for 14 days. The embankment shall be brought up simultaneously in equal layer on each side of the structure to avoid displacement and unequal pressure. The sequence of work in this regard shall be approved by the Engineer or as specified by the Engineer. The material used for back filling shall be suitable material for embankment unless otherwise specified, obtain from excavation for structure and rivers or from borrow areas as directed. Backfilling shall be placed in every 20cm. Layers and thoroughly compacted. Unless otherwise specified. Topsoil vegetation or other organic materials shall be excluded from backfilling materials. Where the provision of any filter medium is specified behind abutment the same shall be laid in layers simultaneously with the laying of fill material. The material used for filter shall conform to the requirements for filter medium spelled out in stone protection unless otherwise directed by the Engineer. Where it may be impracticable to use the specified material the compaction shall be carried out by special compactors. Care shall be taken to see that the compaction plant does not hit or come too close to any structural member so as to cause any damage to them or excessive pressure against the structure. In placing and compacting backfill or embankment adjoining concrete pipes or small structures, sufficient material shall be carefully placed and compacted in layer equally along the sides of the pipes or structures in order to firmly establish line and grade before placing and compacting the adjoining embankment. The Contractor shall be responsible for any damage to structures caused by this operating in placing or compacting embankment or backfill material adjoining to structure, and shall repair damage to the full satisfaction of the Engineer. Construction traffic shall not use the prepared surface of the embankment without the prior permission of the Engineer. Any damage arising out of such use shall however, be made good by the contractor at his own expense. Embankment (and incidental backfill construction) shall be measured by taking cross sections at intervals in the original position before the work starts and after its completion and computing the volumes of embankment in cubic meters by the method of average end areas. The measurement of embankment to filling will be carried out as per embankment of filled section established after proper compaction as per specification. For the work of embankment filling no separate Payment will be given for borrow excavation. The contract unit rate for the embankment (including any incidental backfill construction) shall include the following:

- Setting out
- Compaction of original ground
- Scrapping or cutting continuous horizontal benches 0.20m wide on side slope of existing embankment or slopes as applicable.
- Compaction to specification requirements along with proper watering as required for maximum compaction.
- Shaping and dressing top and slope of the embankment and backfill including rounding off corners.
- Working on narrow widths of embankments.
- Restricted working as sites of structures.



- Excavation in all soil from designated borrow areas and transportation in all soil from designated borrow areas and transportation of the material to embankment site within all lifts and leads unless and otherwise specified and laying and spreading to proper slope & grade for compaction.
 - All labour, material, tools equipment and incidental necessity to complete the work to the specification
10. Concrete works

Concrete

Concrete shall consist of cement, graded aggregate and water thoroughly mixed and compacted to provide strength as detailed below or as directed by the Engineer or as specified in the approved drawings.

Proportion Cement/Sand/Coarse Aggregate	Minimum Compressive Strength of Concrete after 28 days
	200kg/cm ²

The proportion shown in the table above is given, as a guide to mix ordinary needed to achieve the specified strength.

The Contractor shall have to perform mix design for particular batch of cement and aggregate to achieve the required strength for important concrete works if required by the Engineer.

Machine Mixing

The materials for concrete shall be mixed in an approved mechanical mixer. The mixing time for each batch shall be about 3 minutes. The mixer shall not be loaded beyond their rated capacity nor shall be operated at a speed in excess of that recommended by the manufacturer. All mixing equipment shall be cleaned before commencing mixing and shall be kept free from set concrete. Mixed concrete shall be unloaded on impervious platform.

Hand Mixing

Where it is not possible to employ machine mixing and approval has been obtained from the Engineer, concrete shall be mixed by hand as near as practicable to the site where it is to be placed. Clean mixing platforms of sufficient areas for the proper execution of the work shall be provided. Cement and sand shall first be mixed dry on the platform and then dry mix shall be spread over the coarse aggregate uniformly and the whole mass shall then be mixed thoroughly turning over backwards and forwards. The water shall be entirely turned over in a wet state at least three times before being placed in site.

Placing and Compaction

Preparatory Works

The Engineer's approval in writing shall always be obtained before any concrete is placed in the Works. The formwork or area of disposition shall be cleaned as specified in Sub-Clause Formwork. All construction equipment and materials required, or which may be required, during the concreting work and for cooling and curing, shall be on site and fully prepared for the work. The Engineer's approval to place concrete will only be given after all these preparations and other relevant requirements of the Technical Specifications have been carried out and complied with. If concreting is to be executed at night or when otherwise daylight is not sufficient, the Contractor shall provide for sufficient lamps on site so that all elements of the site relevant for the concreting will be clearly visible. Struts, stays and braces, serving temporarily to hold the formwork for structures in correct shape and alignment, pending the placing of concrete at their locations, shall be removed when the concrete placing has reached an elevation rendering their services unnecessary. These temporary members shall be entirely removed from the formwork and not buried in the concrete. If necessary and/or directed by the Engineer, the Contractor shall cool any formwork that has become overheated or exceptionally dry through prolonged exposure to the sun. The Contractor shall ensure that all shuttering retains sufficient humidity content and does not become shrunken or warped. All soaking or spraying of shuttering shall be done with pure water. The Engineer may forbid altogether the placing of concrete in any formwork which he judges has become too hot and/or dry and that concrete members cannot be satisfactorily produced there from. No extra payment for cooling or soaking formwork shall be claimed,

and costs incurred by the Contractor, due to shuttering becoming too hot or dry, shall be deemed to be included in the rates.

Depositing in Works

The methods of conveying and depositing concrete shall be such as to prevent segregation of the materials, and shall be approved by the Engineer before concreting begins.

Concrete shall be deposited directly in the Works, without the need for rehandling, as soon as possible and not more than 20 minutes after mixing and, in any case, before the initial set has taken place. If any delay has occurred after mixing and the concrete has begun to set, it shall not be used in the Works and shall be removed from the Site. Normally, concrete for structures may be deposited at a maximum vertical height of 1.50 metres without the use of tubes, provided suitable measures are taken to prevent segregation and premature coating of upper reinforcing steel. When placing operations involves dropping concrete from more than 1.50 m height, it shall be deposited through sheet metal slides or other approved pipes. As far as practical, the pipes shall be kept full of concrete during placing and their lower ends shall be kept buried in the newly placed concrete. Concreting of any section or unit of the Works shall be carried out in one continuous operation and no interruption of the concreting will be allowed without the approval of the Engineer. Where deposition of concrete has to be interrupted, precautions shall be taken to ensure satisfactory adhesion of later batches of concrete to that previously placed. Where delays of more than one hour occur between successive concreting operations in one section or unit of Works, concreting shall only be resumed when, in the opinion of the Engineer, the previously placed concrete has had ample time to harden and the resulting joint shall be treated as a Construction Joint within the meaning and description of the Sub-Clause 5.9.1.1. When concrete is being placed, a competent steel fixer shall be in continuous attendance to adjust and correct the position of any reinforcement which may be displaced. The Contractor shall take care that during, and immediately after, depositing in the work of the concrete, the concrete will not be contaminated by dust, organic matter or other foreign material. Concrete that, in the opinion of the Engineer, has been contaminated will be regarded as inferior and shall be dealt with as described in Sub-Clause 5.3.2.9. Transportation of concrete directly over the fixed reinforcement during the depositing shall not be allowed without proper provisions to avoid displacing or any other harm to the reinforcement.

Depositing Concrete under Water

A retarding agent shall be added to the concrete, and Portland blast furnace slag cement (BS 12) shall be used. The cement contents shall not be less than 400kg/cu.m of concrete. The consistency shall be such that the concrete will flow out evenly from the tremie tube. Concreting shall commence immediately after approval of the bottom of the wall and after the reinforcing cage has been placed. If concreting has not been started within four hours after cleaning the bottom of the wall, the cleaning shall be repeated at the Contractor's expense. Continuity of concrete placing is essential and a continuous rate of at least 20 cu.m concrete per hour is desirable. Concreting of a wall shall be carried out without construction joints and executed under bentonite by the tremie method. The bentonite level within the wall shall be kept at a constant elevation, well above ground or water elevation outside the casing. The tremie tube shall be filled with concrete while slowly lowering a valve or plug. The tremie tube shall, at all times, be kept full of concrete up to the bottom of the hopper, while the discharge end shall be kept sufficiently submerged (2 to 6 m) in already deposited concrete to prevent surging of bentonite into the tube. The location of the discharge of the tremie tube, relative to the surface of deposited concrete, shall be kept under strict supervision at all times. If, by accident, the concrete in the tremie tube sinks below the bottom of the hopper, the tube shall be refilled in such a way that no air or bentonite is trapped in the tube. The first 0.5 cu.m of concrete to be deposited in a wall may consist of grout, with a consistency and quality corresponding to the rest of the concrete in the wall. Concreting shall be continued to such a level above the theoretical cut-off elevation (minimum 300 mm) in order to ensure the concrete below this cut-off elevation is of a satisfactory quality. The cut-off elevations are as shown on the Drawings unless otherwise directed by the Engineer. After one week of hardening of the concrete the top of the wall shall be cut-off at the theoretical cut-off elevation without damaging the reinforcement or the concrete under the specified cut-off level, and in such a way as to produce a horizontal bearing surface.

Depositing in Layers

Concrete shall be deposited in approved quantities and in horizontal layers of such thickness as to permit thorough compaction, expel air and bond with the layers below. However, in no case shall the thickness of the layer be deeper than 0.30 m. Each layer shall be placed and consolidated before the preceding batch has started its initial set. If, for unforeseen reasons, it is necessary to stop concreting before completion of the



layer then construction joints as specified shall be formed and further concreting will be suspended for at least 24 hours.

Compaction of Concrete

All concrete shall be thoroughly compacted immediately after deposition to expel air and to ensure the concrete is in full contact with all contained and embedded surfaces. Vibrators shall be used for compacting, unless otherwise specified or ordered by the Engineer. The type of vibrator to be used is subject to the approval of the Engineer. Vibrators of the immersion type shall have a frequency of 5,000 - 8,000 vibrations per minute for concrete with a slump of more than 80 mm and a frequency of 9,000 - 12,000 vibrations per minute for concrete with a slump less or equal to 80 mm. The Contractor shall provide a sufficient number of vibrators to properly compact each batch immediately after it is placed in the formwork. The Contractor shall also provide at least a 50 per cent duplication of all vibration equipment as standby during any period of concreting. Vibrators shall not be allowed to come into contact with the reinforcement or formwork and great care shall be taken to avoid over-vibration causing segregation or pockets in the finished mass. All personnel handling vibrators shall be trained in their proper use. Vibration shall not be applied directly or through the reinforcement to sections or layers of concrete which have hardened to the degree that the concrete ceases to be plastic under vibration. It shall not be used to make concrete flow in the formwork over distances so great as to cause segregation, and vibrators shall not be used to transport concrete in the formwork. Every care shall be taken to see that reinforcement and fittings attached to the formwork are not disturbed and that no damage is caused to concrete that has already set or to the internal face of the formwork by using immersion type vibrators. In areas of congested reinforcement, it may be necessary to use small diameter pokers and the Contractor shall supply suitable sizes of pokers for each part of the work. Vibration of concrete by hammering the formwork with hand tools shall not be permitted. Concrete that, in the opinion of the Engineer, has been compacted in a way that does not conform with the Technical Specifications as described above will be regarded as inferior.

Construction Joints

Construction joints shall be made only where located on the drawings prepared by the Contractor and approved by the Engineer. Construction joints shall be formed only on horizontal planes.

Concreting in Unfavourable Weather

Concreting shall not be permitted during heavy rain or stormy weather or when the concrete temperature rises above 32°C on discharge from the mixer. When the air temperature exceeds 25°C, concreting will only be permitted after special precautions, approved by the Engineer, have been taken to prevent early setting of the concrete, such as using chilled mixing water, keeping the aggregates and shutters continuously sprayed with water and erection of temporary sun shades over the working area. During concreting operations, the temperature of the placed concrete shall be recorded. The minimum internal temperature of the concrete within 24 hours after casting in place should not be more than 30°C in excess of the ambient temperature or more than 60°C. Since the temperatures in the project area frequently exceed 25°C the Contractor shall submit a Method Statement, describing all special precautions as described above for the approval of the Engineer. The measures to be taken shall generally comply with the requirements and/or recommendations as described in ACI 305-R77 ("Hot weather concreting"). All cracks wider than 0.3 mm caused by thermal stresses or other causes shall be repaired by the Contractor, by injecting epoxy-resin with a low viscosity. The epoxy resin shall be subject to the Engineer's approval. Any additional cost in connection with the above mentioned preparations and injections with epoxy-resin shall be included in the unit rate of concrete works.

Curing of Concrete

Until a period of 7 days has elapsed from the time of placing the concrete, it shall be kept protected against loss of moisture, rapid temperature change, rain and flowing water, mechanical injury and contamination by airborne dust and/or sand. All methods to be used for curing and protection of freshly placed concrete shall be subject to the prior approval of the Engineer. These methods shall include the use of curing membranes, watering, damp covers, shades and/or any other precautions that the Engineer may require. Curing membranes shall be sprayed on the surface of the concrete as soon as all free water has evaporated from the surface. In the case of forms that have been eased or struck before 7 days have elapsed from the date of placing concrete, the curing membranes shall be applied immediately after the shutter has been removed. In the case rain falls on the newly coated concrete before the film has dried sufficiently to resist damage, or if the film is damaged in any other manner, a new coat of the solution shall be applied to the affected portions. The Contractor shall submit details of the curing procedure he proposes to use, to the Engineer for his approval. During very hot weather conditions, the Contractor may be required to cool



and/or wet formwork containing concrete by spraying with water and this shall be carried out where directed notwithstanding and whatever other measures the Contractor may employ for the curing of the concrete. All materials spray equipment and an ample supply of water for curing shall be ready on site before any concreting starts. The Contractor may submit for the Engineer's consideration alternative methods of curing which will achieve a result at least as good as those specified, and the Engineer shall approve or reject such alternative methods without any reason being given. Concrete that is, in the opinion of the Engineer, not cured according to the approved curing procedure will be regarded as inferior

Faulty Work

Any portion of the work which is honeycombed or otherwise inferior shall, on the written instruction of the Engineer, immediately be cut out and reconstructed in an approved manner without extra charge. Plastering of defective Works shall not be permitted.

Record of Concreting

All pre-cast concrete elements shall have the date of casting engraved on them before the concrete has fully hardened. Any undated elements may be liable to be rejected by the Engineer. The Contractor shall take all measures necessary for the curing and protection of the elements after fabrication.

Cast-in Parts

The cast-in parts, such as lifting lugs, steel plates to fit the Rubber Seals, nosing angles, supporting structures, etc. shall be fixed in the positions as indicated on the Drawings or as directed by the Engineer. Anchor bolts must be free from rust, dirt or grease and be properly stored before using. The delivering, processing and fixing of the cast-in parts shall be deemed to be included in the rates for the steel structures.

