



Procurement of Works (NCB)- Single Stage Two Envelope Procedure



सार्वजनिक खरिद ऐन २०६३ को दफा ६५ को उपदफा (१) को खण्ड (ग) ले दिएको अधिकार बमोजिम
सार्वजनिक खरिद अनुगमन कार्यालयबाट जारी गरिएको

(Issued by the Public Procurement Monitoring Office in accordance with the authority given
by clause (c) of Subsection (1) of Section 65 of the Public Procurement Act, 2063)

STANDARD BIDDING DOCUMENT (SBD)

Procurement of Works

National Competitive Bidding (NCB)

Single-Stage: Two-Envelope Bidding Procedure

[Procurement of value above NRs. 20 Million]

Government of Nepal

Office of The Prime Minister and Council of Ministers

Public Procurement Monitoring Office (PPMO)

(Revised on September 2026)



BIDDING DOCUMENT

for

THE PROCUREMENT OF

Operation & Maintenance of Melamchi Diversion
Tunnel through Alternate Diversion System
including Ancillary Civil Works, Security and
Project Camp Services

National Competitive Bidding (NCB)
Single-Stage: Two-Envelope Bidding Procedure

Melamchi Water Supply Development Board

Issued on: 16 September 2026

Invitation for Bids No.: MWSDB/Tunnel-Operation/83-84

NCB No.: 3

Contract Identification No.: MWSDB/Tunnel-operation/83-84



Abbreviations

BD	Bidding Document
BDF	Bidding Forms
BDS	Bid Data Sheet
BOQ	Bill of Quantities
COF	Contract Forms
DP	Development Partners
DoLI	Department of Local Infrastructure
e-GP	Electronic Government Procurement
ELI	Eligibility
EQC	Evaluation and Qualification Criteria
EXP	Experience
FIN	Financial
GCC	General Conditions of Contract
GoN ¹	Government of Nepal
ICC	International Chamber of Commerce
IFB	Invitation for Bids
ITB	Instructions to Bidders
JV	Joint Venture
LIT	Litigation
NCB	National Competitive Bidding
NRs.	Nepalese Rupees
PAN	Permanent Account Number
PPA	Public Procurement Act
PPMO	Public Procurement Monitoring Office
PPR	Public Procurement Regulations
PL	Profit & Loss
PS	Provisional Sum
SBD	Standard Bidding Document
SCC	Special Conditions of Contract
TS	Technical Specifications
VAT	Value Added Tax
WRQ	Works Requirements

¹ “GoN” word indicates all public entities according to Public Procurement Act, 2063



Table of Contents

Invitation for Bids.....	4
Part I: BIDDING PROCEDURES	6
Section I: Instructions to Bidders	9
Section II : Bid Data Sheet	34
Section III: Evaluation and Qualification Criteria	37
Section IV: Bidding Forms.....	47
Section V - Eligible Countries.....	73
Part II : REQUIREMENT	74
Section VI: Works Requirements.....	76
Section VI: Bill of Quantities	82
Part III: CONDITIONS OF CONTRACT AND CONTRACT FORMS	101
Section VIII: General Conditions of Contract.....	105
Section IX: Special Conditions of Contract	134
Section X: Contract Forms	139



Invitation for Bids

Government of Nepal
Melamchi Water Supply Development Board

Invitation for Bids No: MWSDB/Tunnel-Operation/83-84

Date of publication: 16 September 2026

1. **The Government of Nepal [GoN] has allocated** towards the cost of **Melamchi Water Supply Project** and intends to apply part of the funds to cover eligible payments under the Contract **for Tunnel Operation and Maintenance works (IFB No. MWSDB/Tunnel-Operation/83-84)**. Bidding is open to all eligible as per Section V of bidding document.

2. **Melamchi Water Supply Development Board (MWSDB)** invites sealed bids from eligible bidders for the operation and maintenance of Tunnel of Melamchi Water Supply Project under National Competitive Bidding – Single Stage Two Envelope Bidding procedures.

Only eligible bidders with the following key qualifications should participate in this bidding:

Minimum Average Annual Construction Turnover of the best 3 years within the last 10 years:
NRs. 67,500,000.00

Minimum Work experience of similar size and nature: at least One (1) Contract involving Water Tunnel Construction / Maintenance with a value of at least NRs 81,000,000.00

3. Under the Single Stage, Two Envelope Procedure, Bidders are required to submit simultaneously two separate sealed envelopes, one containing (i) the Technical Bid and the other (ii) the Price Bid, both in turn enclosed in one sealed envelope as per the provision of ITB 21 of the Bidding Document.
4. Eligible Bidders may obtain further information and inspect the Bidding Documents at the office of Melamchi Water Supply Development Board, Panipokhari, Kathmandu
Telephone: 01-4443473; Facsimile number: 01-4006541; Electronic mail address: melamchiwater@gmail.com
5. A complete set of Bidding Documents may be purchased from the office Melamchi Water Supply Development Board, Panipokhari, Kathmandu by eligible Bidders on the submission of a written application, along with the *copy of company/firm registration certificate*, and upon payment of a non-refundable fee of NRs. 10,000 (NRs. ten thousand) till 6 October 2026 **during office hours** in the account as specified below.

Information to deposit the cost of bidding document in Bank:

Office Name: Melamchi Water Supply Development Board

Bank Name: Rastriya Banijya Bank

Bank Address: Singha Durbar, Kathmandu

Account Number: 1000100200010000

Office Code: 337003502

Rajaswa(revenue) Shrishak no: 14229



6. Pre-bid meeting shall be held on 24 September 2026 at 13:00 Hrs.
7. Sealed bids must be submitted to the office Melamchi Water Supply Development Board, Panipokhari, Kathmandu by hand/courier on or before 12:00 Hrs on 7 October 2026. Bids received after this deadline will be rejected.
8. The bids will be opened in the presence of Bidders' representatives who choose to attend at 12:30 Hrs; 7 October 2026 at the office of Melamchi Water Supply Development Board, Panipokhari, Kathmandu. Bids must be valid for a period of 90 *days from* the bid submission deadline and must be accompanied by a bid security amounting to a minimum of NRs. 3,300,000.00, which shall be valid for 30 days beyond the validity period of the bid i.e. **(04 February 2027)**.
9. If the last date of purchasing and /or 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 and bid security shall remain the same as specified for the original last date of bid submission.



Part I: BIDDING PROCEDURES



Section I: Instructions to Bidders (ITB)

This section specifies the procedures to be followed by Bidders in the preparation and submission of their Bids. Information is also provided on the submission, opening, and evaluation of bids and on the award of contract.