Blockouts

Concrete blockouts shall be formed where metalwork and other various items specified under the Contract are to be installed by the Contractor. Where blockouts are to be made, the concrete surfaces shall be chipped, roughened, cleaned and kept moist for at least 4 hours. After such surfaces have been approved by the Engineer and the metalwork and such other items as specified above have been installed in position, the Contractor shall place reinforcement (if required) and cement concrete of M15 grade or concrete of the same type as that specified for the surrounding concrete, which ever is of a higher grade. If blockouts are filled with concrete as specified above, care shall be taken that the freshly placed concrete is tightly bonded to the previously placed concrete and that complete adhesion between the concrete and all metalwork and other items in the blockouts is obtained. The cost of making and backfilling blockouts shall be included in the unit rate of the respective concrete types in the Bill of Quantities.

Grouting

All grout required to be used for spaces under ready made equipment metalwork (gates, guides etc.,) or as may be required by the Engineer shall be furnished by the Contractor. Unless otherwise specified, all materials shall conform to the requirements specified herein for concrete. Grout shall consist of one part Portland cement to three parts sand by volume with sufficient water to obtain a consistency suitable for the intended use. All grouting operations shall be performed in the presence of the Engineer.

11. Form Work

General

Formwork shall include all temporary moulds for forming the concrete, including the 'herring bone' steel, together with all temporary structures required to support such moulds. The Contractor shall submit drawings and calculations showing details of the formwork he intends to use, to the Engineer for approval. The drawings and calculations shall be in accordance with the provisions stipulated in Sub-Clause 1.04.3 of these Technical Specifications. The drawings shall show the materials proposed and indicate details of construction, such as sizes of members and spacing, and position of waling, struts, bolts and wedges. Formwork shall not be constructed until the drawings and the calculations, if applicable, have been approved by the Engineer. Such approval shall not relieve the Contractor of the responsibility for the sufficiency of the formwork. Any changes or modifications to the formwork required by the Engineer shall be borne by the Contractor. Formwork shall be of suitable design and substantial construction to carry the loads resulting from placing and vibrating wet concrete and any incidental loads such as construction loads, wind and other forces, without inadmissible bulging, distortion or deflection. Formwork shall be sufficiently tight to prevent loss of water or mortar from the concrete. Special attention shall be paid to formwork where pokers or shutter vibrators are to be used.



Materials for Formwork

Formwork for the concrete structures shall be made from timber or plywood or steel. The timber or plywood shall be resistant to deterioration by water and shall be fixed and jointed in such a manner as to give a perfectly smooth and even finish to the concrete. It shall have a thickness of not less than 17.5 mm in case of timber and of 9mm for plywood. The steel formwork shall be accurately aligned and with close fitting joints. The outside of the steel formwork shall be painted in a light colour to prevent extreme temperatures due to solar radiation. Only with the approval of the Engineer can formwork be made from good quality seasoned timber, free from loose knots, shakes and warped surfaces. This timber shall not be less than 30 mm in thickness and the board faces in contact with concrete and the board edges shall be planed smooth and joints shall be tongued and grooved. The Contractor shall submit to the Engineer, before commencing construction, a set of forms complying with the above requirements, but such submission to the Engineer or approval by him shall not relieve the Contractor of any of his responsibilities under the Contract for the successful completion of the structure.

Fixing of Formwork

Formwork shall be fixed in perfect line and true plane, with no crevices and joints, and shall be securely braced, supported and wedged so as to retain its position without displacement or deflection during the placing and compaction of the concrete.

Joints in formwork shall be made so that no leakage of grout can occur from the concrete. All joints shall be either horizontal or vertical, unless the form of the finished concrete requires them to be otherwise. Chamfers measuring 30 mm by 30 mm are to be made to all exposed edges of concrete, unless otherwise indicated in the Technical Specifications or ordered by the Engineer.

Subject to the approval of the Engineer, internal ties may be used. All such fastening shall be so arranged that when the forms are removed, no metal left permanently in the work shall be within 50 mm of any surface.

The use of wire ties for supporting the forms shall not be permitted in concrete walls which are to be subject to water, or when the finished surface, required as determined by the Engineer, is to be permanently exposed; wire ties used for other concrete works shall be cut off flush with the concrete surface, after the forms are removed.

Connections shall be so formed as to permit the easy removal of the forms without hammering, etc., and without the necessity of levelling against the surface of the concrete.

Adequate access holes shall be left for the purpose of inspecting, cleaning out the forms and for placing and compacting the concrete.

Scaffolding (if required) shall be firmly constructed to the satisfaction of the Engineer. No separate payment shall be made for scaffolding.

Before placing any concrete, all bolts and the like (if required and which are to be built in) shall be fixed in their correct positions, and cores and other devices for forming holes, openings, etc., shall be fixed to the forms. No holes shall be cut in any concrete unless approved by the Engineer.

Surfaces of the forms to be in contact with concrete shall be free from adhering foreign matter, projecting nails and the like, grooves, splits or other defects.

A non-staining commercial mineral oil or other approved material shall be applied to the faces of the forms before concreting to prevent adherence to the concrete. Care shall be exercised to prevent the material applied to the faces of the forms from coming in contact with the reinforcement, but if this should inadvertently occur, the reinforcement shall be cleaned to the satisfaction of the Engineer.

When forms have been built and have been prepared ready for concreting, they will be inspected by the Engineer and no concrete shall be placed until the forms have been approved by him. In order to avoid



delays in obtaining approval, the Contractor shall inform the Engineer, at least 24 hours in advance, of his intention to have the forms ready for inspection.

Dimensional Tolerances

Any deviation on the minus side in measurements of the finished concrete works is not permitted. Unless specifically indicated on the duly approved Drawings, tolerances on the plus side can only be accepted up to a range of 4% at the most with a maximum of 5 mm.

Cleaning and Re-using of Shuttering

Before any concrete is placed, the forms shall be properly cleaned and washed out with water and air under pressure to remove saw-dust, shavings and all other foreign matter. All water shall then be trained and mopped out from the formwork. If side forms are to be re-used, all surfaces shall be cleaned and shall be completely free from remains of concrete or mortar. If, in the opinion of the Engineer, moulds are not acceptable for re-use, they shall be either properly repaired or be substituted by other moulds. Substituting moulds shall comply with the requirements as specified above.

Removal of Forms

Forms shall be removed only under skilled supervision and in such a manner as to not damage the concrete. Forms shall not be removed before the concrete is sufficiently set and hardened. Nevertheless, the forms shall not be struck without the prior approval of the Engineer. The minimum periods which shall elapse between placing concrete and the removal of the forms are given in Table 5.8.

Table 5.8: Removal of Forms

Type of formwork	Minimum net period before removal in days
Vertical : Columns and walls	2
Soffit : Slabs	5
Beams	8
Drops : Slab	16
Beams	18

Compliance with the above requirements shall not relieve the Contractor of his obligation to delay the removal of the forms if the concrete has not sufficiently set. Due to variations in site temperatures and depending on the curing conditions, the Engineer may, at his discretion, vary the time listed above. Any damage to the concrete, which may occur by the removal of the forms or by overloading, shall be fixed at the Contractor's expense and to the satisfaction of the Engineer.

Finishing of Concrete

Surface finishing shall be classified as follows:

- Ordinary finish;
- Wire Brush finish.
- Power Trowel finish

Ordinary Finish

If not otherwise specified, exposed surfaces shall be given an ordinary finish. Immediately following the removal of forms, fins and irregular projections shall be removed from surfaces. On all surfaces, the cavities produced by form ties and all other holes, broken corners or edges, and other defects shall be thoroughly cleaned, and after having been thoroughly saturated with water shall be carefully pointed and trued with an approved non-shrinkable polymer modified cement mortar with at least the same qualities of the adjacent concrete. The concrete shall then be rubbed if required or cured. Construction joints in the work shall be left carefully tooled and free of mortar and concrete. The resulting surfaces shall be true and uniform. Exposed surfaces not protected by forms shall be struck off with a straight-edge and finished with a wood float to a true and even surface. The use of additional mortar to provide a grout finish will not be permitted.

Wire Brush Finish



All surfaces that will come into contact with cementitious grout or epoxy bonding grout shall be ridged finished by means of a wire brush. As soon as the forms are removed, and while the concrete is still comparatively green, the surface shall be thoroughly and evenly scrubbed with stiff wire or fibre brushes, using a solution of muriatic acid in the proportion of one part acid to four parts of water until the cement film or surface is completely removed and the aggregate particles are exposed, leaving an even pebbled texture presenting an appearance grading from that of fine granite to coarse conglomerate, depending upon the size and grading of aggregate used. When the scrubbing has progressed sufficiently to produce the texture desired, the entire surface shall be thoroughly washed with water to which a small amount of ammonia has been added, to remove all traces of acid.

Power Trowel Finish

Where indicated in the drawings as power trowel finish, the surface will be finished with a steel trowelled 3 mm thick floating coat of neat cement. Immediately after trowelling and removing excess laitance, a well-mixed cement slurry consisting of ordinary Portland cement or coloured cement and water solution shall be mixed with hardener and sprinkled over the surface in a uniform layer at maximum rate of 2.5 kg per square metre. The cement slurry shall then be steel trowelled perfectly smooth.

12. Gates, Trash rack and Gate Hardware

Design, Drawing and Data

No drawings other than those included in the Bidding Documents shall be provided by the Employer. The Drawings provided show general details only. The Contractor shall therefore prepare the necessary detailed Design Drawings and data required for the fabrication and installation of the gates/trash rack and other metalworks. Steel gates/trash shall be designed/fabricated by a firm which has reasonable past experience. If the Contractor lacks sufficient experience in fabricating gates/trash, a specialist firm shall be engaged. Any fabrication or procurement, prior to approval of the design, drawings and the relevant data, shall be at the Contractor's own risk. The Engineer has the right to order the Contractor to make any change in the design, drawings and data so as to make the gates/trash and metal works conform to the requirement of the under mentioned specifications without additional cost to the Employer. However, approval from the Engineer on the Contractor's design, drawings and data shall not relieve the Contractor of any part of the Contractor's responsibility. Before proceeding with fabrication or procurement of gates and metal-works, the Contractor shall submit two (2) sets of the drawings and data showing specification of materials, assembly, lift capacity and detailed dimensions to the Engineer for approval. The costs of preparing the design, drawings and data, and submitting such things to the Engineer shall be included in the unit rates in the Bill of Quantities for furnishing and installing the gates/trash and other metal-works.

Design to Suit Climate

The water control equipment to be supplied, shall be designed with due regard to the climatic conditions prevailing in the Project area, particular care being taken to accommodate expansion and contraction due to temperature changes. Water control equipment shall be suitable for operating in ambient air temperatures from 5° C to 45° C but parts exposed to the sun may reach higher temperatures.

Materials, Stresses and Workmanship

The water control equipment shall be designed and constructed in accordance with the requirements of BS 153 except where inconsistent with the terms of the Specifications. The deflection of gates/trash shall be restricted to 1/600 of their clear span.

Minimum Thickness

An allowance of 2 mm shall be added to the thickness of gates/trash skin-plates/screening members over and above the calculated thickness required to meet the design stresses, but in no case shall the actual skin-plate thickness be less than 8 mm, unless otherwise shown on the Drawings. Unless otherwise shown on the Drawings, plates (other than skin-plates) rolled steel angles and tee sections used in the construction of gates shall have a minimum thickness of 10 mm and the webs of rolled steel beams and channel sections shall have a minimum thickness of 9 mm. Unless otherwise shown on the Drawings, metal-works which will be permanently or semi-permanently submerged, such as that used for embedded guides, frames, etc., shall have a minimum thickness of 10 mm, with the exception of rolled steel beam and channel sections which shall have a minimum thickness of 7.5 mm.



Gates/trash rack Design

Each gates/trash shall be designed to withstand and operate against the seating head of water specified on the relevant Drawings with no water downstream and of being raised clear of the orifice soffit. Each gate shall consist of framing incorporating guide grooves, sealing faces and a spindle guide bracket supporting members specified on the Drawings, movable gate leaf with sealing faces and operating gear.

Framing and Gear Supporting Members

The gates/trash framing shall consist of steel guide grooves fabricated from a standard MS sections with sill, lintel and spindle guide bracket supporting members, where specified on the Drawing, and shall all be connected to the grooves by bolts at their ends. Gear for supporting members shall be angle sections or other suitable sections connected to the grooves by bolts at their ends. The groove members shall extend upwards to support and guide the gate throughout its travel and shall be arranged for bolting on to the concrete headwall, or casting into gate slots, as shown on the Drawings. The framing shall be fitted with machined non-ferrous or stainless steel faces upon which the gate shall slide and seal. Arrangements shall be incorporated to permit the framing to be accurately aligned and levelled and finally held in position before being grouted to the concrete headwall, or gate slot filled with concrete. The gear supporting members shall be designed to resist the loads resulting from operating the gate.

Gate

The gate shall consist of a steel skinplate supported by horizontal stiffening members connected to vertical side guiding and stiffening members contained within the grooves. Arrangements shall be provided for attaching the gate to the operating spindle by a non-ferrous hinge pin.

Slide Gates - The gate shall be fitted with machined non-ferrous sliding faces and approved rubber seals, as detailed on the Drawings, to achieve an effective watertight seal.

Roller Gates - The gate shall have cast iron self-lubricating rollers with ARMCO "Lubrite", or similar, bushings.

Operating Gear

The operating gear shall consist of a hand operated self-sustaining gear capable of operating the gate against the maximum water loading conditions specified, and capable of positively holding the gate in any position when the handwheel or crank handle is released. The operating gear shall be capable of being operated by one man. The gear units shall consist of a bronze operating nut engaging with a mild steel operating screw attached to the gate. The lifting mechanisms shall be either Armco type HB 18 to 24 Armco type for gates requiring only a single lifting mechanism or Armco type CPE 2 or 4 for gates requiring tandem lifting mechanisms with one stem left threaded and one right threaded. Other proprietary lifting mechanisms of equivalent specification to the Armco units can be supplied with the prior approval of the Engineer. All gear sprockets and pinions shall be machine cut with ratio and strength adequate to withstand operating loads. Gears shall be enclosed with casings to avoid dust and rain. To prevent unauthorised use, operating gear shall be provided with appropriate locking devices. The lift housing or handwheel shall be provided with a cast-in direction arrow and the word "OPEN" to indicate the direction of operation, to open gates. Lift mechanisms shall be provided with a cast iron stop nut to allow adjustable end-stop travel.

Bolted Joints

The Contractor shall supply all the necessary bolts, nuts, washers etc, for fixing the metalwork, together with a suitable number of spare bolts, nuts and washers. Bolted joints subject to vibration shall be securely locked. All bolt holes shall be drilled and the outside edges slightly countersunk. Friction grip bolts, nuts and washers shall comply with BS 4604, Part 1. They shall be used on all bolted joints which are liable to vibrate and elsewhere to the approval of the Engineer.