Table of Contents

A. General.....	9
1. Scope of Bid.....	9
2. Source of Funds	9
3. Fraud and Corruption.....	9
4. Eligible Bidders	11
5. Eligible Materials, Equipment and Services	13
B. Contents of Bidding Documents.....	14
6. Sections of Bidding Document	14
7. Clarification of Bidding Document, Site Visit, Pre-Bid Meeting	14
8. Amendment of Bidding Document	15
9. Cost of Bidding.....	15
10. Language of Bid.....	15
11. Documents Comprising the Bid.....	15
12. Letter of Bid and Schedules	16
13. Alternative Bids	16
14. Bid Prices and Discounts.....	17
15. Currency of Bid and Payment.....	18
16. Documents Comprising the Technical Proposal	18
17. Documents Establishing the Qualifications of the Bidder.....	18
18. Period of Validity of Bids	18
19. Bid Security	18
20. Format and Signing of Bid.....	20
D. Submission and Opening of Bids	20
21. Sealing and Marking of Bids.....	20
22. Deadline for Submission of Bids.....	22



23. Late Bids	23
24. Withdrawal, and Modification of Bids.....	23
25. Bid Opening	24
E. Evaluation and Comparison of Bids	25
26. Confidentiality	25
27. Clarification of Bids	26
28. Deviations, Reservations, and Omissions.....	26
29. Examination of Technical Bid	26
30. Determination of Responsiveness of Technical Bid	26
31. Non-conformities Errors, and Omissions.....	27
32 Eligibility and Qualification of the Bidder.....	27
33. Correction of Arithmetical Errors	28
34 Subcontractors.....	28
35. Evaluation of Price Bids	28
36. Comparison of Bids	29
37. Employer's Right to Accept Any Bid, and to Reject Any or All Bids	30
38. Award Criteria	30
39. Letter of Intent to Award the Contract/Notification of Award	30
40. Performance Security.....	31
41 Signing of Contract	31
42. Complaint and Review.....	32



Section I: Instructions to Bidders

A. General	
1. Scope of Bid	1.1 In connection with the Invitation for Bids indicated in the Bid Data Sheet (BDS), the Employer, as indicated in the BDS, issues this Bidding Document for the procurement of Works as specified in Section VI (Works Requirements). The name, identification, and number of lots (contracts) / multiple contracts of the National Competitive Bidding (NCB) are provided in the BDS. 1.2 Throughout this Bidding Document: (a) the term “in writing” means communicated in written form and delivered against receipt through e-GP system or email or fax or courier; (b) except where the context requires otherwise, words indicating the singular also include the plural and words indicating the plural also include the singular; and (c) “day” means calendar day.
2. Source of Funds	2.1 GoN Funded: In accordance with its annual program and budget, approved by the GoN, the implementing agency indicated in the BDS plans to apply a portion of the allocated budget to eligible payments under the contract(s) for which this Bidding Document is issued. Or Public Entities' own Resource Funded: In accordance with its annual program and budget, approved by the public entity, the implementing agency indicated in the BDS plans to apply a portion of the allocated budget to eligible payments under the contract(s) for which this Bidding Document is issued. Or DP Funded: The GoN has applied for or received financing (hereinafter called “funds”) from the Development Partner (hereinafter called “the DP”) indicated in the BDS toward the cost of the project named in the BDS. The GoN intends to apply a portion of the funds to eligible payments under the contract(s) for which this Bidding Document is issued. 2.2 DP Funded: Payment by the DP will be made only at the request of the GoN and upon approval by the DP in accordance with the terms and conditions of the financing agreement between the GoN and the DP (hereinafter called the “Loan/Grant Agreement”), and will be subject in all respects to the terms and conditions of that Loan/Grant Agreement. No party other than the GoN shall derive any rights from the Loan Agreement or have any claim to the funds.
3. Fraud and Corruption	3.1 Procuring Entities as well as Bidders, suppliers and contractors and their sub-contractors shall adhere to the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this; (a) the Employer adopts, for the purposes of this provision, the terms as defined below: (i) “corrupt practice” means the offering, giving, receiving, or soliciting, directly

	or indirectly, anything of value to influence improperly the actions of another party; (ii) “fraudulent practice” means 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) “coercive practice” means 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; (iv) “collusive practice” means an arrangement between two or more parties designed to achieve an improper purpose, including influencing improperly the actions of another party. v) “obstructive practice” means (a) deliberately destroying, falsifying, altering, or concealing of evidence material to an investigation; (b) making false statements to investigators in order to materially impede an investigation; (c) failing to comply with requests to provide information, documents, or records in connection with an investigation; (d) 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 (e) materially impeding GoN/DP’s contractual rights of audit or access to information; and vi) “integrity violation” is any act which violates Anticorruption Policy, including (i) to (v) above and the following: abuse, conflict of interest, violations of GoN/DP sanctions, retaliation against whistleblowers or witnesses, and other violations of Anticorruption Policy, including failure to adhere to the highest ethical standard. (b) the Employer will reject a proposal for award if it determines that the Bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices or other integrity violations in competing for the contract; (c) DP will cancel the portion of the financing allocated to a contract if it determines at any time that representative(s) of the GoN/or of a beneficiary of DP-financing engaged in corrupt, fraudulent, collusive, or coercive practices or other integrity violations during the procurement or the execution of that contract, without the GoN having taken timely and appropriate action satisfactory to DP to remedy the situation. d) DP will impose remedial actions on a firm or an individual, at any time, in accordance with DP's Anticorruption Policy and related Guidelines (as amended from time to time), including declaring ineligible, either indefinitely or for a stated period of time, to participate in DP-financed, -administered, or -supported activities or to benefit from an DP-financed, -administered, or -supported contract, financially or otherwise, if it at any time determines that the firm or individual has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices or other integrity violations; and (e) The Contractor shall permit the GoN/DP to inspect the Contractor’s accounts and records relating to the performance of the Contractor and to have them audited by auditors appointed by the GoN /DP, if so, required by the GoN/DP. 3.2 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 in corrupt or fraudulent practice or involving in such act, (d) interference in participation of other competing 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 bids or interference of any kind in examination and evaluation of the bids during the period from the time of opening of the bids until the notification of award of contract. 3.3 PPMO, on the recommendation of the Procuring Entity may blacklist a Bidder for a period of one (1) to three (3) years for its conduct including on the following grounds and seriousness of the act committed by the bidder: (a) if convicted by a court of law in a criminal offence which disqualifies the Bidder from participating in the contract, (b) if it is established that the contract agreement signed by the Bidder was based on false or misrepresentation of Bidder's qualification information, (c) if it at any time determines that the firm has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for, or in executing, a GoN/DP-financed contract. (d) if the Successful Bidder fails to sign the Contract. (e) if the bidder fails to inform or informs after the specified time about the saturation of the maximum number of contracts as per ITB 4.10. (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 Technical Bid and Price 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 Technical Bid and Price 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 27.1. (h) a Bidder changes the prices or substance of the bid while providing information pursuant to ITB 27.1. 3.4 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. 3.5 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. 3.6 Furthermore, Bidders shall be aware of the provisions of GCC 28.3 and GCC 72.3(j).
4. Eligible	4.1 A Bidder may be a natural person, private entity, or government owned entity subject to