Field Connections

Field connections shall, whenever possible, be bolted connections. Welded field connections will be permitted where it is considered by the Engineer impractical to form bolted connections, in which case the weld preparation shall be carried out in the manufacturer's works before despatch and the prepared surfaces shall be fully protected for transport to, and storage on, the Site. The Contractor shall supply the electrodes for completing the connections on site. Connections to be welded at Site shall be made by the Contractor's welders using their own welding plant.

Standardisation and Maintenance

Wherever possible, corresponding parts shall be finished with sufficient accuracy to ensure that they are interchangeable, and where required by the Engineer interchangeability shall be proved by actually



changing the various parts. The design shall be such that all parts of the installations are accessible for inspection and maintenance and for use where continuity of operation is a first consideration. Drainage holes shall be provided in members which are likely to collect or retain water.

Advance Delivery of Anchor Members, etc.

Anchor members, seating plates etc. for building into primary concrete work to facilitate alignment and fixing of embedded parts shall be supplied by the Contractor and delivered in advance of the remainder of the parts, in accordance with a programme arranged by the Contractor and agreed by the Engineer to fit the overall construction programme.

Preparation and Storage of Bolts

Before they are despatched to the Site, the Contractor shall protect all bolts (other than rag-bolts, Lewis bolts and galvanised bolts) by heating them and dipping them while hot into boiled linseed oil, or shall provide such other protection as may be approved by the Engineer. The Contractor shall pack the bolts carefully so that the threads do not become damaged or dirty during delivery, storage and transport to Site.

Packing and Marking

The Contractor shall pack, mark, and as necessary protect, all parts for delivery, unloading, storage and subsequent transport to Site in accordance with the relevant section of BS 1133.

Attention shall be given to the protection of parts which are liable to deterioration in the climatic condition prevailing in the Project Area, and the form of packaging shall be such that no damage to the equipment shall result from normal handling or prolonged storage in the open.

Small parts shall be boxed and suitably marked on the outside. Larger parts shall be protected as necessary and shall be suitably marked and listed. Lists of contents of crates, boxes and bunches shall be supplied and shall be handed over to the Engineer on delivery of each consignment. Attention shall be given to the method of marking sub-assemblies and other components to assist in identifying them at Site. The method of marking employed shall enable any particular component or sub-assembly to be easily identified from the Contractor's Drawings and also from the shipping specification. Where practicable, components for each individual site shall be packed separately so that all items required for each site may be easily separated and transported to individual sites.

Erection at Place of Manufacture

Each gate and operating gear shall be fully assembled at the place of manufacture for inspection by the Engineer and, if considered necessary, testing before despatch. The Contractor shall arrange for the manufacturer to give the Engineer, in writing, a minimum of fourteen (14) days' notice prior to the date when the assemblies will be ready for inspection. No parts shall be despatched from the manufacturer's works until they have been marked to ensure correct re-assembly at Site.

Inspection at Place of Manufacture

Inspection of materials, workmanship, manufacture of the gates, and the trial assembly of components at the place of manufacture, in accordance with the preceding Sub-Clause of these Specifications, shall be carried out by the Engineer at his discretion and shall include the following:

- a. Checks on steel and other materials used to ensure compliance with accepted standards. Manufacturer's chemical analysis sheets and report sheets showing results of tests on any physical properties which may be called for.
- b. Dimensional checks to ensure conformity with approved Drawings.
- c. Weld inspection and testing where required.
- d. Inspection of cleaning and painting of steelwork.
- e. Witnessing erection and testing at the manufacturer's works.
- f. Inspection of method of packing components for despatch.

Instructions for Site Erection

As soon as practicable four (4) sets of instructions, detailing the method of Site erection of the various types of Water Control Units to be supplied under the Contract, shall be furnished by the Contractor and handed over to the Engineer. The instructions shall be in English and shall refer to identification marks on the various components.



Operating and Maintenance Manuals

Manuals with sufficient detailed instructions, in English, for operating and maintaining the various items of water control shall be provided by the Contractor. The Contractor shall prepare a draft of the instructions for the approval of the Engineer, and thereafter shall supply six (6) sets of the Manuals, together with any relevant reduced-scale drawings, catalogues, parts lists etc., on stout paper bound into durable covers for use at the various sites. The manuals shall be provided as soon as possible after the delivery of the water control units.

Spare Parts, Special Tools, etc.

Spare parts, as recommended by the manufacturer, together with any special tools, grease guns, etc. required for maintaining the gates, shall be provided and delivered to the store at the Project Office in Nepalgunj. The spare parts shall generally consist of one (1) set of all gate fittings, seals, etc., sufficient to fit up one gate of each type, together with recommended spares.

Storage of Fabricated Metalwork

Fabricated steelwork when stored at the Works, and at the Site, shall be properly laid out and stacked in an orderly manner. The method of stacking shall ensure that the steelwork is kept clear of the ground and that no pools of water or debris can collect thereon; each layer shall be separated from adjacent layers by stout timber battens or packings.

Erection of Metalwork

The erection of the metalwork at the Site shall comply with BS 449, Part 5 and be in accordance with the recommendations of BS 5531. When lifting and fitting metalwork into position care shall be taken that the parts thereof are not strained, twisted, bent or damaged in any way whatsoever. Should any parts be strained, twisted, bent or damaged they shall be rectified in such manner as the Engineer may approve. Any parts that are, in the opinion of the Engineer, too badly damaged for rectification in the manner aforesaid shall be replaced by new material. All rectification and/or replacement shall be carried out at the Contractor's own cost. The stacking of metalwork, or the individual parts thereof, that are stored in positions as may, in the opinion of the Engineer, cause damage to any of the members or parts thereof or to any portion of the Works, shall not be permitted. Proper and suitable slings, blocks, tackles, shear legs, derricks, cranes and other types of lifting appliances and equipment shall be provided, whenever needed for the erection of the metalwork and the use of all such equipment shall be in accordance with the recommendations of CP 3010. Every care and precaution shall be taken to ensure the safety of all persons engaged in such work and to prevent damage to any metalwork in the process of being erected or already erected or to any part of the Works from the results of any mishap, failure, breakdown or other accident to any of the aforesaid lifting appliances and equipment. The lifting of metalwork in bundles or in such quantities or in any manner which, in the opinion of the Engineer, is liable to cause damage or strain or is in any way considered to be insecure or unsafe shall not be permitted. The use of high strength friction grip bolts and nuts in the erection of metalwork shall be generally in accordance with the provisions of BS 4604: Part 1, except that the method of tightening load indicating bolts or bolts incorporating load indicators shall be in conformity with the manufacturer's instructions.

Testing after Erection

After erection, the Contractor shall check that the gates and gate hardware are complete and in working order, and satisfactorily fulfils the purpose for which it is intended. The Contractor shall test all gates to the satisfaction of the Engineer. Each gate shall be made to move through a full cycle of operation using the equipment specified for the purpose, unless otherwise instructed, and each gate when closed shall affect a watertight seal to the approval of the Engineer.

Painting of Gates/ Trash racks

The painting of gates/ trash racks shall be done as specified in the Clause 7.2 Protection of Metalworks of the Technical specification

13. Gabion

Gabions shall consist of wire netting double knotted to form a hexagonal mesh of 100 mm X 120 mm. Unless and otherwise specified in the BOQ. The stone for filling gabions shall be hard clean stone of one-man size i.e. between 20 cm & 35 cm. The minimum weight of Zinc coating per unit area of uncoated wire surface shall



be at least 135 gm/m². The tensile strength of the wire shall be between 290 to 540 N/mm². To meet the required length of apron and slope protection, dimension of gabion boxes other than specified may also be fabricated as directed by the Engineer.

Laying of Gabion Mattress

Before placing position the gabions shall be stretched their full size and shall be wired at all edges. Each gabions shall be made of standard galvanized iron wire fulfilling the specifications and wired with adjoining gabions. Each gabion shall be carefully packed by hand with stone so placed as to minimize voids. After stuffing the stone, the mouth of the gabion shall be closed by means of galvanized iron wire net. Where it is shown on the Drawings or directed by the Engineer, filter cloth or equivalent approved by the Engineer shall be placed under the gabion mattresses. Regardless of numbers, size and weight of the boulders measurement for payment of gabion mattress will be made at the unit rate per sq. meters. The unit rate shall include all costs of collecting and loading onto truck, in quarry, hauling, unloading, storing of boulders, supply of materials and knitting of wire baskets, packing boulders into wire baskets and placing the mattress to the place including furnishing filter cloth under the mattress, if any.

14. Concrete Block Pitching

Materials

The concrete blocks for pitching shall be cast-in-situ to the sizes specified using concrete class M10. The dimension of the blocks shall as shown on the drawings or such dimensions as ordered by the Engineer. The blocks shall be placed on a prepared gravel backing, 0.20m or 0.30m thick or as the Engineer directs otherwise, to a true and even surface with a gap of 10 mm between the blocks. The Concrete shall comply with the requirement of as directed by Engineer

15. Geo-textiles

Geo-textile used for sub-surface drains shall be made of polyethylene or polypropylene or polyester or similar fibres, either woven or non-woven. Unless otherwise shown on the Drawing, the geo-textile shall:

- sustain a load of not less than 10 kN/m at break and have a minimum failure strain of 10 percent when determined in accordance with BS: 6906 or shall have a grab tensile strength more than 0.4 kN/m and grab elongation corresponding to this limit in accordance with ASTM D4632.
- have apparent opening size as shown on the Drawing. If no size is shown on the Drawing, then the apparent size shall be 0.1 mm.
- allow water to flow through it at right angles to its principal plane, in either direction at a rate of not less than 50 litres/sq.m./sec. under a constant head of 100 mm, determined in accordance with BS: 6906 (Part 3) or ASTM D4491, unless otherwise shown on the Drawing. The flow rate determined in the test shall be corrected to that applicable to a temperature of 15°C using data on variation in viscosity of water with temperature.
- have a minimum puncture resistance of 200 N when determined in accordance with ASTM D4833.
- have a minimum tear resistance of 350 N when determined in accordance with ASTM D4533.

The higher tensile strength alignment of the geo-textile should in cross sectional direction. Unless otherwise specified, the overlap between two pieces should be at least 0.50 m. The supplier shall provide a method statement detailing installation procedures. Prior to deliver material at site the supplier shall submit a representative geo-textile sample minimum 4.0 m², to be retained by the engineer for purpose of comparative testing together with materials sampled from product delivered to site.

16. Gravel Filter

Unless otherwise directed by the Engineer, gravel filter shall be placed and compacted under the concrete, back of weep holes, and boulder pitching. The filter shall be as specified in the Drawings or as directed by the Engineer. The granular material used for the graded filter shall be obtained from the sources approved by the Engineer, and be hard, dense and free from clay and other foreign matters. It shall be well graded in accordance with the following limits:

- maximum size shall be 40 mm.
- grading coefficient (60% size/10% size) shall be greater than 4.
- the 15% size shall be less than 5 times the 85% size of the soil to be protected.



- the 15% size shall be less than 20 times the 15% size of the soil to be protected.
- the 50% size shall be less than 25 times the 50% size of the soil to be protected.
- the 15% size shall be greater than 5 times the 15% size of the soil to be protected.

The grading of the soil to be protected shall be determined by the Contractor at locations directed by the Engineer. The filter shall be placed in two equal layers. The lower layer shall contain finer material and the upper layer the coarser material. The filter shall be designed and compacted as approved or directed by the Engineer.

17. Stone masonry

Mortar for all stone masonry, unless specified, shall consist of one part Portland cement and four parts of sand (by volume) and sufficient water to produce a proper consistency. All stone used shall be properly cleaned and shall be approved by the Engineer. Before placing, stone shall be wetted. Stone masonry shall be placed on properly prepared and firm foundation in accordance with the drawings or as directed by the Engineer. All stone masonry shall be kept wet continuously for at least 4 days, unless otherwise specified by the Engineer. If after completion of any stone masonry works, masonry does not conform to the lines and grades shown on the drawings, it shall be removed and replaced by the contractor at his expenses unless the Engineer grants permission in writing to patch or replace part of the defective area to his satisfaction. Measurement for payment shall be according to the lines shown in the drawings or as determined by the Engineer. The volume of all opening embedded pipes and recesses shall be deducted. Stone Lining Thickness of stone lining shall be as given in BOQ or in drawings or as specified by the Engineer. Mortar for lining unless otherwise specified shall be of one part Portland Cement and three parts of sand (by volume) and sufficient water to produce a workable consistency. Mortar shall be placed upon a firm clean foundation, clean angular quarry stones or clean cut boulders which is flushed upon the required depth of lining. A smooth outer surface on the lining shall be done by keeping the surface continuously wet for at least 4 days or as specified by the Engineer. Measurement for payment shall be made according to the lines and grades as shown in the drawings or as determined by the Engineer.

18. Dry Boulder Packing

Boulder for packing shall be sound, hard, durable and fairly regular in shape. Stone subject to marked deterioration by water or weather shall not be used. All stone shall be taken from approved sources. The stones shall be fine or rock quarrying of granite, quartzite, or similar materials. Boulder packing comprises pieces of rock, which shall be hard durable and free from incipient fractures and slumps, whose shortest dimension shall not be less than one half of their largest dimension. The material shall be from an approved location.

19. Filter Materials

The material for filter shall consist of sound gravel, stone ballast and coarse sand uniformly graded from 5mm to 75mm. For a single layer filter the compacted thickness of the filter shall not be less than 200 mm. for a multi-layer filter, the compacted thickness of layer filter shall not be less than 115mm. Riprap comprise of rock shall be hard durable and free from incipient fractures and slumps, whose shortest dimension shall not be less than one half of their largest dimension. The material shall be from an approved location.

20. Plastering

In case of brick the joints shall be raked out to a depth of 12.5 mm and the surface shall be cleaned, kept wet before plastering as directed by the Engineer. In case of concrete surface it shall be rendered rough, washed and cleaned before plastering. Cement mortar plastering should be applied having total thickness of 12.5 mm for wall and ceiling or specified.

21. Stop log

Timber for stop log shall be of salwood of best quality, free from saps, fissures, knots, sare and/or other defects. The Engineer reserve the right to approved or disapprove the adequacy of the stop log proposed by the contractor's

22. Water stop, Joint filler and sealer

Scope

The Contractor shall furnish and install waterstop of polyvinyl chloride in the shape and dimensions specified, and in the locations as shown on the Drawings, or as directed by the Engineer. For convenience



of placement in forms, a waterstop utilizing a split flange may be used; however, prior to placement of final concrete, the split flange portion shall be jointed in an approved manner such that no concrete or mortar can enter between the two split portions of the flange. Unless otherwise specified, two kinds of water stops, 230 mm wide waterstops shall be used depending on the magnitude and importance of the works as designated on the Drawings or as directed by the Engineer.