Bidders	ITB 4.5 or any combination of them in the form of a Joint Venture (JV) under an existing agreement, or with the intent to constitute a legally-enforceable joint venture. In the case of a JV: (a) all partners shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms. Maximum number of JV shall be as specified in the BDS and (b) the JV shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the parties of the JV during the bidding process and, in the event the JV is awarded the Contract, during Contract execution. 4.2 A Bidder, and all parties constituting the Bidder, shall have the nationality of an eligible country, in accordance with Section V (Eligible Countries). A Bidder shall be deemed to have the nationality of a country if the Bidder is a citizen or is constituted, or incorporated, and operates in conformity with the provisions of the laws of that country. This criterion shall also apply to the determination of the nationality of proposed sub-contractors or suppliers for any part of the Contract including related services. 4.3 A Bidder shall not have a conflict of interest. A Bidder found to have a conflict of interest shall be disqualified. A Bidder may be considered to be in a conflict of interest with one or more parties in this bidding process, if any of, including but not limited to, the following apply: (a) they have controlling shareholders in common; or (b) they receive or have received any direct or indirect subsidy from any of them; or (c) they have the same legal representative for purposes of this bid; or (d) they have a relationship with each other, directly or through common third parties, that puts them in a position to have access to material information about or improperly influence the Bid of another Bidder, or influence the decisions of the Employer regarding this bidding process; or (e) a Bidder participates in more than one bid in this bidding process either individually or as a partner in a joint venture. This will result in the disqualification of all Bids in which it is involved. However, subject to any finding of a conflict of interest in terms of ITB 4.3 (a)-(d) above, this does not limit the participation of the same subcontractor in more than one bid; or (f) a Bidder or any of its affiliated entity, participated as a consultant in the preparation of the design or technical specifications of the works that are the subject of the Bid; or (g) a Bidder was affiliated with a firm or entity that has been hired (or is proposed to be hired) by the Employer as Engineer for the Contract. (h) a Bidder that has a close business or family relationship with a professional staff of the Procuring Entity. 4.4 A firm that is under a declaration of ineligibility by the GoN in accordance with ITB 3, at the date of the deadline for bid submission or thereafter, shall be disqualified. A firm shall not be eligible to participate in any procurement activities under an DP-financed, -administered, or -supported project while under temporary suspension or debarment by DP pursuant to the DP's Anticorruption Policy (see ITB 3), whether such debarment was directly imposed by the DP, or enforced by other DPs pursuant to
---------	--

	the Agreement for Mutual Enforcement of Debarment Decisions. A bid from a temporary suspended or debarred firm will be rejected.
	4.5 Enterprises owned by Government shall be eligible only if they can establish that they are legally and financially autonomous and operate under commercial law, and that they are not a dependent agency of the GoN.
	4.6 Bidders shall provide such evidence of their continued eligibility satisfactory to the Employer, as the Employer shall reasonably request.
	4.7 Firms shall be excluded in any of the cases, if (a) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, Nepal prohibits any import of goods or contracting of works or services from that country or any payments to persons or entities in that country. Where Nepal prohibits payments to a particular firm or for particular goods by such an act of compliance, that firm may be excluded; (b) DP Funded: as a matter of law or official regulation, Nepal prohibits commercial relations with that country, provided that the DP is satisfied that such exclusion does not preclude effective competition for the supply of goods or related services required; (c) DP Funded: a firm sanctioned or temporarily suspended by the DP in relation to their guidelines or appropriate provisions on preventing and combating fraud and corruption in projects financed by them.
	4.8 In case a prequalification process has been conducted prior to the bidding process, this bidding is open only to prequalified Bidders.
	4.9 The Bidder, including all parties constituting the Bidder, shall be ineligible to participate in the open competitive bidding process if it has already secured maximum number of construction contracts (in open competitive bidding) as specified in BDS and has not yet completed the work as stipulated in the respective contracts
	4.10 For the purpose of ITB 4.9 above, the bidder shall declare that the bidder, and all parties constituting the Bidder have not already secured maximum number of construction contract (in open competitive bidding) as specified in BDS . If the bidder, and all parties constituting the Bidder has participated in bidding processes of many public entities and during that period the maximum number of contracts have been attained as specified saturates due to issuance of letters of acceptance by a particular public entity, the bidder shall inform in writing to all other concerned public entities, where the bidder have participated in bidding process, within three days of issuance of last letter of acceptance that saturates the maximum number of contracts as specified.
5. Eligible Materials, Equipment and Services	5.1 The materials, equipment and services to be supplied under the Contract shall have their origin in any source countries as defined in accordance with Section V (Eligible Countries) and all expenditures under the Contract will be limited to such materials, equipment, and services. At the Employer's request, Bidders may be required to provide evidence of the origin of materials, equipment and services.
	5.2 For purposes of ITB 5.1 above, "origin" means the place where the materials and equipment are mined, grown, produced or manufactured, and from which the

	services are provided. Materials and equipment are produced when, through manufacturing, processing, or substantial or major assembling of components, a commercially recognized product results that differs substantially in its basic characteristics or in purpose or utility from its components.
B. Contents of Bidding Documents	
6. Sections of Bidding Document	6.1 The Bidding Document consist of Parts I, II, and III, which include all the Sections indicated below, and should be read in conjunction with any Addenda issued in accordance with ITB 8. PART I Bidding Procedures Section I Instructions to Bidders (ITB) Section II Bid Data Sheet (BDS) Section III Evaluation and Qualification Criteria (EQC) Section IV Bidding Forms (BDF) Section V Eligible Countries PART II Requirements Section VI Works Requirements (WRQ) Section VII Bill of Quantities (BOQ) PART III Conditions of Contract and Contract Forms Section VIII General Conditions of Contract (GCC) Section IX Special Conditions of Contract (SCC) Section X Contract Forms (COF) 6.2 The Invitation for Bids (IFB) issued by the Employer is not part of the Bidding Document. 6.3 The Employer is not responsible for the completeness of the Bidding Document and their Addenda, if they were not obtained directly from the source stated by the Employer in the Invitation for Bids. 6.4 The Bidder is expected to examine all instructions, forms, terms, and specifications in the Bidding Document and to furnish with its bid all information and documentation as is required by the Bidding Documents. Failure to furnish all information or documentation required by the Bidding Document may result in the rejection of the bid.
7. Clarification of Bidding Document, Site Visit, Pre-Bid Meeting	7.1 A prospective Bidder requiring any clarification of the Bidding Document shall contact the Employer in writing at the Employer's address indicated in BDS or raise any question or curiosity during the pre-bid meeting if provided for in accordance with ITB 7.4. The Employer will respond in writing to any request for clarification, provided that such request is received within the period as mentioned in ITB 7.5. The Employer shall forward copies of its response to all Bidders who have acquired the Bidding Document in accordance with ITB 6.3, including a description of the inquiry but without identifying its source. Should the Employer deem it necessary to amend the Bidding Document as a result of a request for clarification, it shall do so following the procedure under ITB 8 and ITB 22.2. 7.2 The Bidder is advised to visit and examine the Site of Works and its surroundings and obtain for itself, on its own risk and responsibility, all information that may be necessary for preparing the bid and entering into a Contract for construction of the Works. The costs of visiting the Site shall be at the Bidder's own expense. 7.3 The Bidder and any of its personnel or agents will be granted permission by the

	Employer to enter upon its premises and lands for the purpose of such visit, but only upon the express condition that the Bidder, its personnel, and agents will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the inspection.
	7.4 The Bidder's designated representative is invited to attend a pre-bid meeting, if provided for in the BDS . The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.
	7.5 The Bidder is requested, to submit any questions in writing, to reach the Employer as mentioned in BDS .
	7.6 Minutes of the pre-bid meeting, including the text of the questions raised, without identifying the source, and the responses given, together with any responses prepared after the meeting, will be transmitted promptly to all Bidders who have acquired the Bidding Document in accordance with ITB 6.3. Any modification to the Bidding Document that may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an addendum pursuant to ITB 8 and not through the minutes of the pre-bid meeting.
	7.7 Nonattendance at the pre-bid meeting will not be a cause for disqualification of a Bidder.
8. Amendment of Bidding Document	8.1 At any time prior to the deadline for submission of bids, the Employer may amend the Bidding Document by issuing addendum or several addenda.
	8.2 Any addendum issued shall be part of the Bidding Document and shall be communicated in writing to all who have obtained the Bidding Document from the Employer in accordance with ITB 6.3.
	8.3 To give prospective Bidders reasonable time in which to take an addendum into account in preparing their Bids, the Employer may, at its discretion, extend the deadline for the submission of Bids, pursuant to ITB 22.2. However, the time available to submit bids shall not be less than five (5) days since amendment in bidding document.
C. Preparation of Bids	
9. Cost of Bidding	9.1 The Bidder shall bear all costs associated with the preparation and submission of its Bid, and the Employer shall in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.
10. Language of Bid	10.1 The Bid, as well as all correspondence and documents relating to the bid exchanged by the Bidder and the Employer, shall be written in the language specified in the BDS . Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages in the language specified in the BDS , in which case, for purposes of interpretation of the Bid, such translation shall govern.
11. Documents	11.1 The Bid shall comprise two envelopes submitted simultaneously, one called the Technical Bid containing the documents listed in ITB 11.2 and the other the Price Bid

Comprising the Bid	containing the documents listed in ITB 11.3, both envelopes enclosed together in an outer single envelope. 11.2 The Technical Bid shall comprise the following: (a) Letter of Technical Bid; (b) Bid Security in accordance with ITB 19; (c) alternative Technical Bid, at Bidder's option and if permissible, in accordance with ITB 13; (d) written confirmation authorizing the signatory of the Bid to commit the Bidder, in accordance with ITB 20.2; (e) documentary evidence in accordance with ITB 17, establishing the Bidder's qualifications to perform the contract; (f) Technical Proposal in accordance with ITB 16; (g) Bids submitted by a Joint Venture shall include a copy of the Joint Venture Agreement entered into by all partners. Alternatively, a Letter of Intent to execute a Joint Venture Agreement in the event of a successful Bid shall be signed by all partners and submitted with the Bid, together with a copy of the proposed agreement. The Joint Venture agreement, or letter of intent to enter into a Joint Venture including a draft agreement shall indicate at least the parts of the Works to be executed by the respective partners; (h) list of subcontractors, in accordance with ITB 34 (If any); and (i) Any other documents required in the BDS. 11.3 The Price Bid shall comprise the following: (a) Letter of Price Bid; (b) completed Bill of Quantities (BoQ), in accordance with ITB 12 and ITB 14, or as stipulated in the BDS; (c) alternative price Bids, at Bidder's option and if permissible, in accordance with ITB 13; (d) Table of Price adjustment (if applicable) ; and (e) Any other document required in the BDS. 11.4 The Bidder is solely responsible for the authenticity of the submitted documents. 11.5 The Technical Bid shall not include any financial information related to the Price Bid. A Technical Bid containing such material financial information shall be declared non-responsive.
12. Letter of Bid and Schedules	12.1 The Letters of Technical Bid and Price Bid, Schedules, and all documents listed under ITB 11, shall be prepared using the relevant forms in Section IV (Bidding Forms) and in Section VII (Bill of Quantities). The forms 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.
13. Alternative Bids	13.1 Unless otherwise specified in the BDS, alternative bids shall not be considered. 13.2 When alternative times for completion are explicitly invited, a statement to that effect will be included in the BDS, as will the method of evaluating different times for completion. 13.3 When specified in the BDS pursuant to ITB 13.1, and subject to ITB 13.4 below,

	Bidders wishing to offer technical alternatives to the requirements of the Bidding Document must first price the Employer's design as described in the Bidding Document and shall further provide all information necessary for a complete evaluation of the alternative by the Employer, including drawings, design calculations, technical specifications, breakdown of prices, and proposed construction methodology and other relevant details. Only the technical alternatives, if any, of the evaluated Bidder whose Bid Price is closest to the Average Bid Price conforming to the basic technical requirements shall be considered by the Employer. 13.4 When specified in the BDS, Bidders are permitted to submit alternative technical solutions for specified parts of the Works. Such parts will be identified in the BDS and described in Section VI (Works Requirements). The method for their evaluation will be stipulated in Section III (Evaluation and Qualification Criteria).
14. Bid Prices and Discounts	14.1 The prices and discounts quoted by the Bidder in the Letter of Price Bid and in the Schedules shall conform to the requirements specified below. 14.2 The Bidder shall submit a bid for the whole of the works described in ITB 1.1 by filling in prices for all items of the Works, as identified in Section VII (Bill of Quantities). In case of Unit Rate Contracts, the Bidder shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items against which no rate or price is entered by the Bidder will not be paid for by the Employer when executed and shall be deemed covered by the rates for other items and prices in the Bill of Quantities. 14.3 The price to be quoted in the Letter of Price Bid shall be the total price of the Bid, excluding any discounts offered. Absence of the total price in the Letter of Price Bid may result in rejection of the Bid. 14.4 The Bidder shall quote any discounts and the methodology for their application in the Letter of Price Bid, in accordance with ITB 12.1. 14.5 If so indicated in ITB 1.1 and ITB 35.4, bids are invited for individual Contracts or for any combination of Contracts (packages). Bidders wishing to offer any price reduction for the award of more than one Contract shall specify in their bid the price reductions applicable to each package, or alternatively, to individual Contracts within the package. Price reductions or discounts shall be submitted in accordance with ITB 14.4, provided the Bids for all Contracts are submitted and opened at the same time. 14.6 Unless otherwise provided in the BDS and the Conditions of Contract, the prices quoted by the Bidder shall be fixed. If the prices quoted by the Bidder are subject to adjustment during the performance of the Contract in accordance with the provisions of the Conditions of Contract, the Bidder shall furnish the indices and weightings for the price adjustment formulae in the Table of Adjustment Data in Section IV (Bidding Forms) and the Employer may require the Bidder to justify its proposed indices and weightings. 14.7 All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause, as of the date 30 days prior to the deadline for submission of bids, shall be included in the rates and prices and the total bid price submitted by the Bidder.