Material

Waterstops shall be manufactured by the extrusion process from an elastometric plastic compound, the basic resin of which is one hundred (100) per cent polyvinyl chloride (PVC). The product shall be dense, homogeneous and free from holes and other imperfections. The waterstops as described herein shall have the following physical properties as per IS:15058:2002

Specific gravity	1.33 + 0.03 at 23°C	
Tensile strength	13.8 Mpa	(IS8543 Part 4-sec 1)
Ultimate elongation	285%	(IS8543 Part 4-sec 1)
Brittleness	- 25°C	(Annex of IS 9766)
Hardness	65	(IS 13360 Part 5 sec 1)
Maximum water absorption	0.6	Annex Of IS:5058:2002
after 1 days at 27°±2°C	5%	

The Contractor shall provide the Engineer with a sample to be used in the Works and the manufacturer's test certificate for the Engineer's approval, before issuing the purchasing order to the suppliers, and shall, if requested, supply a sufficient length of each sample for confirmatory tests to be carried out in accordance with the appropriate test procedure, at the Contractor's own expense.

Workmanship

The Contractor shall furnish all materials, equipment and electric power required for making field splices and installing the waterstops. Field splices for waterstops shall be made by cutting the waterstops as required, heating the ends to the melting point and jointing them to form the desired splice. The heating of the splice ends shall be made by means of the splicing machine recommended by the waterstop manufacturer or by any other approved electric heating device acceptable to the Engineer. Care shall be taken when installing the waterstops to ensure that the centres of the waterstops coincide at the joints. The Contractor shall suitably support and protect the waterstops during the progress of the Works. The stop-boards on each side of the waterstop shall be accurately wrought to match the profile of the waterstop. The concrete shall be carefully compacted under and around the waterstop so as to leave no cavities.

Dowel Bars

In the contraction joint, dowel bars shall be provided, as shown on the Drawings, or as directed by the Engineer. The dowel bars shall be of straight plain round steel bars conforming to the requirements specified for reinforcement bars in Clause 5.8 of these Specifications. In joints, the part of the dowel bar to be free to move shall be encased in rigid PVC hose, or pipe, or metal sleeve, or other approved materials and fitted with a compressible cap of joint filler to prevent bonding and shall be placed at intervals shown on the Drawings or as directed by the Engineer. The free end of the dowel bar shall be coated with an approved bitumen bond breaking compound. The diameter of the sleeve shall be the minimum necessary to allow free sliding movement of the bar after concreting. The other half shall be bonded firmly on one side of the joint.

Joint Filler

The Contractor shall supply and fix pre-moulded joint fillers in expansion joints as shown on the Drawings. Unless otherwise specified, the joint filler shall be resin bonded cork such as Expandite "Hydrocor" or similar approved. It shall be obtained from manufacturers approved by the Engineer and shall be stored and fixed in accordance with the manufacturer's instructions. Resin bonded cork filler shall comply with the United States Federal Specification HH-F-341e Type II Class B with the following limitations when tested in accordance with the said specification:

- the load required to compress the material to 50% of its thickness shall be more than 0.035 N/sq.mm and less than 0.35 N/sq.mm.
- the recovery after compression to 50% of the original thickness shall be not less than 95% of the original thickness.



The Contractor shall provide the Engineer with a sample to be used in the Works and the manufacturer's test certificate for the Engineer's approval, before issuing the purchasing order to the suppliers, and shall, if requested, supply sufficient of each sample for confirmatory tests to be carried out in accordance with the appropriate test procedure. The joint filler of the thickness specified shall be cut to shape, and fixed to fill the whole space between the concrete faces of the joint which is not otherwise filled by waterstop or joint sealer. Abutting pieces shall be placed in close contact and the joints covered on each side to prevent passage of cement grout.

Joint Sealer

Joint sealer shall be Expandite "Thioflex 600 based on a liquid polysulphide polymer", or similar approved. It shall be obtained from manufacturers approved by the Engineer, and shall be used in accordance with the manufacturer's instruction inclusive of the supply and application of any priming materials. An approved bond breaker shall be supplied for placing between the sealant and the joint filler. The Contractor shall provide the Engineer with a sample to be used in the Works and the manufacturer's test certificate for the Engineer's approval, before issuing the purchasing order to the suppliers, and shall, if requested, supply sufficient of each sample for confirmatory tests to be carried out in accordance with the appropriate test procedure. Measurement for payment of joint sealer shall be made in running meter actually placed in the joint in accordance with the Drawings, or as directed by the Engineer.

23. Steel Sheet Piling

Scope

The work shall consist of furnishing, transporting, and installing steel sheet piling as shown on the construction drawings.

Materials

Sheet Steel Piling shall conform to the requirements of ASTM Specification A 328, Standard Specification for Steel Sheet Piling; A 572, Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; or A 857, Standard Specification for Steel Sheet Piling, Cold Formed, Light Gage. Appurtenant Materials (steel plates, bars, structural shapes) shall conform with ASTM Specification A 36, Standard Specification for Carbon Structural Steel. Protective Coatings shall be a coal tar polyamide epoxy paint suitable for use on structural steel and shall meet Paint Specification No. 16, Type 1, Class II, of the Steel Structures Painting Council (SSPC) or a zinc (hot-dip galvanized) coating conforming to the requirements of ASTM Specification A 123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

Site Preparation

All clearing within the area to be occupied by the steel sheet piles shall be completed before the piling is installed.

Placement of Steel sheet Piling

Steel sheet piling shall be installed as specified in the construction plans by one of the following methods:

a. Driving Sheet Piling

The Contractor shall provide driving heads and other devices for sheet pile driving and shall conform to the recommendations of the manufacturer. The piling shall be driven in such a manner as to insure perfect interlocking throughout the entire length of each pile. The piles shall be held in proper alignment during driving by means of assembling frames or other suitable temporary guide structures. Temporary guide structures shall be removed when they have served their purpose. At any time the forward edge of the sheet pile wall is found to be out of correct alignment: (a) the piling already assembled and partly driven shall be driven to the required depth, and (b) taper piles shall be then driven to bring the forward edge into correct alignment before additional regular piling is assembled and driven. The maximum permissible taper in a single pile shall be one-fourth inch per foot of length. The Contractor shall not attempt to drive sheet piles beyond the point of refusal, as indicated by excessive bouncing of the hammer or kicking of the sheet pile.

b. Trench Embedment of Sheet Piling

Steel sheet piling is embedded by excavating a trench and backfilling to the dimensions and lines shown on the drawings. Backfill material shall be placed and compacted to the density of the surrounding material, taking care not to displace or damage the steel sheet piling or its protective coating. Backfill material shall contain no frozen soil, sod, brush, roots or other perishable material.

Cutting of piles

The Contractor shall cut off the steel sheet pile at the specified elevations. The length of the pile cut off shall be sufficient to permit the removal of all damaged material.



Defective piles and damaged coating

Any sheet pile ruptured in the interlock or otherwise damaged during installation shall be pulled and replaced. Damaged coatings on painted steel sheet piles shall be prepared and repainted in accordance with the manufacturer's specifications of the original coating. Damaged galvanized coatings shall be repaired in accordance with ASTM A 780, Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

24. Standards and Supplementary Specifications

All workmanship materials and components throughout shall, where applicable, and unless otherwise stated in the Contract Documents, comply either.

- a. With the relevant American, British, German or India Standard or Code of practice current on the date fixed for receipt of tenders. Or
- b. With the relevant American, British, German or Indian Standard or code of Practice.

The Acceptance of a tender based upon a Standard or Code of Practice proposed by the contractor shall only signify the Engineer's general approval of the use of such standard or Code of Practice and shall not make the Engineer liable to accept a standard of workmanship subsequently found to be inferior to the corresponding American, British, German or Indian Standard or Nepal Standard or Code of Practice. Where the relevant standard provides for the furnishing of a certificate to Employer or Engineer at their request, stating that the materials supplied comply in all respects with the standard the contractor shall obtain the certificate and forward it to the Engineer. If no standard is indicated then the relevant American, British, German or Indian Standard, if any shall apply. Where reference is made within these documents to certain standard specifications the reference shall unless otherwise specially stated be construed to mean the standard with all subsequent amendments, changes or additional as thereafter adopted and published that are in effect on the date of issue of the Tender Documents. Whenever in these documents references are made to particular reference standards or abbreviations thereof, their meaning shall be as listed below and copies of such standards may be obtained at the contractor's expense from the particular organization at the address given:

ASTM American Society for Testing and Materials 1916 Race St. Philadelphia, PA 19103, USA



BIS Bureau of Indian Standards, Manak Bhawan, 9 Bahadur Shah Zafar Marg, New Delhi- 110002, India

BSI	British Standard institution 101 Pantenville Road London NI 9ND, England
DIN	Deutsche Industries Norm (German Industry Standard)
NS	Nepal Standard



25. Control Water

- The contractor shall be responsible for the control of water met within the excavations due to ground water, spring, seepage, rain or other causes. He shall take all measures and necessary precautions to control water seepage into excavations by suitable diversions and by bailing out or by pumping or necessary to keep the excavations dry during excavation, concrete construction, and embankment of back fill placement and compaction.
- The contractor shall submit to the Engineer for approval, details of such measures as he proposes to adopt for the control of water from any source notwithstanding any approval by the Engineer of the Contractor's arrangement for the exclusion of water, the contractor shall be responsible for sufficiency thereof and for keeping the works safe at all times, particularly during any floods, and for making good at his own expense any damage to the works including any that maybe attributable to floods.
- Pumping from the interior of any foundation, enclosure shall be done in such a manner as to preclude the possibility of the movement of water through any fresh concrete. No pumping shall be permitted during the placing of concrete or for any period of at least 24 hours thereafter, unless it is done from a suitable pump separated from the concrete work by a water tight wall or other similar means.
- At the direction of the Engineer, cement grouting of other approved methods may be used to prevent or reduce seepage and to protect the excavation area.
- The contractor shall keep the works well drained until the Engineer certifies that the whole of the works is substantially complete and shall ensure that so far as is practicable all work is carried out in the dry temporary works such as temporary dams, water courses and other works of all kinds including pumping and well point dewatering that may be necessary or exclude water from toe works with the approval of the Engineer's representative. The Contractor is to take all necessary precautions to avoid floating of any partially completed structure.
- The contractor shall make provision for the discharge or disposal from the works and temporary works of all water and waste products howsoever arising and the methods or disposal shall be to the satisfaction of the Engineer and of any authority or person having an interest in any pond or water course over or in which water and waste products any be so discharged. Care shall be taken so that discharge of drained water will cause no damage to the works, crops or any other property. The requirements of that clause shall not limit any of the contractor's obligations or liabilities particularly as to clause of the conditions of contract.
- Costs incurred by the contractor in complying with the requirements of the section shall be deemed to be included in the price tendered for the various items of the Bill of Quantities for which the control of the water is required and no separate payment will be made if it is not given in Bill of quantities.

26. Temporary Diversion Works

The Contractor shall have to construct temporary diversion works for construction of cross drainage structures, canals, roads, drains, natural stream and rivers and the related structures such as turnouts, culverts, bridges, etc. Coffor and/or diversion channel shall be constructed in such a manner that the water can be smoothly supplied downstream without overtopping and damaging any part of the coffer and channel. Not less than 14 days before he intends to commence construction of any part of the temporary diversion works, the Contractor shall submit to the Engineer the detailed construction programme, and drawings of:

- a. coffer including impermeable membrane and diversion channel which he proposes; and
- b. any other temporary works which he considers necessary for the proper execution of the Works.

The Contractor shall not commence any temporary diversion works until the Engineer's approval thereto has been obtained. However, the approval shall not relieve the Contractor of any liability or obligation under the Contract. The Contractor shall construct the temporary diversion works in accordance with the approved drawings and construction programme. The Contractor shall remove all temporary diversion works on completion of the canals, roads and structures. The cost of all the



temporary diversion works, care of water including dewatering and the related temporary works including crops and land compensation related to the diversion works shall be borne by the Contractor.

27. Pre-cast Concrete Units

Pre-cast concrete units, i.e., RCC pipes and bridge girders shall be provided as shown on the Drawings. The Contractor shall submit Working Drawings to the Engineer at least 14 days in advance of the manufacturing date of each type of pre-cast element. The Contractor may manufacture the pre-cast concrete units at the site, after approval from the Engineer, in accordance with the Specifications. All materials to be furnished and used for pre-cast concrete units by the Contractor shall conform to the requirements of this Sub-Clause and shall be approved by the Engineer. Forms or moulds for concrete units shall conform to shapes lines and dimensions as shown on the Drawings, or as directed by the Engineer. The Contractor shall submit details of the forms or moulds he proposes to use for the approval of the Engineer. Pre-cast units may also be manufactured in a factory off the Site. In such cases, the Contractor shall provide the Engineer with full information, in advance, concerning the name and address of the factory, details of the probable date of commencement of manufacture and arrangements for inspections in the factory.

In all cases, the Contractor shall submit a time schedule indicating the following:

- date of commencement of manufacturing
- date of delivery
- date and sequence of erection
- duration of the execution

No commencement of works shall be made until the time schedule has been approved by the Engineer.

Pre-casting of Concrete Units

Pre-cast concrete units to be manufactured shall be of concrete with adequate strength for bearing loads as shown on the Drawings, or as directed by the Engineer. Moulds for pre-cast concrete shall be of steel construction. The Contractor shall submit details of the mould to the Engineer for his approval. The quality, tests, trial mixes and test cubes of the concrete shall be made, all in accordance with Sub-Clause 5.3 of these Technical Specifications. The concrete units shall be cast in horizontal position, unless otherwise directed by the Engineer. The concrete shall be placed continuously in each of these units and compacted by vibrating in a manner acceptable to the Engineer. Special care shall be exercised in tamping and vibrating the concrete so as not to displace the reinforcement. The method of curing shall be approved by the Engineer. At least four hours must elapse from completion of the placing of concrete before its temperature is raised. The rise in temperature within any period of 30 minutes shall not exceed 100C and the maximum temperature attained shall not exceed 700C. The rate of subsequent cooling shall not exceed the rate of heating. The method of curing used shall minimize the loss of moisture from the concrete. The concrete units shall remain in their moulds for three (3) days before being stripped, during which time the exposed face shall be covered with sacking or matting and kept constantly wet; in addition, the sides of the forms or moulds shall be shielded from the direct rays of the sun. After removal of forms or from the moulds, the units shall be kept moist continuously, for a minimum period of eleven (11) days. After stripping, the pre-cast units shall be stacked for a period of not less than thirty (30) days, unless otherwise directed by the Engineer, so as to leave a free air space between each of these pre-cast units. All pre-cast units shall have the date of casting engraved on them before the concrete has fully hardened. Any undated units may be rejected by the Engineer. The cast-in parts, such as lifting lugs, fasteners, jointing materials, supporting structures, etc. shall be fixed in position as indicated on the Drawings or directed by the Engineer. Cast-in parts shall be free from rust, dirt or grease. The Contractor shall also coat the concrete joints with straight run bitumen, grade 40/50 as indicated on the Drawings or instructed by the Engineer. The costs for the delivering, processing and fixing of cast-in parts as well as bitumen coating shall be deemed to be included in the unit rates of the relevant pre-cast concrete units and no separate payment shall be made. Loading, unloading, storage and placing of the pre-cast units at the Site shall be done by skilled labour under the supervision of a competent supervisor. When pre-cast units are stored they shall be supported at such positions as will ensure that the stresses induced in them are always less than the permissible design stresses. Transportation, storage and placing of the pre-cast units shall be done carefully and in such a manner as to avoid damage and to keep the surfaces of the units free of dirt and other unwanted spots. Any unit which is damaged or has any

perceptible impairment shall be liable to be rejected by the Engineer. Materials to the approval of the Engineer and shall be internally smooth and seamless.

Laying and Jointing Pipes

Arrangements for handling including lifting, loading, transporting, unloading from factory/yard and site as well as storage and lowering the pipes onto the bed shall be such that the pipes do not suffer any damage. The thickness of the gravel filter in the bedding and the surroundings shall be as shown on the Drawings. The pipes shall be laid true to line and level. No pipes shall be laid until the foundation has been approved by the Engineer. Pipes shall be laid so that each one is in contact with the bed throughout the length of the barrel. The pipes shall be laid closely against each other so as to obtain tight joints. Joints shall be such that they do not permit entry of soil into the pipe. Perforated pipes shall be laid as shown the Drawings. The concrete pipes shall be jointed by either collar joints or flush joints. In case of a collar joint, the collar shall be of reinforced cement concrete 150 to 200 mm wide, according to the diameter of the pipe, and having the same structural strength as the pipes to be jointed. Caulking space shall be between 13 to 19 mm according to the diameter of the pipe as specified by the relevant clause of NS or IS or ASTM Standard. Caulking material shall be a slightly wet mix of cement and sand in the ratio of 1:2 rammed with caulking irons. Before caulking, the collar shall be placed in such a way that its centre coincides with the joint and an even annular space is left between the collar and the pipe. In case of flush joints, the ends of the pipes shall be spaced to form a self-centring joint with a 13 mm wide jointing space. The jointing space shall be filled with cement sand mortar in the ratio of 1:2. Care shall be taken to fill all voids and to see that any excess of cement mortar is neatly cleaned off while each joint is being made, and any earth, cement or other material thoroughly cleaned out of the pipes. All joints shall be made with care so that the interior surface is smooth and consistent with the interior surface of the pipes. After finishing, the joint shall be kept covered and damp for at least four (4) days. A properly fitted plug shall be well secured at the end of each pipe already laid and shall be removed only when the next pipe is being laid. The foundation shall be kept free from water until the joints are thoroughly set. On completion, all pipelines, shall be flushed from end to end with water and left clean and free from obstructions.

28. Joints

Construction Joints

The location of all construction joints in concrete work shall be subject to approval by the Engineer, and the joints shall be constructed as specified herein. Construction joints are joints which are placed in structures to facilitate construction, or which occur in structures as a result of inadvertent delays in concrete placing operations. Construction joints are to be placed to reduce initial shrinkage stresses and cracks, to allow time for the installation of embedded metalwork, or to allow for the subsequent placing of other concrete, blockout concrete, or second stage concrete. All vertical members such as columns and walls shall be in place for not less than four (4) hours, before any concrete is placed in concrete elements directly over such columns or walls. Before placing is resumed, all excess water and fine materials, which have risen to the top, shall be removed and the concrete shall be cut away as may be necessary to ensure a strong and dense concrete at the joint. The surface of construction joints shall be clean, rough, and dry when covered with fresh concrete or mortar. Cleaning shall consist of the removal of all laitance, loose or defective concrete, coatings, sand, sealing compound if used, and other foreign materials. The surfaces of construction joints shall be wet-sandblasted, washed thoroughly with air-water jets, and surface dried prior to placement of adjoining concrete. Construction joints in beams and slabs shall not be permitted, except where the Engineer approves. Where construction joints are made in plain and reinforced concrete of monolithic construction other than beams, a tongue and groove joint and reinforcement bars equal in area to not less than 0.25 per cent of the surfaces to be connected and forty (40) diameters in length shall be provided unless otherwise shown on the Drawings. At horizontal construction joints which will be exposed, the concrete shall be struck off at the level of the top of the form sheathing or shall be carried about 12 mm above the underside of a 25 mm high by 12 mm thick strip set level on the form. Beams, brackets, column capitals, and haunches shall be considered as part of the floor system and shall be placed monolithically therewith. Where new concrete is to be bonded to existing concrete, the existing surface shall be cleaned and roughened thoroughly in order to remove all laitance and loose matter.



Unscheduled construction joints in structures requiring water tightness shall have waterstop approved by the Engineer. Such joints shall be located by the Contractor so as to least impair the strength of the structure and shall be subject to the approval of the Engineer.

Contraction Joints

Contraction joints, of the types shown on the Drawings, shall be provided in walls, floors, beams, footings, and foundations where indicated on the Drawings, or directed by the Engineer. The joints shall be made by forming the concrete on one side of the joint and allowing it to set before concrete is placed on the other side of the joint. The surface of the concrete first placed at the contraction joint shall be coated with bitumen or other materials so as to avoid bond. Waterstops, specified in Sub-Clause 5.11 hereof, shall be provided where so shown on the Drawings, or as directed by the Engineer. All the joints shall be provided with dowel bars of plain round steel bars, as specified in Sub-Clause 5.13 hereof.

29. Storage of Materials

- Materials shall be stored so as to ensure preservation of their specified quality and fitness for the work. They shall be placed on hard, clean surface, and when required, they shall be placed under cover as approved by the Engineer. Stored materials shall be located so as to facilitate prompt inspection. Private property shall not be used for storage purposes without the written permission of the owner or lessees and payment to him if necessary.
- The stockpile site shall be prepared by clearing and levelling as approved by the Engineer.
- Aggregate storage piles shall be built up and removed in lays not exceeding 1m. All height of such stockpiles shall be limited to 5.0m the centre of the storage areas shall be raised and sloped to the sides, as required to provide proper drainage of excess moisture, the materials shall be stored in such a manner as to prevent segregation and to ensure proper gradation and moisture content.
- The cost of providing for storage of materials shall be included in the prices tendered for the various items of the Bill of Quantities for which storage of materials is required and no separate payment will be made thereof.

30. Measurement and Payment

Measurement

The items as set out in the Bill Quantities are understood to be full compensation for the preparation of working drawings for the civil Engineering works and conforming to the requirements for the equipment and drawings as set out in the specification, conditions of contract, information and instruction, drawings, schedules and appendices submitted with the Tender Document.

- for all materials, part and labor cost as well of supervision, quantity inspection and testing and all other costs for the supply of the equipment and materials.
- For all handling, packing and shipping charges, rail road and all other transport costs, including harbour dues, dock handling charges, insurance during transit, customs outside Nepal (if any) and all other charges on the equipment and materials from any place outside Nepal until it is delivered on site. For all cost of labor, supervising, erection of plant and temporary works, materials and other things of whatever nature required for storing moving into final position, setting out handling and erection, final painting and protection, quality inspection and testing.
- For site testing and commissioning of the equipment.
- For maintenance and making good.
- For all duties and obligations as set out in the Conditions of contract, the specification, information and instructions, drawing, schedules and appendices.



Measurement methods specified in the individual sections of the specification shall govern if they differ from methods specified in this section. The Engineer will compute all quantities and will take measurements as requires for such computations.

Measurement Standards

All works to be paid at a contract price per unit of measurement will be measured by the Engineer in accordance with Metric Standards Measures. A ton shall consist of 1,000 kilograms.

Measurement by weight

- Steel shapes casting, miscellaneous, metal fabrications, and similar items to be paid for any weight shall be measured by handbook weights for the type and quantity of material actually furnished and used.
- The Engineer may be present to witness the weighing and to check and compile the daily record of such scale weights; however, if any case, the Engineer will require that contractor furnish weight slips and daily summary weight sheets. In such case furnish a duplicate weight slip to the Engineer at the point of delivery of the materials.

Measurements by volume

- Measurement by volume will be the cubic dimension listed or indicated in the Bill of Quantities. Method of volume measurement will be as determined or directed by the Engineer.
- When materials is to be measured and paid for on a volume basis and it is impractical to determine the volume by the specific method of measurement, or requested by the contractor in writing and accepted by the Engineer in writing, the material will be weighted in accordance with the requirements specified for weight measurement. Such weight will be converted to volume measurement for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the Engineer and shall be agreed by the contractor before such method of measurement of payment for quantities will be accepted.

Measurement by Area

Measurement by area will be the square dimension listed or indicated in the Bill of Quantities. Method of square measurement will be as determined or directed by the Engineer.

Linear Measurement

Linear measurement will be by the linear dimension listed or indicated in the Bill of Quantities. Method of linear measurement will be as determined or directed by the Engineer. Generally, items, components, or work to be measured will be measured at the Centre line of the item in place.

Lump-sum Measurement

- Lump-sum measurement will be for the entire item, unit of work, structure or combination hereof as listed or indicated in the Bill of Quantities.



- If the contractor requests progress payments for lump-sum or amounts in the Bill of Quantities, such progress payment will be made in accordance with a well-balance, detailed program of payment-apportioning prepared by the Contractor and submitted to the Engineer for approval.
- Such program for each applicable lump-sum item shall show estimated quantities and unit prices therefore as allocated by the contractor to the different features of the work and major sub-decision thereof It shall also show the amounts allocated by the contractor for;
 - i. cost of the various materials to be furnished,
 - ii. direct labour cost and deviated charges,
 - iii. other itemized costs,
 - iv. overhead
- The summation of contents of quantities and unit prices and related cost shall total in each case, the exact amount to be paid under the lump-sum contract price for the item.
- Such program will be used for computing progress payment as provided herein but will not be used to determine the amount of the final payment for the final payment for the work of this contract.

Field Measurement for Payments

- The Engineer will compute for payment purpose all quantities of work performed by the contractor or of materials and equipment delivered to the site.
- The Contractor shall assist the Engineer in the taking of measurement by providing all equipment's and workers as required to measure quantities in accordance with the provision for measurement specified herein.
- All measurement services required of the Contractor, as specified shall be performed under the direction and supervision of the Engineer.

31. Rejected Materials

Quantities of material wasted or disposed of in a manner not called for under the contract: rejected loads of material, including material rejected after it has been placed by reasons of the failure of the Contractor to conform to the provisions of the contract; materials not unloaded from the transporting vehicle; or material placed outside the hues; indicated on the contract Drawing's or established by the Engineer's or material remaining on hand after completion of the Work; will not be paid for, and such quantities shall not be included in the final total quantities. No compensation will be permitted or loading, hauling and disposing of rejected materials.

Separate measurement of payment will not be made for work required under this section. All costs in connection with the related item of work in the Bill of Quantities incidental to the Project.

32. Site Investigation

If at any time during the execution of the works the Engineer shall require the contractor to name bore holes or to carry out exploratory excavation such requirement shall be ordered in writing and a provisional sum in respect of such anticipated work shall have been included in the bill of quantities.

33. Drawings



Bidding Drawings

The drawings provided in the Bidding Documents show the general features of the construction works. Additional drawings may be delivered to the Contractor prior to the commencement of the works. The Contractor shall prepare construction and/or shop drawings as stipulated in Specifications.

Additional Drawings

The drawings attached to the Bidding Documents (hereinafter referred to as "Bidding Drawings") accompany and form part of the Contract Documents. In addition to the Bidding Drawings, Additional Drawings may be delivered by the Engineer to the Contractor and such drawings shall thereupon become part of the Contract. During the progress of the work, Additional Drawings will be issued by the Engineer prior to commencement of the Works and as necessity arises to supplement and/or supersede the Bidding Drawings, and such Additional Drawings shall thereupon become part of the Contract. The Contractor shall be governed by figures and dimensions as given on the drawings. Where required dimensions are not shown, the Contractor shall obtain such dimensions from the Engineer before proceeding with the construction of the portion of the Works to which they refer. In every case, detailed drawings shall take precedence of general drawings. The Contractor shall scrutinise such drawings and such further drawings issued from time to time to the Contractor. If any ambiguity, discrepancy or mistake is found in the drawings, the same shall be referred to the Engineer before proceeding with the works, and the Engineer's decision on resolving such ambiguity, discrepancy or mistake shall be final, conclusive and binding.

Drawings and Calculations to be furnished by the Contractor

Unless otherwise stated in the Contract, the Contractor shall prepare drawings for all Temporary Works to be constructed or supplied and installed by the Contractor or his Sub-Contractor. The Bidding Drawings and the Additional Drawings delivered by the Engineer will not always be detailed enough for performance of the works. They will show many works only in typical forms supplemented by tables of dimensions. The Contractor shall at his own expense prepare detailed Construction Drawings of the individual works (hereinafter referred to as "Construction Drawings") based on the Bidding Drawings and the Additional Drawings as needed for performance of the works. All Construction Drawings prepared by the Contractor shall be submitted to the Engineer for his approval. If required by the Engineer, the Contractor shall also submit calculations to the Engineer for his approval. The drawings submitted by the Contractor shall be clear and complete. The recommendable scales of the drawings are 1:1,000, 1:100, 1:50, 1:20, 1:10, 1:5, 1:2 or 1:1 depending upon the type of drawing and/or details which have to be drawn. Drawings shall be of standard sizes as required by the Engineer. In addition to the above, the Contractor shall at his own expense prepare reinforcement drawings based on the drawings supplied by the Employer/Engineer as needed for the performance of the works. These reinforcement drawings shall include such bar placing drawings, bar-bending drawings, bar list and any other reinforcement drawings as may be required to facilitate fabrication and placement of reinforcement bars. All reinforcement drawings prepared by the Contractor shall be submitted to the Engineer for his approval. For all sections of the work to be executed under the Contract, the Contractor shall submit detailed drawings to the Engineer for his approval, including working drawings, shop drawings and specifications. The Contractor shall submit these drawings in four (4) copies to the Engineer for approval unless otherwise specified, and these drawings shall be sufficiently detailed to show:

- a. The general arrangement and dimensions of all the parts and the size of each and every part of the works to be executed under the Contract.
- b. The nature of the materials from which various parts are to be made, and
- c. Details of all construction.

Fabrication, manufacture or construction of any part of the works shall not commence until the drawings have been approved by the Engineer, and thereafter no change shall be made to any drawings so



approved without permission of the Engineer. Subsequent changes shall be reported by sending another set of four (4) or specified number of copies of each revised drawing to the Engineer for approval. The approval of Contractor's drawings by the Engineer shall not relieve the Contractor from any of his liabilities or responsibilities under the Contract. The Engineer shall check or review the drawings submitted by the Contractor and shall return them with comments or approval within fourteen (28) days from the date of submission by the Contractor. If re-submission of the drawings is required by the Engineer, the Contractor shall re-submit them after necessary modifications and corrections until the approval of the Engineer is obtained. In the event of disagreement with alteration, the Contractor shall send a written notice to the Engineer within 7 days after receiving the altered drawing(s). From the approved drawings and calculations, four paper copies and one reproducible copy of each set shall be submitted to the Engineer.