15. Currency of Bid and Payment	15.1 The currency of the bid and payment shall be in Nepalese Rupees.
16. Documents Comprising the Technical Proposal	16.1 The Bidder shall furnish a Technical Proposal including a statement of work methods, equipment, personnel, schedule and any other information as stipulated in Section IV (Bidding Forms), in sufficient detail to demonstrate the adequacy of the Bidders' proposal to meet the work requirements and the completion time.
17. Documents Establishing the Qualifications of the Bidder	17.1 To establish its qualifications to perform the Contract in accordance with Section III (Evaluation and Qualification Criteria) the Bidder shall provide the information requested in the corresponding information sheets included in Section IV (Bidding Forms).
18. Period of Validity of Bids	18.1 Bids shall remain valid for the period specified in the BDS. The bid validity period shall start from the bid submission deadline as prescribed by the Employer in accordance with ITB 22.1. If the prescribed bid submission deadline date falls on a government holiday, then the next working day shall be considered as the bid submission deadline date. In such case the validity period of the bids shall be considered from the original bid submission deadline date. 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. A bid valid for a shorter period shall be rejected by the Employer as nonresponsive.
	18.2 In exceptional circumstances, prior to the expiration of the bid validity period, the Employer may request Bidders to extend the period of validity of their Bids. The request and the responses shall be made in writing. If a bid security is requested in accordance with ITB 19, it shall also be extended 30 days beyond the deadline of the extended validity period. A Bidder may refuse the request without forfeiting its bid security. A Bidder granting the request shall not be required or permitted to modify its Bid and to include any additional conditions against the provisions specified in Bid Documents.
19. Bid Security	19.1 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.
	19.2 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, or beyond any period of extension if requested under ITB 18.2. A bid security valid for a shorter period shall be rejected by the Employer as nonresponsive. 19.3 The bid security issued by any foreign Bank outside Nepal must be counter guaranteed by Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law in Nepal. 19.4 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. 19.5 The public entity shall return the bid securities except those that are to be forfeited as per ITB 19.6 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 40.1 and ITB 41.1. 19.6 The bid security shall be forfeited if: GoN funded: (a) a Bidder requests for withdrawal or modification of its bid, except as provided in ITB 18.2: (i) during the period of bid validity specified by the Bidder on the Letter of Technical Bid and Price 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 Technical Bid and Price Bid, in case of hard copy submission. (b) a Bidder changes the prices or substance of the bid while providing information pursuant to clause 27.1; (c) a Bidder involves in fraud and corruption pursuant to clause 3.1; (d) the successful Bidder fails to: (i) furnish a performance security in accordance with ITB 35.5, ITB 35.8 and ITB 40.1; or (ii) sign the Contract in accordance with ITB 41.1; or (iii) accept the correction of arithmetical errors pursuant to clause 33.1; (e) if the bidder fails to inform about the saturation of the maximum number of contracts as per ITB 4.10. DP funded: The bid security shall be forfeited (a) if a Bidder withdraws its bid during the period of bid validity specified by the Bidder on the Letters of Technical Bid and Price Bid, except as provided in ITB 18.2; or (b) if the successful Bidder fails to (i) furnish a performance security in accordance with ITB 35.5 and ITB 40.1; or (ii) sign the Contract in accordance with ITB 41.1; or (iii) accept arithmetical corrections in accordance with ITB 33.1.
--	---

	19.7 The Bid Security of a Joint Venture shall be in the name of the Joint Venture that submits the bid. If the Joint Venture has not been legally constituted at the time of bidding, the Bid Security shall be in the names of all future partners as named in the letter of intent mentioned in ITB 4.1.
20. Format and Signing of Bid	20.1 The Bidder shall prepare one original set of the Technical Bid and one original of the Price Bid comprising the Bid as described in ITB 11 and clearly mark it “ORIGINAL – TECHNICAL BID” and “ORIGINAL – PRICE BID.” Alternative bids, if permitted in accordance with ITB 13, shall be clearly marked “ALTERNATIVE”. In addition, the Bidder shall submit copies of the bid in the number specified in the BDS, and clearly mark each of them “COPY.” In the event of any discrepancy between the original and the copies, the original shall prevail. In case of e-submission of bid, the Bidder shall submit his bid electronically in PDF or web forms files as specified in ITB Clause 21.1(b).
	20.2 The original and all copies of the bid shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Bidder. This authorization shall consist of a written confirmation as specified in the BDS and shall be attached to the bid. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the bid, except for un amended printed literature, shall be signed or initialed by the person signing the bid.
	20.3 Any amendments such as interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the bid.
D. Submission and Opening of Bids	
21. Sealing and Marking of Bids	21.1 Unless otherwise specified in BDS, Bidders shall submit their bids by electronic or by mail/by hand/by courier. Procedures for submission, sealing and marking are as follows: (a) Bidders submitting bids by mail, by hand or by courier shall enclose the original of the Technical Bid, and the original of the Price Bid and each copy of the Technical Bid and Price Bid, including alternative bids, if permitted in accordance with ITB 13, in separate sealed envelopes, duly marking the envelopes as “ORIGINAL TECHNICAL BID”, “ORIGINAL – PRICE BID”, “ALTERNATIVE” and “COPY No. – TECHNICAL BID” and “COPY NO. PRICE BID” These envelopes containing the original and the copies shall then be enclosed in one single envelope. (b) Bidders submitting Bids electronically shall follow the electronic bid submission procedure specified in this clause. - The bidder is required to register in the e-GP system https://www.bolpatra.gov.np/egp following the procedure specified in e-GP guideline. - 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. - The registered bidders need to maintain their profile data required during preparation of bids.

- iv. The bidder can prepare their technical and price 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 or as a joint venture. The bidder submitting bid in joint venture shall have to upload joint venture agreement along with partner(s) Bolpatra ID provided during bidder's registration.
- v. Bidders (all partners in case of JV) should update their profile data and documents required during preparation and submission of their technical bids.
- vi. In case of bid submission in JV, the consent of the partners shall be obtained through the confirmation link sent to the registered email address and the partners shall have to acknowledge their confirmation.

The required forms and documents shall be part of technical bids.

No.	Document	Requirement	Remarks
1.	Letter of Technical Bid	Mandatory	PDF
2.	Bid Security / Bank Guarantee	Mandatory	PDF
3.	Firm or Company registration Certificate	Mandatory	PDF
4.	VAT and PAN registration Certificate	Mandatory (for domestic bidders only)	PDF
5.	Business Registration Licence	Mandatory	PDF
6.	Tax Clearance Certificate/Tax return submission evidence/evidence of time extension	Mandatory (for domestic bidders only)	PDF
7.	Power of Attorney of Bid signatory	Mandatory	PDF
8.	Joint venture agreement	Mandatory in case of JV Bids Only	PDF
9.	Qualification Documents	Mandatory	Using profile data(financial details, contract details etc.) and Technical Proposal
10.	Additional documents] specified in ITB 11.2 (i)	Mandatory (If any)	PDF

The required forms and documents shall be part of price bids.

No.	Document	Requirement	Remarks
1.	Letter of Price Bid	Mandatory	PDF
2.	Completed Bill of Quantities (BoQ)	Mandatory	Online Forms
3.	Price Adjustment Table	Mandatory (If applicable)	Online Forms
4.	Additional Documents specified in ITB 11.3 (e)	Mandatory (If any)	PDF