Right to Change Design and Drawings

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

"As-Built" Drawings

The Contractor shall submit whole sets of "As-Built" Drawings of the completed Works, clearly printed drawings along with two sets of CD, to the Employer. The "As-Built" Drawings shall clearly show the lines and dimensions of the permanent construction actually made based on the original design and/or change of design from time to time ordered by the Engineer or proposed by the Contractor and approved by the Engineer. No separate payment shall be made for preparation of all construction drawings, reinforcement drawings, working drawings and shop drawings, drawing details, etc., to be prepared by the Contractor and submitted to the Engineer and/or the Employer in accordance with the provisions of the Contract, except for provision of "As-Built" Drawings.



Drawings

Note:

1. It is customary to bind the drawings in a separate volume, which is often larger than other volumes of the contract documents. The size will be dictated by the scale of the drawings, which must not be reduced to the extent that details are reduced illegible.
2. A simplified map showing the location of the Site in relation to the local geography, indicating major roads, posts, airports, and railroads, is helpful.
3. The construction drawings, even if not fully developed, must show sufficient details to enable bidders to understand the type and complexity of the work involved and the price the Bill of Quantities.

Drawing is Attached in separate page



Supplementary Information

SECTION VI: Bill of Quantities¹

Notes for Unit Rate Contracts:

Objectives

The objectives of the Bill of Quantities are

- (a) to provide sufficient information on the quantities of Works to be performed to enable Bids to be prepared efficiently and accurately; and
- (b) when a Contract has been entered into, to provide a priced Bill of Quantities for use in the periodic valuation of Works executed.

In order to attain these objectives, Works should be itemized in the Bill of Quantities in sufficient detail to distinguish between the different classes of Works, or between Works of the same nature carried out in different locations or in other circumstances which may give rise to different considerations of cost. Consistent with these requirements, the layout and content of the Bill of Quantities should be as simple and brief as possible.

Content

The Bill of Quantities should be divided generally into the following sections:

- (a) Preamble;
- (b) Work Items (grouped into parts);
- (c) Day works Schedule;
- d) Provisional Sums; and
- (d) Summary.

Preamble

The Preamble should indicate the inclusiveness of the unit prices, and should state the methods of measurement which have been adopted in the preparation of the Bill of Quantities and which are to be used for the measurement of any part of the works.

Work Items

The items in the Bill of Quantities should be grouped into sections to distinguish between those parts of the Works which by nature, location, access, timing, or any other special characteristics may give rise to different methods of construction, or phasing of the Works, or considerations of cost. General items common to all parts of the works may be grouped as a separate section in the Bill of Quantities.

Day work Schedule

A Day work Schedule should be included only if the probability of unforeseen work, outside the items included in the Bill of Quantities, is high. To facilitate checking by the Employer of the realism of rates quoted by the Bidders, the Day work Schedule should normally comprise the following:

- (a) A list of the various classes of labour, materials, and Constructional Plant for which basic day work rates or prices are to be inserted by the Bidder, together with a statement of the conditions under which the Contractor will be paid for work executed on a day work basis.

¹In lump sum contracts, delete “Bill of Quantities” and replace with “Schedule of Activities” throughout this section.



- (b) Nominal quantities for each item of Day work, to be priced by each Bidder at Day work rates as bid. The rate to be entered by the Bidder against each basic Day work item should include the Contractor's profit, overheads, supervision, and other charges.

Provisional Sums

A general provision for physical contingencies (quantity overruns) may be made by including a provisional sum in the Summary Bill of Quantities. Similarly, a contingency allowance for possible price increases should be provided as a provisional sum in the Summary Bill of Quantities. The inclusion of such provisional sums often facilitates budgetary approval by avoiding the need to request periodic supplementary approvals as the future need arises. Where such provisional sums or contingency allowances are used, the Contract Data should state the manner in which they will be used, and under whose authority (usually the Project Manager's).

Summary

The Summary should contain a tabulation of the separate parts of the Bill of Quantities carried forward, with provisional sums for Day work, for physical (quantity) contingencies, and for price contingencies (upward price adjustment) where applicable.

These Notes for Preparing Specifications are intended only as information for the Employer or the person drafting the Bidding documents. They should not be included in the final documents.



Preamble of Bill of Quantities

A. General

1. The Bill of Quantities shall be read in conjunction with the Instructions to Bidders, General and Special Conditions of Contract, Technical Specifications, and Drawings.
2. The quantities given in the Bill of Quantities are estimated and provisional, and are given to provide a common basis for bidding. The basis of payment will be the actual quantities of work ordered and carried out, as measured by the Contractor and verified by the Project Manager and valued at the rates and prices bid in the priced Bill of Quantities, where applicable, and otherwise at such rates and prices as the Project Manager may fix within the terms of the Contract.
3. For any item for which measurement is based on records made before or during construction the records shall be prepared and agreed between the Engineer and the Contractor. Should the Contractor carry out such work without the prior agreement of the Engineer, the Engineer may request the Contractor to carry out investigations to confirm the extent of the work and the quantity of work certified for payment shall be solely at the Engineer's discretion. The cost of any such investigation shall be borne by the Contractor.
4. The rates and prices bid in the priced Bill of Quantities shall, except as otherwise provided under the Contract, include all construction equipment, labour, supervision, materials, erection, maintenance, insurance, profit, taxes, and duties, together with all general risks, liabilities, and obligations set out or implied in the Contract.
5. A rate or price shall be entered against each item in the priced Bill of Quantities, whether quantities are stated or not. The cost of items against which the Contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities.
6. The whole cost of complying with the provisions of the Contract shall be included in the Items provided in the priced Bill of Quantities, and where no Items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related Items of Work.
7. General directions and descriptions of work and materials are not necessarily repeated nor summarized in the Bill of Quantities. References to the relevant sections of the Contract documentation shall be made before entering prices against each item in the priced Bill of Quantities. The Specification Clause references where given in the item description of the Bills of Quantities are for the convenience of bidders and generally refer to the principal relevant- specification clause but do not necessarily represent the whole of the specification requirements for the work required within the item. The presence of a Specification clause reference shall not in any way reduce the Bidders obligation to complete work in accordance with all the requirements of the Specification.
8. 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 Project Manager in accordance with the Conditions of Contract.
9. The method of measurement of completed work for payment shall be in accordance with the Specifications.
10. The abbreviations and symbols used in this Bill of Quantities are:

[Insert as applicable]

B. Day work Schedule

a) General

1. Work shall not be executed on a day work basis except by written order of the Project Manager. Bidders shall enter basic rates for day work items in the Schedules. These rates shall apply to any quantity of day work ordered by the Project Manager. Nominal quantities have been indicated against each item of day work, and the extended total for day work shall, be carried forward as a Provisional Sum to the Summary Total Bid Amount. Unless otherwise adjusted, payments for day work shall be subject to price adjustment in accordance with the provisions in the Conditions of Contract.

b) Day work Labour



1. In calculating payments due to the Contractor for the execution of day works, the hours for labour will be reckoned from the time of arrival of the labour at the job site to execute the particular item of day work to the time of departure from the job site, but excluding meal breaks and rest periods. Only the time of classes of labour directly doing work ordered by the Project Manager and are competent to perform such work will be measured. The time of gangers (charge hands) actually doing work with the gangs will also be measured but not the time of foremen or other supervisory personnel.
2. The Contractor shall be entitled to payment in respect of the total time that labour is employed on day work, calculated at the basis rates entered by it in the " SCHEDULE OF DAY WORK RATES: 1. LABOUR ". The rates for labour shall be deemed to cover all costs to the Contractor including (but not limited to) i) the amount of wages paid to such labour, transportation time, overtime, subsistence allowances, ii) any sums paid to or on behalf of such labour for social benefits in accordance with Nepal law, iii) Contractor's profit, overheads, superintendence, liabilities and insurance and iv) charges incidental to the foregoing.

c) Day work Equipment

1. The Contractor shall be entitled to payments in respect of Constructional Plant already on site and employed on day work at the basis rental rates entered by him in the "SCHEDULE OF DAY WORK RATES:2 EQUIPMENT". The said rates shall be deemed to include due and complete allowance for depreciation, interest, indemnity and insurance, repairs, maintenance, supplies, fuel, lubricant, and other consumables and all overhead, profit and administrative costs related to the use of such equipment. The cost of drivers, operators and assistants also shall be included in the rate of the equipment and no separately payment shall be made for it.
2. In calculating the payment due to the Contractor for Constructional Plant employed on day work, only the actual number of working hours will be eligible for payment, except that where applicable and agreed with the Project Manager, the travelling time from the part of the Site where the Construction Plant was located when ordered by the Project Manager to be employed on day work and the time for return journey there to shall be included for payment.

d) Day work Materials

1. The Contractor shall be entitled to payment in respect of materials used for day work (except for materials for which the cost is included in the percentage addition to labour costs as detailed heretofore), at the rates entered by him in the "SCHEDULE OF DAY WORK RATES: 3 MATERIALS" and shall be deemed to include overhead charges and profit as follows;
 - (i) the 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.
 - (ii) the cost of hauling materials for use on work ordered to be carried out as day work, from the store or stockpile on the Site to the place where it is to be used also shall be include in the same rate.

Provisional Sums

A general provision for physical contingencies (quantity overruns) may be made by including a provisional sum in the Summary Bill of Quantities. Similarly, a contingency allowance for possible price increases should be provided as a provisional sum in the Summary Bill of Quantities. The inclusion of such provisional sums often facilitates budgetary approval by avoiding the need to request periodic supplementary approvals as the future need arises. Where such provisional sums or contingency allowances are used, the SCC should state the manner in which they will be used, and under whose authority (usually the Project Manager's).

The estimated cost of specialized work to be carried out, or of special goods to be supplied, by other contractors should be indicated in the relevant part of the Bill of Quantities as a particular provisional sum with an appropriate brief description. A separate procurement procedure is normally carried out by the Employer to select such specialized contractors. To provide an element of competition among the Bidders in respect of any facilities, amenities, attendance, etc., to be provided by the successful Bidder as prime Contractor for the use and convenience of the specialist contractors, each related provisional sum should be followed by an item in the Bill of Quantities inviting the Bidder to quote a sum for such amenities, facilities, attendance, etc.



Bill of Quantities

Bill of Quantity is attached below



Part - III Conditions of Contract and Contract Forms

- Section VII. General Conditions of Contract (GCC)
- Section VIII. Special Conditions of Contract (SCC)
- Section IX Contract Forms



Section VII: General Conditions of Contract (GCC)

1. General Provisions	
1.1 Definitions	In the Contract as defined below, the words and expressions defined shall have the following meanings assigned to them, except where the context requires otherwise:
The Contract	1.1.1 “Contract” means the Agreement signed between the Employer and the contractor and the other documents listed in the Special Conditions of Contract (SCC) .
	1.1.2 “Specification” means the document as listed in the SCC, and any variation to such document.
	1.1.3 “Drawings” means the Employer’s drawings of the Works as listed in the SCC, and any variation to such drawings.
	1.1.4 “Bill of Quantities” means the priced and completed bill of quantities forming part of the Tender.
	1.1.5 “Bid or Quotation” 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.
	1.1.6 “Letter of Acceptance” means the formal acceptance by the Employer of the bid or Tender.
Persons	1.1.7 “Employer” means the person named in the Agreement and the legal successors in title to this person, but not (except with the consent of the contractor) any assignee.
	1.1.8 “Contractor” means the person named in the Agreement and the legal successors in title to this person, but not (except with the consent of the Employer) any assignee.
	1.1.9 “Party” means either Employer or the contractor.
Date, Times and Periods	1.1.10 “Commencement Date” means the date stated in the SCC after the date the Agreement comes into effect or any other date agreed between the Parties.
	1.1.11 “Day” means a calendar day.
	1.1.12 “Time for Completion” means the time for completing the Works as stated in the SCC (or as extended under Sub-Clause 6.3), calculated from the Commencement Date.



Money and Payments	1.1.13 "Cost" means all expenditure properly incurred (or to be incurred) by the contractor, whether on or off the Site, including overheads and similar charges, but does not include profit. 1.1.14 "Contract Price" means the sum stated in the Letter of Acceptance as payable to the contractor and adjusted with any Variation Orders and Other Adjustments upon completion of the works and the remedying of any defects therein in accordance with the provisions of the Contract. 1.1.15 "Retention Money" means the aggregate of all monies retained by the Employer pursuant to Sub-Clause 10.3
Other Definitions	1.1.16 "Contractor's Equipment" means all apparatus, machinery, vehicles, facilities and other things required for the execution of the Works but does not include Materials or Plant. 1.1.17 "Country" means Nepal. 1.1.18 "Employer's Liabilities" means those matters listed in Sub-Clause 5.1. 1.1.19 "Materials" means things of all kinds (other than Plant) intended to form or forming part of the permanent work. 1.1.20 "Plant" means the machinery and apparatus intended to form or forming part of the Permanent Works. 1.1.21 "Site" means the places provided by the Employer where the Works are to be executed, and any other places specified in the Contract as forming part of the Site. 1.1.22 "Variation" means any change which is a result of unforeseen circumstances that arise as a result of instruction by the Employer/ Engineer under Sub-Clause 9.1. 1.1.23 "Works" means all the work and design (if any) to be performed by the contractor including temporary work and any Variation. 1.1.24 "Permanent Works" means the permanent works to be executed (Including Plant) in accordance with the Contract. 1.1.25 "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.
1.2 Interpretation	Words importing persons or parties shall include firms and organisations. Words importing singular or one gender shall include plural or the other gender where the context requires.
1.3 Priority of Documents	The documents forming the Contract shall to be taken as mutually explanatory of one another. If an ambiguity or discrepancy is found in the documents, the Employer shall issue any necessary instructions to the contractor, and the priority of the documents shall be in accordance with the order as listed in the SCC.
1.4 Law	The law of the Contract is stated in the Law of Nepal.
1.5 Communications	Where provision is made for the giving or issue of any notice, instruction, or other communication by any person, unless otherwise specified such communication shall be written in the language stated in the SCC, as shall not be unreasonably withheld or delayed.

	If a notice given pursuant to Sub Clause 1.5 fails to be delivered due to failure to trace the address of the party then the notice shall be published as public notice in a National daily newspaper and when the notice is so published then the notice shall be considered to be delivered to the concerned party.
1.6 Statutory Obligations	The contractor shall comply with the laws of Nepal where activities are performed. The contractor shall give all notices and pay all fees and other charges in respect of the Works.
2. The Employer	
2.1 Provision of Site	The Employer shall provide the Site and right of access thereto at the times stated in the SCC .
2.2 Permits and Licenses	The Employer shall, if requested by the contractor, assist him in applying for permits, licenses or approvals which are required for the Works.
2.3 Employer's Instructions	The contractor shall comply with all instructions given by the Employer in respect of the Works including the suspension of all or part of the Works.
2.4 Approvals	No approval or consent or absence of comment by the Employer or the Employer's representative shall affect the contractor's obligations.
3. Employer's Representatives	
3.1 Authorized Person	One of the Employer's personnel shall have authority to act for him. This authorized person shall be as stated in the SCC , or as otherwise notified by the Employer to the contractor.
3.2 Employer's Representative	The Employer may also appoint a firm or individual to carry out certain duties. The appointee may be named in the SCC , or notified by the Employer to the contractor from time to time. The Employer shall notify the contractor of the delegated duties and authority of this Employer's representative.
4. The Contractor	
4.1 General Obligations	The contractor shall carry out the Works properly and in accordance with the Contract. The contractor shall provide all supervision, labour, Materials, Plant and contractor's Equipment which may be required. All Materials and Plant on Site shall be deemed to be the property of the Employer. During continuance of the of the contract, the contractor and his sub-contractors shall abide at all times by all labour laws, including child labour related enactments, and rules made there under. A child who has not attained the age of fourteen years shall not be employed in any work as a labourer.
4.2 Contractor's Representative	The contractor shall submit to the Employer for consent the name and particulars of the person authorized to receive instructions on behalf of the contractor.
4.3 Subcontracting	The contractor shall not subcontract the Works.
4.4 Performance Security	4.4.1 The Performance Security, including any additional security, shall be provided to the Employer no later than the date specified in the Letter of



	Acceptance and shall be issued in an amount specified in the SCC, by a Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law in Nepal in accordance with the conditions of Contract using Sample Form for the Performance Security included in Section IX (Contract Forms), or another form acceptable to the Employer., and denominated in Nepalese Rupees. The Performance Security shall be valid until a date 30 days beyond the end of the intended Defect Liability Period. 4.4.2 However, any additional performance securities required as per ITB 26.1, should be valid until a date 30 days beyond the end of the intended completion date.
5. Employer's Liabilities	
5.1 Employer's Liabilities	In this Contract, Employer's Liabilities mean: a. war, hostilities (whether war be declared or not), invasion, act of foreign enemies, within the Country, b. rebellion, terrorism, revolution, insurrection, military or usurped power, or civil war, within the Country, c. riot, commotion or disorder by persons other than the contractor's personnel and other employees, affecting the Site and/or the Works. d. use or occupation by the Employer of any part of the Works, except as may be specified in the Contract, e. design of any part of the Works by the Employer's personnel or by others for whom the Employer is responsible, f. any operation of the forces of nature affecting the Site and/or the Works, which was unforeseeable or against which an experienced contractor could not reasonably have been expected to take precautions g. a suspension under Sub-Clause 2.3 unless it is attributable to the contractor's failure, h. any failure of the Employer, i. physical obstructions or physical conditions, other than climatic conditions, encountered on the Site during the performance of the Works, which obstructions or conditions were not reasonably foreseeable by an experienced contractor and which the contractor immediately notified to the Employer, j. any delay or disruption caused by any Variation, k. any change to the law of the Contract after the date of the contractor's offer as stated in the Agreement, l. losses arising out of the Employer's right to have the permanent work executed on, over, under, in or through any land, and to occupy this land for the permanent work, and m. damage which is an unavoidable result of the contractor's obligations to execute the Works and to remedy any defects.

6. Time for Completion	
6.1 Execution of the Works	The contractor shall commence the Works on the Commencement Date and shall proceed expeditiously and without delay and shall complete the Works within the Time for Completion.
6.2 Programme	The contractor shall submit to the Employer a programme for the Works within the time stated in the SCC .
6.3 Extension of Time	The contractor shall be entitled to an extension to the Time for Completion if he is or shall be delayed by any of the Employer's Liabilities. The contractor shall submit an application to the Employer for extension of time, stating the causes for delay, 21 days before the expiry of the Contract completion date. On receipt of an application from the contractor, within 21 days , the Employer shall consider all supporting details provided by the contractor and shall decide extend the Time for Completion as appropriate.
6.4 Liquidated Damages for Delay	If the contractor fails to complete the Works within the Time for Completion, the contractor's liability to the Employer for such failure shall be to pay the amount stated in the SCC for each day for which he fails to complete the Works.
7. Taking-Over	
7.1 Completion	The contractor may notify the Employer when he considers that the Works are complete. In addition to the other provisions, before acceptance of the completed works, Employer shall verify and assure that such works are within the set objective, quality and appropriate to operate and use.
7.2 Taking-Over Notice	The Employer shall notify the Contractor when he considers that the Contractor has completed the Works stating the date accordingly. Alternatively, the Employer may notify the Contractor that the Works, although not fully complete, are ready for taking over, stating the date accordingly. The Employer shall take over the Works upon the issue of this notice. The Contractor shall promptly complete any outstanding work and, subject to Clause 8, clear the Site.
8. Remedying Defects	
8.1 Remedying Defects	The Employer may at any time prior to the expiry of the period stated in the SCC, notify the Contractor of any defects or outstanding work. The Contractor shall remedy at no cost to the Employer any defects due to the Contractor's design, materials, plant or workmanship not being in accordance with the Contract. Failure to remedy any defects or complete outstanding work within a reasonable time of the Employer's notice shall entitle the Employer to carry out all necessary work at the Contractor's cost.
8.2 Uncovering and Testing	The Employer may give instruction as to the uncovering and/or testing of any work. Unless as a result of any uncovering and/or testing it is established that the contractor's design, materials, plant or workmanship are not in accordance with



	the Contract, the Contractor shall be paid for such uncovering and/or testing as a Variation in accordance with Sub-Clause 9.2.
9. Variations and Claims	
9.1 Right to Vary	The Employer may instruct Variations.
9.2 Valuation of Variations	Variations shall be valued as follows: a. where appropriate, at rates in the Contract, or b. in the absence of appropriate rates, the rates in the Contract shall be used as the basis for valuation or c. at appropriate new rates, as may be agreed or which the Employer considers appropriate.
9.4 Right to Claim	If the contractor incurs cost as a result of any of the Employer's Liabilities, the contractor shall be entitled to the amount of such cost. If as a result of any of the Employer's Liabilities, it is necessary to change the Works, this shall be dealt with as a Variation.
9.5 Variation and Claim Procedure	The contractor shall submit the Employer an itemised make-up of the value of Variations and claims within 7 days of the instruction or of the event giving rise to the claim. The Employer shall check and if possible, agree the value. In the absence of agreement, the Employer shall determine the value.
10. Contract Price and Payment	
10.1 Valuation of the Works	The Contract Bill of Quantities and the approved Variation quantities shall be used to calculate the valuation of the works completed. The Contractor shall be paid for the quantity of work done at the rate in the Bill of Quantities or rate agreed pursuant to clause 9.2 for varied works.
10.2 Payments Certificates	The Contractor shall submit to the Employer monthly statements of the estimated value of the works completed less the cumulative amount certified previously. The Employer shall check the Contractor's monthly statement and certify the amount to be paid to the Contractor
10.3 Payments	The Employer shall pay to the contractor the amount certified less retention at the rate stated in the SCC within 30 days of the date of each certificate.
10.4 Payment Retention of	One half of the retention shall be repaid by the Employer to the contractor within 30 days upon expiry of Defects Liability Period and the Employer has certified that the notified defects have been corrected. The remainder of the retention shall be paid by the Employer to the contractor within 7 days after submission of evidence document from the concerned Internal Revenue Office that the contractor has submitted his Income Returns

10.5 Advance Payment	10.5.1 The Employer shall make advance payment to the Contractor of the amounts stated in the SCC in two equal installments by the date stated in the SCC, against provision by the Contractor of an unconditional bank guarantee from Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law in Nepal in a form acceptable to the Employer in amounts equal to the advance payment. The guarantee shall remain effective until the advance payment has been repaid, but the amount of the guarantee shall be progressively reduced by the amounts repaid by the Contractor. Interest shall not be charged on the advance payment. 10.5.2 The Contractor is to use the advance payment only to pay for Equipment, Plant, Materials, and mobilization expenses required specifically for execution of the Contract. The Contractor shall demonstrate that advance payment has been used in this way by supplying copies of invoices or other documents to the Project Manager. 10.5.3 The advance payment shall be repaid by deducting proportionate amounts, as stated in SCC, from payments otherwise due Contractor, following the schedule of completed percentages of the Works on a payment basis. No account shall be taken of the advance payment or its repayment in assessing valuations of work done, Variations, price adjustments, Compensation Events, Bonuses, or Liquidated Damages. 10.5.4 If the advance provided under GCC 10.5.1 is not settled due to non-performance of the Works under the contract, by the Contractor within the time period specified in the Contract, the Employer shall recover the advance by enforcing the bank guarantee as provided under GCC 10.5.1, and shall also recover interest on the advance amount from the Contractor at a rate stated in SCC
10.6 Local Taxation & Value Added Tax	a. The prices quoted by the Contractor shall include all taxes that may be levied in accordance to the laws and regulations in being in Nepal. b. The Contractor shall pay VAT in the concerned VAT office within time frame specified in VAT regulation.
11. Termination of Contract and Payment	11.1 The Employer may terminate the Contract at any time if the contractor; a. does not commence the work as per the Contract, b. abandons the work without completing, c. fails to achieve progress as per the Contract. 11.2 The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract. 11.3 Fundamental breaches of Contract shall include, but shall not be limited to, the following : (a) The Contractor uses the advance payment for matters other than the contractual obligations, (b) the Contractor stops work for 30 days when no stoppage of work is shown on the current Program and the stoppage has not been authorized by the Project

	Manager; (c) the Project Manager instructs the Contractor to delay the progress of the Works, and the instruction is not withdrawn within 30 days; (d) the Employer or the Contractor is made bankrupt or goes into liquidation other than for a reconstruction or amalgamation. (e) a payment certified by the Project Manager is not paid by the Employer to the Contractor within 90 days of the date of the Project Manager's certificate; (f) the Project Manager gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Project Manager; (g) The Contractor fails to update the Program as per the contract and demonstrate acceleration of the works within a reasonable period of time determined by the Project Manager; (h) the Contractor does not maintain a Security, which is required; (i) the Contractor has delayed the completion of the Works by the number of days for which the maximum amount of liquidated damages can be paid, as defined in the SCC 6.4; and (j) If the Contractor, in the judgment of the Employer has engaged in corrupt or fraudulent practices in competing for or in executing the Contract, pursuant to GCC 14. 11.5 Notwithstanding the above, the Employer may terminate the Contract for convenience. 11.6 If the Contract is terminated, the Contractor shall stop work immediately, make the Site safe and secure, and leave the Site as soon as reasonably possible.
	11.7 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Project Manager shall issue a certificate for the value of the work done and Materials ordered minus the advance payments received up to the date of the issue of the certificate. Additional Liquidated Damages shall not apply. If the total amount due to the Employer exceeds any payment due to the Contractor, the difference shall be a debt payable to the Employer. 11.8 If the Contract is terminated for the Employer's convenience or because of a fundamental breach of Contract by the Employer, the Project Manager shall issue a certificate for the value of the work done, Materials ordered, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works, and less advance payments received up to the date of the certificate. 11.9 If the Contract is terminated because of fundamental breach of Contract or for any other fault by the Contractor, the Employer may after forfeiting the performance security: (a) withhold further payments to the Contractor until the costs of design, execution, completion and remedying of any defects, liquidated damages (if any), and all other costs incurred by the Employer, have been established, and/or (b) recover from the Contractor any losses and damages incurred by the Employer and any additional costs of completing the Works, after allowing

	for any sum due to the Contractor, as Government dues. After recovering any such losses, damages and extra costs, the Employer shall pay any balance to the Contractor. If the total amount due to the Employer exceeds any payment due to the Contractor, the difference shall be a debt payable to the Employer.
12. Risk and Responsibility	
12.1 Contractor's Care of the Works	The contractor shall take full responsibility for the care of the Works from the Commencement Date until the date of the Employer's notice under Sub-Clause 7.2. Responsibility shall then pass to the Employer. If any loss or damage occurs to the Works during the above period, the contractor shall rectify such loss or damage so that the Works conform to the Contract.
12.2 Force Majeure	If a Party is or shall be prevented from performing any of its obligations by Force Majeure, the Party affected shall notify the other Party immediately. If necessary, the contractor shall suspend the execution of the Works and, to the extent agreed with the Employer, demobilize the contractor's Equipment. If the event continues for a period of 90 days, either Party may then give notice of termination which shall take effect 30 days after the giving of the notice. After termination, the contractor shall be entitled to payment of the unpaid balance of the value of the Works executed and of the Materials and Plant reasonably delivered to the Site, adjusted by the following: a. any sums to which the contractor is entitled under Sub-Clause 9.4, b. the Cost of his suspension and demobilization, c. any sums to which the Employer is entitled. The net balance due shall be paid or repaid within 30 days of the notice of termination.
13. Resolution of Disputes	
13.2 Amicable Settlement	The Employer and the Contractor shall attempt to settle amicably by direct negotiation any disagreement or dispute arising between them under or in connection with the Contract.
14. Fraud and Corruption	14.1 If the Employer determines that the Contractor has engaged in corrupt, fraudulent, collusive, coercive or obstructive practices, in competing for or in executing the Contract, then the Employer may, after giving 15 days' notice to the Contractor, terminate the Contractor's employment under the Contract and expel him from the Site. For the purposes of this GCC 14; (i) "corrupt practice" is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party. (ii) "fraudulent practice"⁵ is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to

	mislead, a party to obtain a financial or other benefit or to avoid an obligation; (iii) “collusive practice”⁶ is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party; (iv) “coercive practice”⁷ is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party; (v) “obstructive practice” is (aa) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or (bb) acts intended to materially impede the exercise of the GON’s/DP’s inspection and testing rights provided for under GCC8. 14.2 The contractor shall be prosecuted for offenses under prevailing criminal laws, if the contractor: (i) Misuses the Advance Payment or payments received from the Employer; (ii) Receives payment by submitting false information or documents; (iii) Abandons the works before completion; (iv) Commits a serious violation of the contract; or (v) Causes loss or damage to the Employer.
15. Blacklisting	15.1 Without prejudice to any other right of the Employer under this Contract, GoN, Public Procurement Monitoring Office may blacklist a contractor for his conduct up to three years on the following grounds and seriousness of the act committed by the contractor: a) if it is proved that the contractor committed acts pursuant to the GCC Clause 14 b) if it is proved later that the contractor had committed substantial defect in implementation of the contract or had not substantially fulfilled his obligations under the contract or the completed work is not of the specified quality as per the contract, c) if convicted by a court of law in a criminal offence which disqualifies the bidder from participating in the contract. d) if it is proved that the contract agreement signed by the bidder was based on false or misrepresentation of bidder’s qualification information,
16. Provision of PPA and PPR	If any provision of this document is inconsistent with Public Procurement Act (PPA), 2063 or Public Procurement Regulations (PPR), 2064, the provision of this document shall be void to the extent of such inconsistency and the provision of PPA and PPR shall prevail.