Note:

	a) The documents specified as “Mandatory” should be included in e-submission and non-submission of the documents shall be considered as non-responsive bid. b) Bidders (all partners in case of JV) should verify/update their profile documents as appropriate for the specific bid before submitting their bid electronically. vii. After providing all the details and documents, two separate bid response documents i.e technical bids and price bids will be generated from the system. Bidders are advised to download and verify the response documents prior to bid submission. viii. For verifying the authentic user, the system will send one time password (OTP) in the registered e-mail address of the bidder. System will validate the OTP and allow bidder to submit their bid. ix. Electronically submitted bids can be modified and/or withdrawn through system. The bidder may modify their bids multiple times online within bid submission date and time specified in e-GP system. Once a Bid is withdrawn, bidder won’t be able to submit another bid response for the same bid. x. The Bidder / Bid shall meet the following requirements and conditions for e-submission of bids; aa) The e-submitted bids must be readable through PDF reader. bb) 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. cc) 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. 21.2. The inner and outer envelopes shall: (aa) bear the name and address of the Bidder; (bb) be addressed to the Employer as provided in BDS 22.1; (cc) bear the specific identification of this bidding process indicated in BDS 1.1; and 21.3 The outer envelope and the inner envelope containing Technical Proposal shall bear a warning not to open before the time and date for the opening of Technical Bid in accordance with ITB 25.1. 21.4 The inner envelope containing the Price Bid shall bear a warning not to open until advised by the Employer in accordance with ITB 25.7 21.5 If all envelopes are not sealed and marked as required, the Employer will assume no responsibility for the misplacement or premature opening of the bid.
22. Deadline for Submission of Bids	22.1 Bids must be received by the Employer at the address and no later than the date and time indicated in the BDS. In case of e-submission, the standard time for e-submission is Nepal Standard Time as set out in the server. The e-procurement system will accept the e-submission of bid from the date of publishing of notice and will automatically not allow the e-submission

	of bid after the deadline for submission of bid.
	22.2 The Employer may, at its discretion, extend the deadline for the submission of bids by amending the Bidding Document in accordance with ITB 8, in which case all rights and obligations of the Employer and Bidders previously subject to the deadline shall thereafter be subject to the deadline as extended.
23. Late Bids	23.1 The Employer shall not consider any bid that arrives after the deadline for submission of bids, in accordance with ITB 22. Any bid received by the Employer after the deadline for submission of bids shall be declared late, rejected, and returned unopened to the Bidder.
24. Withdrawal, and Modification of Bids	24.1 A Bidder may withdraw, or modify its bid- Technical or Price - after it has been submitted either in hard copy or by e-submission. Once a Bid is withdrawn, bidder shall not be able to submit another bid for this bidding process. Procedures for withdrawal or modification of submitted bids are as follows: (i) Bids submitted in Hard Copy GoN Funded: a) Bidders may withdraw or modify its bids by sending a written notice in a sealed envelope, duly signed by an authorized representative, and shall include a copy of the authorization in accordance with ITB 20.2. The corresponding modification of the bid must accompany the respective written notice. All notices must be: (aa) prepared and submitted in accordance with ITB 20 and ITB 21, and in addition, the respective envelopes shall be clearly marked “WITHDRAWAL”, “MODIFICATION;” and (bb) received by the Employer twenty; four hours prior to the deadline prescribed for submission of bids, in accordance with ITB 22. DP Funded: A Bidder may withdraw or modify its Bid – Technical or Price – after it has been submitted by sending a written notice, duly signed by an authorized representative, and shall include a copy of the authorization in accordance with ITB 20.2, (except that withdrawal notices do not require copies). The corresponding modification of the Bid must accompany the respective written notice. All notices must be (a) prepared and submitted in accordance with ITB 20 and ITB 21 (except that withdrawal notices do not require copies), and in addition, the respective envelopes shall be clearly marked “WITHDRAWAL,” and “MODIFICATION;” and (b) received by the Employer prior to the deadline prescribed for submission of Bids, in accordance with ITB 22. ii) E-submitted bids. a) Bidder may submit modification or withdrawal prior to the deadline prescribed for submission of bids through e-GP system by using the forms and instructions provided by the system. 24.2 Bids requested to be withdrawn in accordance with ITB 24.1 shall not be opened. In case of hard copy submission, the Bid will be returned unopened to the Bidders. 24.3 The following provisions apply for withdrawal or modification of the Bids: GoN Funded: (i) In case of bids submitted in hard copy no bid shall be withdrawn or modified in the

	interval between 24 hours prior to the deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Letter of Bid or any extension thereof. (ii) In case of e-submitted bids no bids shall be withdrawn or modified in the interval between deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Letter of Technical Bid and Price Bid or any extension thereof. DP Funded: No Bid may be withdrawn or modified in the interval between the deadline for submission of Bids and the expiration of the period of bid validity specified by the Bidder on the Letters of Technical Bid and Price Bid or any extension thereof. 24.4 Except in case of any modification or correction in bid document made by procuring entity, Bidder may submit request for withdrawal or modification only one time. 24.5 In case of hard copy bid, no bid may be withdrawn if the bid has already been modified; except in case of any modification or correction in bid document by procuring entity. 24.6 Request for withdrawal or modification must be made through the same medium of submission. Request for withdrawal or modifications through different medium shall not be considered.
25. Bid Opening	25.1 The Employer shall open the Technical Bids in public at the address, on the date and time specified in the BDS in the presence of Bidders' designated representatives who choose to attend. The Price Bids will remain unopened and will be held in custody of the Employer until the specified time of their opening. If the Technical Bid and Price Bid are submitted together in one envelope, the Employer shall reject the Bid as nonresponsive. 25.2 The Employer shall download the e-submitted Technical Bid. The e-GP system allows the Employer to download the e-submitted technical bid only after bid opening date and time after login simultaneously by at least two members of the Bid Opening Committee. 25.3 Electronically submitted Technical Bid shall be opened at first in the same time and date as specified above. Electronic Bids shall be opened one by one and read out. The e-submitted technical bids must be readable through open standards interfaces. Unreadable and or partially submitted bid files shall be considered incomplete. 25.4 Thereafter, envelopes marked "WITHDRAWAL" shall be opened and read out and the envelope with the corresponding Bid shall not be opened, but returned to the Bidder. No bid withdrawal shall be Permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at bid opening. Next, envelopes marked "MODIFICATION" shall be opened and read out with the corresponding bid. No Technical Bid and/or Price Bid modification shall be permitted unless the corresponding modification notice contains a valid authorization to request the modification and is read out and recorded at bid opening. Only the Technical Bid, both Original as well as Modification, are to be opened, read out, and recorded at the opening. Price Bids, both Original and Modification, will remain unopened in accordance with ITB 25.1.

	25.5 All other envelopes holding the Technical Bid shall be opened one at a time, reading out: the name of the Bidder; whether there is a modification; the presence of a bid security and any other details as the Employer may consider appropriate. Only Technical Bids read out and recorded at bid opening shall be considered for evaluation. No bid shall be rejected at opening of Technical Bids except for late bids, in accordance with ITB 23.1. 25.6 The Employer shall prepare a record of the opening of Technical Bids that shall include, as a minimum: the name of the Bidder and whether there is a withdrawal, or modification; and the presence or absence of a bid security. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record. 25.7 At the end of the evaluation of the Technical Bids, the Employer will invite bidders who have submitted substantially responsive Technical Bids and who have been determined as being qualified for award to attend the opening of the Price Bids. The date, time, and location of the opening of Price Bids will be advised in writing by the Employer. Bidders shall be given at least 7 days' notice for the opening of Price Bids. 25.8 The Employer will notify Bidders in writing who have been rejected on the grounds of their Technical Bids being substantially nonresponsive to the requirements of the Bidding Document and return their Price Bids unopened. 25.9 The Employer shall conduct the opening of Price Bids of all Bidders who submitted substantially responsive Technical Bids, in the presence of Bidders' representatives who choose to attend at the address, on the date, and time specified by the Employer. The Bidder's representatives who are present shall be requested to sign a register evidencing their attendance. 25.10 All envelopes containing Price Bids shall be opened one at a time and the following read out and recorded: (a) the name of the Bidder; (b) whether there is a modification; (c) the Bid Prices, including any discounts and alternative offers; and (d) any other details as the Employer may consider appropriate. Only Price Bids, discounts, modifications, and alternative offers read out and recorded during the opening of Price Bids shall be considered for evaluation. No Bid shall be rejected at the opening of Price Bids. 25.11 The Employer shall prepare a record of the opening of Price Bids that shall include, as a minimum, the name of the Bidder, the Bid Price (per lot if applicable), any discounts, modifications and alternative offers. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record.
E. Evaluation and Comparison of Bids	
26. Confidentiality	26.1 Information relating to the examination, evaluation, comparison, and post-qualification of bids and recommendation of Contract award, shall not be disclosed to Bidders or any other persons not officially concerned with such process until information on

	Contract award is communicated to all Bidders.
	26.2 Any attempt by a Bidder to influence the Employer in the evaluation of the bids or Contract award decisions may result in the rejection of its bid.
	26.3 Notwithstanding ITB 26.2, from the time of bid opening to the time of Contract award, if any Bidder wishes to contact the Employer on any matter related to the bidding process, it may do so in writing.
27. Clarification of Bids	27.1 To assist in the examination, evaluation, and comparison of the Technical and Price Bids, the Employer may, at its discretion, ask any Bidder for a clarification of its Bid. Any clarification submitted by a Bidder that is not in response to a request by the Employer shall not be considered. The Employer's request for clarification and the response shall be in writing. No change in the substance of the Technical Bid or prices in the Price Bid shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the Price Bids, in accordance with ITB 33. In case of e-submission of bid, upon notification from the employer, the bidder shall also submit the original of documents comprising the Technical and Price Bid as per ITB 11.2 and ITB 11.3 for verification of submitted documents for acceptance of the e-submitted bid.
	27.2 If a Bidder does not provide clarifications of its Bid by the date and time set in the Employer's request for clarification, its Bid shall be rejected.
28. Deviations, Reservations , and Omissions	28.1 During the evaluation of bids, the following definitions apply: (a) "Deviation" is a departure from the requirements specified in the Bidding Document; (b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Bidding Document; and (c) "Omission" is the failure to submit part or all of the information or documentation required in the Bidding Document.
29. Examination of Technical Bid	29.1 The Employer shall examine the Technical Bid to confirm that all documents and technical documentation requested in ITB 11.2 have been submitted. If any of these documents or information (except alternative Technical Bid which is optional) is missing, the bid shall be rejected.
	29.2 In case of e-submission bids, the Employer shall confirm that all the documents and information requested in ITB 21.1 have been submitted. If any of these documents or information is missing, the bid shall be rejected.
30. Determinati on of Responsiven ess of Technical Bid	30.1 The Employer's determination of a Bid's responsiveness is to be based on the contents of the bid itself, as defined in ITB 11.2.
	30.2 A substantially responsive Technical Bid is one that meets the requirements of the Bidding Document without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that, (a) if accepted, would: (i) affect in any substantial way the scope, quality, or performance of the Works specified in the Contract;

	or (ii) limit in any substantial way, inconsistent with the Bidding Document, the Employer's rights or the Bidder's obligations under the proposed Contract; or (b) if rectified, would unfairly affect the competitive position of other Bidders presenting substantially responsive bids.
	30.3 The Employer shall examine the technical aspects of the Bid submitted in accordance with ITB 16, Technical Proposal, in particular, to confirm that all requirements of Section VI (Works Requirements) have been met without any material deviation, reservation or omission.
	30.4 If a bid is not substantially responsive to the requirements of the Bidding Document, it shall be rejected by the Employer and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.
	30.5 In case of e-submission bids, the Employer evaluates the bid on the basis of the information in the electronically submitted bid files. If the Bidder cannot substantiate or provide evidence to establish the information provided in e-submitted bid through documents/ clarifications as per ITB Clause 27.1, the bid shall not be considered for further evaluation.
	30.6 Except in case of e-submission, the Price Bid of the bidder, which is evaluated as substantially non-responsive in technical bid, shall be returned to the respective bidders.
31. Non-conformities Errors, and Omissions	31.1 Provided that a bid is substantially responsive, the Employer may waive any non-conformities in the bid that do not constitute a material deviation, reservation, or omission.
	31.2 Provided that a Technical Bid is substantially responsive, the Employer may request that the Bidder submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities in the Technical Bid related to documentation requirements. Requesting information or documentation on such nonconformities shall not be related to any aspect of the Price Bid. Failure of the Bidder to comply with the request may result in the rejection of its bid.
	31.3 Provided that a Technical Bid is substantially responsive, the Employer shall rectify quantifiable nonmaterial nonconformities related to the Bid Price. To this effect, the Bid Price shall be adjusted, for comparison purposes only, to reflect the price of a missing or non-conforming item or component. The adjustment shall be made using the methods indicated in Section III (Evaluation and Qualification Criteria).
	31.4 If the monetary value of such non-conformities is found to be more than fifteen percent of the Bid Price of the bidder pursuant to ITB 31.3, such bid shall be considered nonresponsive and shall not be involved in evaluation.
32 Eligibility and Qualification of the Bidder	32.1 The Employer shall determine to its satisfaction during the evaluation of Technical Bids whether Bidders meet the eligibility and qualifying criteria specified in Section III (Evaluation and Qualification Criteria).
	32.2 The determination shall be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, pursuant to ITB 17.1. If two

	or more companies or firms have been merged prior to the submission of the bid, the qualifications of the companies or firms existing prior to such merger shall be deemed to form part of the qualifications of the resulting merged firm or company.
	32.3 An affirmative determination shall be a prerequisite for the opening and evaluation of a Bidder's Price Bid. A negative determination shall result into the disqualification of the Bid, in which event the Employer shall return the unopened Price Bid to the Bidder.
33. Correction of Arithmetical Errors	33.1 During the evaluation of Price Bids, the Employer shall correct arithmetical errors on the following basis: (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; (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 Price Bid, the bid price in the Summary of Bill of Quantities will prevail and the bid amount in item (c) of the Letter of Price 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. 33.2 If a Bidder does not accept the correction of arithmetical errors, its bid shall be disqualified and its bid security shall be forfeited.
34 Subcontractors	34.1 In case of Prequalification, the Bidder's Bid shall name the same subcontractor as submitted in the prequalification application and approved by the Employer. In case of Post-qualification, the Employer may permit subcontracting for certain specialized works as indicated in Section III. When subcontracting is permitted by the Employer, the sub-contractor shall meet the qualifications criteria as indicated in section III. Sub-contractors' qualification and experience will not be considered for evaluation of the Bidder. The Bidder on its own (without taking into account the qualification and experience of the sub-contractor) should meet the qualification criteria. Bidders may propose subcontracting up to the percentage of total value of contracts or the volume of works as specified in the BDS.
35. Evaluation of Price Bids	35.1 The Employer shall use the criteria and methodologies listed in this Clause. No other evaluation criteria or methodologies shall be permitted. 35.2 To evaluate a Price Bid, the Employer shall consider the following: (a) the bid price, excluding Value Added Tax, and Provisional Sums, in the Summary Bill of Quantities, for Unit Rate Contracts, or Schedule of Prices for lump sum Contracts, but including Day work items, where priced competitively; (b) adjustment for correction of arithmetic errors in accordance with ITB 33.1;