Section VIII: Special Conditions of Contract (SCC)

This SCC forms part of the Agreement.

[Note: with the exception of the items for which the Employer's requirements have been inserted, the Bidder shall complete the following information before submitting his bid.]

Clause	Item
GCC 1.1.1 and GCC 1.3	Documents forming the Contract listed in the order of priority : 1. Contract Agreement ; 2. Letter of Acceptance ; 3. Letter of Bid ; 4. Special Conditions of Contract ; 5. General Conditions of Contract ; 6. Specifications ; 7. Drawings ; 8. Bill of Quantities ;
1.1.12	The indented completion date for the works shall be: B.S. 2084/3/10
GCC 1.5.1	The language of the contract is ENGLISH/NEPALI .
GCC 1.5.2(a)	The agreed electronic transmission shall be : Email: irrigation.lumbini@gmail.com
GCC 2.1	The Site Possession Date(s) shall be: <i>Within 7 days from signing of contract.</i>
GCC 3.1	Authorized person is Division Chief
GCC 3.2	Name and address of Employer's representative Er. Yubraj Bhandari, WRIDDO, GULMI
GCC 4.4	The Performance Security amount is: 5%
GCC 6.2	Time for the submission of programme <i>Within 15 days from date of work started</i>
GCC 6.4.1	Liquidated Damages for Delay is 0.05% of the final Contract Price (without VAT but including PS) per day. The maximum amount of Liquidated Damages for Delay is up to a maximum of 10% of the final Contract Price (without VAT but including PS).
GCC 8.1	Period for notifying defects is 365 days calculated from the date stated in the notice under Sub-Clause 7.2.
GCC 10.5.1	The provision of Advance Payments “Not Applicable” in the contract.
GCC 10.5.3	Deductions from Payment Certificates will commence in the first certificate in which the Value of works executed exceeds 30% of the Contract Price. Deduction will be at the rate of <i>[Insert percentage [% of advance payment (as per GCC 10.5.1) × 100/(80-30)]]</i> of the respective Monthly Interim Payment Certificate until such time as the advance payment has been repaid; provided that the advance payment shall be completely repaid prior to the end of 80 % of the approved contract price.



Clause	Item
GCC 10.5.4	Recover interest on the advance amount from the Contractor should be at a rate of 10 %.

SECTION IX: Contract Forms

This Section contains forms which, once completed, will form part of the Contract. The forms for Performance Security and when required Advance Payment Security, when required, shall only be completed by the successful Bidder after contract award.



Letter of Acceptance

[on letterhead paper of the Employer]

Date:

To:..... name and address of the Contractor

Subject: Notification of Award

This is to notify that your Quotation dateddatefor execution of the.....name of the contract and identification number, as given in the SCC for the Contract price of Nepalese Rupees [insert amount in figures and words in Nepalese Rupees], as corrected in accordance with the Instructions to Bidders is hereby accepted in accordance with the Instruction to Bidders.

You are hereby instructed to contact this office to sign the formal contract agreement within 7 days with Performance Security of[specify the performance security amount computed as per ITB 22.2 and 25.1] consisting of a Bank Guarantee in the format included in Section IX (Contract Forms) of this Bidding Document.

The Employer shall forfeit the bid security, in case you fail to furnish the Performance Security and to sign the contract within specified period.

Authorized Signature:

Name and Title of Signatory:

CC:

[Insert name and address of all other Bidders, who submitted the SQ]



Contract Agreement

THIS AGREEMENT made theday of between..... name of the Employer (hereinafter “the Employer”), of the one part, andname of the Contractor(hereinafter “the Contractor”), of the other part:

WHEREAS the Employer desires that the Works known as name of the Contractshould be executed by the Contractor, and has accepted a Quotation by the Contractor for the execution and completion of these Works and the remedying of any defects in the sum of NRs[insert amount of contract price in words and figures including taxes] (hereinafter “the Contract Price”).

The Employer and the Contractor agree as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Contract documents referred to.
 2. The following documents shall be deemed to form and be read and construed as part of this Agreement.
 - (a) the Letter of Acceptance;
 - (b) the Letter of Bid;
 - (c) the Addenda Nos *[insert addenda numbers if any]*
 - (d) the Special Conditions of Contract;
 - (e) the General Conditions of Contract;
 - (f) Bills of Quantities (BOQ);
 - (g) the Specification;
 - (h) the Drawings;
 - (i) the Activity Schedules; and
 - (j)*[Specify if there are any other document]*
 3. In consideration of the payments to be made by the Employer to the Contractor as indicated in this Agreement, the Contractor hereby covenants with the Employer to execute the Works and to remedy defects therein in conformity in all respects with the provisions of the Contract.
 4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.
- IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of Nepal on the day, month and year indicated above.

Signed by
for and on behalf the Contractor in the presence of

Witness, Name Signature, Address, Date



Signed by.....
for and on behalf of the Employer in the presence of

Witness, Name, Signature, Address, Date



Performance Security

Bank's Name, and Address of Issuing Branch or Office

(On Letter head of the Commercial bank or any Financial Institution eligible to issue Bank Guarantee as per prevailing Law)

..... *Bank's Name, and Address of Issuing Branch or Office*Beneficiary:

..... Name and Address of Employer

Date:

Performance Guarantee No.:.....

We have been informed that ... *[insert name of the Contractor]* (hereinafter called "the Contractor") has been notified by you to sign the Contract No. *[insert reference number of the Contract]* for the execution of *[insert name of contract and brief description of Works]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Contractor, we..... *[insert name of the Bank]* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of*[insert name of the currency and amount in figures*]* (..... *insert amount in words*) such sum being payable in Nepalese Rupees, upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire, no later than the.....Day of **, and any demand for payment under it must be received by us at this office on or before that date.

.....
Seal of Bank and Signature(s)

Note:

All italicized text is for guidance on how to prepare this demand guarantee and shall be deleted from the final document.

* The Guarantor shall insert an amount representing the percentage of the Contract Price specified in the Contract in Nepalese Rupees.

** Insert the date thirty days after the date specified for the Defect Liability Period. The Employer should note that in the event of an extension of the time for completion of the Contract, the Employer would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the Employer might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [six months], in response to the Employer's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee".



Advance Payment Security

Bank's Name, and Address of Issuing Branch or Office

(On Letter head of the Commercial bank or any Financial Institution eligible to issue Bank Guarantee as per prevailing Law)

..... *Bank's Name, and Address of Issuing Branch or Office*.....

Beneficiary: *Name and address of employer*

Date :

Advance Payment Guarantee No.....

We have been informed thathas entered into Contract No. *Name and Address of Employer*.....*name of the Contractor*.....(hereinafter called "the Contractor")..reference number of the Contract.....dated with you, for the execution of ...contract and brief description of Works (hereinafter called "the Contract").

Furthermore, we understand that, according to the Conditions of the Contract, an advance payment in the sum..... name of the currency and amount in figures*...(.... *amount in words*) is to be made against an advance payment guarantee.

At the request of the Contractor, we... *name of the Bank* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of.....name of the currency and amount in figures*.....(*amount in words*)upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation under the Contract because the Contractor used the advance payment for purposes other than the costs of mobilization in respect of the Works.

The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Contractor as indicated in copies of interim statements or payment certificates which shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of a copy of the interim payment certificate indicating that eighty (80) percent of the Contract Price has been certified for payment, or on the day of**, whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

.....
Seal of Bank and Signature(s)

Note:

All italicized text is for guidance on how to prepare this demand guarantee and shall be deleted from the final document.

*The Guarantor shall insert an amount representing the amount of the advance payment in Nepalese Rupees of the advance payment as specified in the Contract.

** Insert the date Thirty days after the Intended completion date. The Employer should note that in the event of an extension of the time for completion of the Contract, the Employer would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the Employer might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [six months], in response to the Employer's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee".





GOVERNMENT OF LUMBINI PROVINCE
MINISTRY OF URBAN DEVELOPMENT, ENERGY, IRRIGATION AND WATER SUPPLY
WATER RESOURCES & IRRIGATION DEVELOPMENT DIVISION OFFICE
Gulmi
Bill of Quantity

2083/084

Name of project : chaurasi Salbot sinchai yojan

Name of works : Construction of Canal Works

Location : Isma-06, Gulmi

S. No.	Description of work	Total Quantity	Unit	Rate		Total Amount	Remarks
				In Figure	In Words		
1	Earth Work in excavation of soil including disposal all lead and lift all complete	35.60	Cu.m				
2	Backfilling behind the structures in 20 cm layer compaction by tamping rod all complete	15.00	Cu.m				
3	Concreting work in ratio of (1:3:6) (M 10) including supplying of materials as per drawing and instruction all complete	6.90	each				
4	Concreting work in ratio of (1:2:34) (M 15) including supplying of materials as per drawing and instruction all complete	31.83	Cu.m				
5	Cutting , Bending, placing in position as shown in the Drawing & binding by binding wire of Reinforcement Bars for RCC as per drawing and instruction all complete	1635.34	Kg				



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Bill of Quantity

2083/084

Name of project : chaurasi Salbot sinchai yojan

Name of works : Construction of Canal Works

Location : Isma-06, Gulmi

S. No.	Description of work	Total Quantity	Unit	Rate		Total Amount	Remarks
				In Figure	In Words		
6	Providing, Preparing, and Installing Formworks including Necessary Support and Removing after completion all complete as per specification and Direction of Engineer all complete	395.83	Sq.m				
Sub total							
13% VAT							
Total Amount							
Total Amount (IN WORDS)							

On behalf of contractor

Name :

Address :

Signature :

Date:



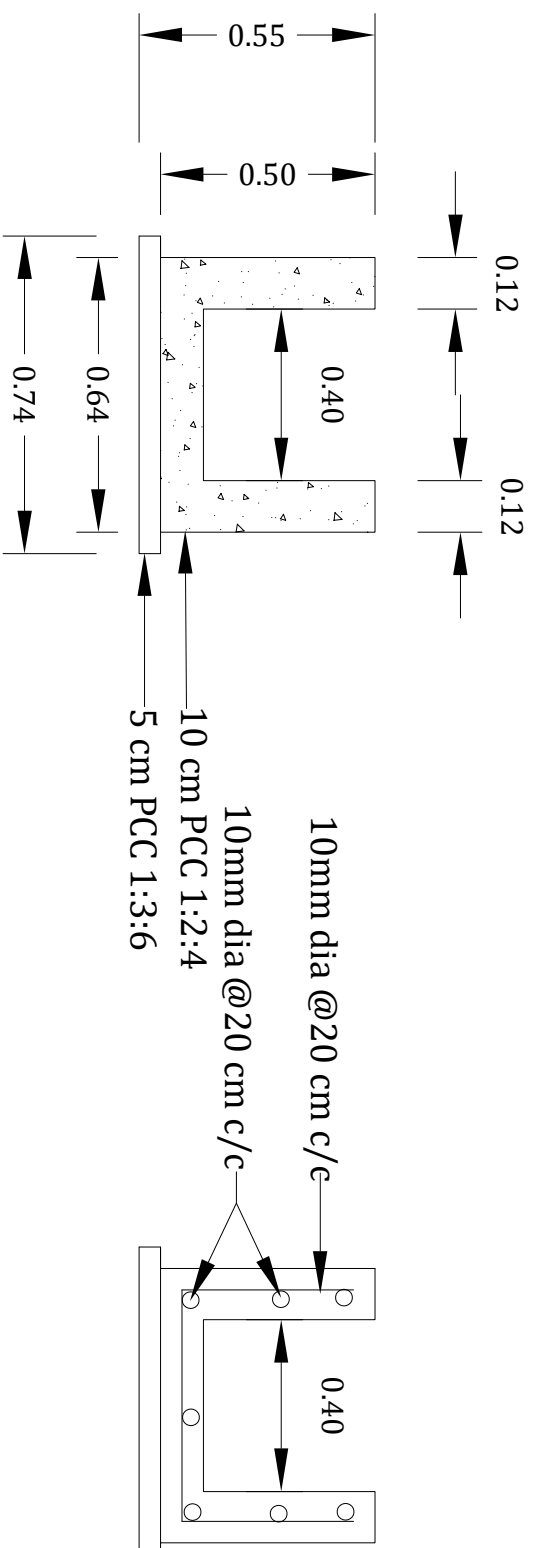


Fig : Section & Reinforcement detailing (40*40)cm

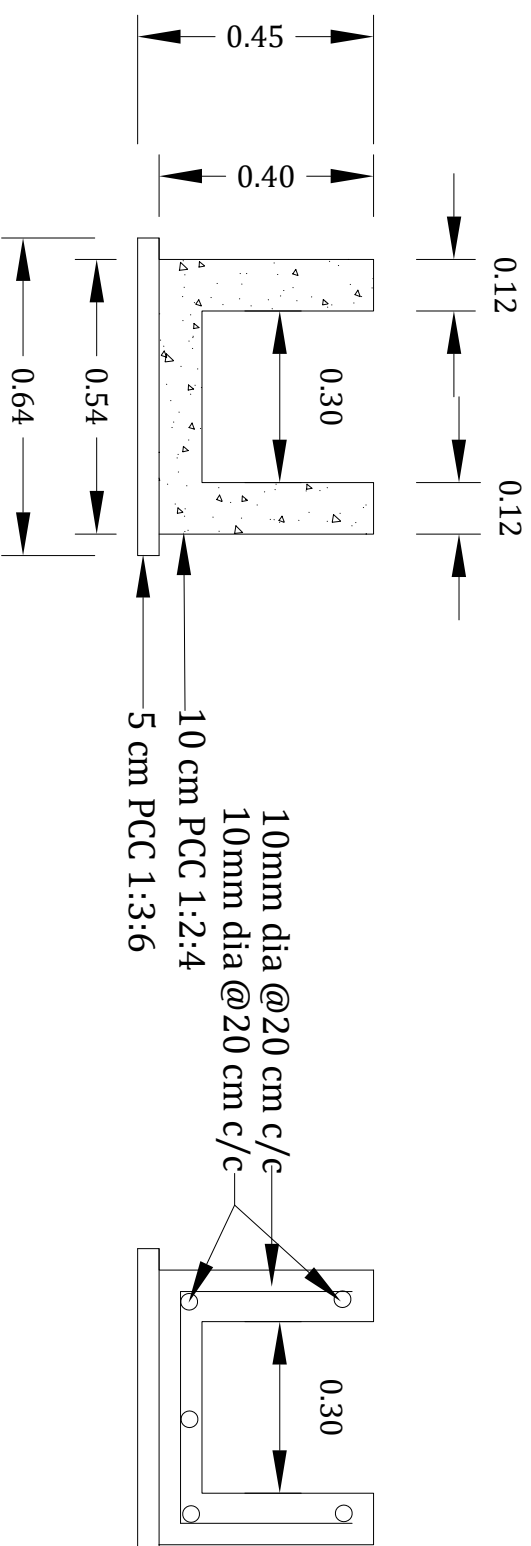


Fig : Section & Reinforcement detailing (30*30)cm