	(c) adjustment due to discounts offered in accordance with ITB 14.4; (d) adjustment for nonconformities in accordance with ITB 31.3; (e) application of all the evaluation factors indicated in Section III (Evaluation and Qualification Criteria) If the evaluated Bid Price of the Bidder is more than 30 (thirty) percent below or substantially higher than the cost estimate, the Employer shall reject the Bid as non-responsive. 35.3 The estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be taken into account in bid evaluation. 35.4 If this Bidding Document allows Bidders to quote separate prices for different lots (Contracts), and to award multiple Contracts to a single Bidder as specified in BDS, the methodology to determine the lowest evaluated price of the Contract combinations, including any discounts offered in the Letter of Price Bid, is specified in Section III (Evaluation and Qualification Criteria). 35.5 If the bid for a Unit Rate Contract, evaluated as per ITB 36.1, is front-loaded or has quoted abnormally high rate for any item believing that the item was underestimated, the Employer shall require the Bidder to provide clarification along with detailed rate analysis, for any or all items of the Bill of Quantities as per ITB 27.1. The rate analysis submitted shall be analyzed and compared against prevailing norms and rates, on the basis of the work execution methodology, technology, and management methods specified by the bidder. If the clarification is deemed unsatisfactory, the Employer shall require that the amount of the performance security be increased at the expense of the Bidder as specified in BDS. 35.6 In case of e-submission bids, the Employer evaluates the bid on the basis of the information in the electronically submitted bid files. If the Bidder cannot substantiate or provide evidence to establish the information provided in e-submitted bid through documents/ clarifications as per ITB Clause 27.1, the bid shall not be considered for further evaluation. 35.7 If all the Bids evaluated are substantially higher than the cost estimate, the employer may negotiate with the bidder who submitted the lowest evaluated substantially responsive Bid to propose a lump sum discount rate in order to bring the bid price within the approved cost estimate. However, no change in the substance of the bid is permitted during the negotiations. 35.8 If no agreement can be reached as per ITB 29.8, the employer shall cancel the procurement proceedings.
36. Comparison	36.1 The Employer shall evaluate all the bid prices of the substantially responsive bids in accordance with ITB 35.2. The Employer shall determine the Average Bid Price of

of Bids	all the substantially responsive Bids. The Bid Price which is closest to the Average Bid Price <u>AND is not substantially higher than the cost estimate</u> shall be selected for awarding the contract. In case two or more Bid Prices are determined to be equally closest to the Average Bid Price, the Bid Price which is below the Average Bid Price shall be selected for awarding the contract. 36.2 While evaluating the Bid Price as per ITB 36.1, if the Bid Price of two or more Bidders is found to be equal, the Employer shall select the bid for awarding the contract by drawing of lots in presence of Bidders' designated representatives who choose to attend in date, time and place as notified by the Employer in writing to the concerned bidders. The Bidders' representatives who are present shall be requested to sign a record evidencing their attendance. The omission of a Bidder's signature on the record or the absence of a Bidder during the drawing of lots shall not invalidate the contents and the effect of the record. The method of drawing of lots shall be determined by the Employer.
37. Employer's Right to Accept Any Bid, and to Reject Any or All Bids	37.1 The Employer reserves the right to accept or reject any bid, and to annul the bidding process and reject all Bids at any time prior to contract award, without thereby incurring any liability to Bidders. In case of annulment, all Bids submitted and specifically, bid securities, shall be promptly returned to the Bidders. 37.2 The public entity shall give notice of the rejection of bids or the cancellation of the procurement proceedings pursuant to ITB 37.1, along with the reasons for such rejection or cancellation, to all bidders. 37.3 Where any bidder requests, within thirty (30) days of the communication of the notice pursuant to ITB 37.2, 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.
F. Award of Contract	
38. Award Criteria	38.1 The Employer shall award the Contract to the Bidder whose Bid Price is selected as per ITB 35.8, ITB 36.1 or ITB 36.2 and is substantially responsive to the Bidding Document, provided further that the Bidder is determined to be qualified to perform the Contract satisfactorily.
39. Letter of Intent to Award the Contract/Notification of Award	39.1 The Employer shall notify the concerned Bidder whose bid has been selected in accordance with ITB 38.1 within seven days of the selection of the bid, in writing that the Employer has intention to accept its bid and the information regarding the name, address and amount of selected bidder shall be given to all other bidders who submitted the bid. 39.2 After issuance of the notice under ITB 39.1 if the concerned bidder provides information pursuant to ITB 4.10 regarding saturation of maximum number of contracts, the employer shall disqualify the bidder and shall select the next Bidder whose Bid Price is closest to the previously determined Average Bid Price in accordance with ITB 38.1 and notify accordingly as per ITB 39.1. 39.3 If no bidder submits an application pursuant to ITB 42 within a period of seven days of the notice provided under ITB 39.1, the Employer shall, accept the bid selected in accordance with ITB 38.1 and Letter of Acceptance shall be communicated to the

	selected bidder prior to the expiration of period of Bid validity, to furnish the performance security and sign the contract within fifteen days.
	39.4 After communicating letter of acceptance under ITB 39.3, if the concerned bidder provides information pursuant to ITB 4.10 regarding saturation of maximum number of contracts, the employer shall reject the bid of that bidder and shall select the next Bidder whose Bid Price is closest to the previously determined Average Bid Price in accordance with ITB 38.1 and shall issue the notice accordingly as per ITB 39.1. In such case bid security of the rejected bidder shall not be forfeited.
40. Performance Security	40.1 Within Fifteen (15) days of the receipt of Letter of Acceptance from the Employer, the successful Bidder shall furnish the performance security in an amount equal to 5 (five) percent of the Bid Price in accordance with the Conditions of Contract and subject to ITB 35.5, from Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law in Nepal using Sample Form for the Performance Security included in Section X (Contract Forms), or another form acceptable to the Employer. The performance security issued by any foreign Bank outside Nepal must be counter guaranteed by Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law in Nepal. The Bid Price shall be without VAT but including Provisional Sum.
	40.2 Failure of the successful Bidder to submit the above-mentioned Performance Security or to sign the Contract Agreement shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security. In that event the Employer may award the Contract to the next Bidder whose Bid Price is closest to the previously determined Average Bid Price in accordance with ITB 38.1 whose offer is substantially responsive and is determined by the Employer to be qualified to perform the Contract satisfactorily. The process shall be repeated according to ITB 39.
41 Signing of Contract	41.1 The Employer and the successful Bidder shall sign the Contract Agreement within the period as stated ITB 40.1.
	41.2 At the same time, the Employer shall affix a public notice on the result of the award on its notice board and make arrangement for causing such notice to be affixed on the notice board also of the District Coordination Committee, District Administration Office, Provincial Treasury and Controller Office and District Treasury and Controller Office. The Employer may make arrangements to post the notice into its website, if it has; and if it does not have, into the website of the Public Procurement Monitoring Office, identifying the bid and lot numbers and the following information: (i) the result of evaluation of bid; (ii) date of publication of notice inviting bids; (iii) name of newspaper; (iv) reference number of notice; (v) item of procurement; (vi) name and address of bidder making contract and (viii) contract price
	41.3 Within thirty (30) days from the date of issuance of notification pursuant to ITB 39.1 unsuccessful bidders may request in writing to the Employer for a debriefing seeking explanations on the grounds on which their bids were not selected. The Employer shall promptly respond in writing to any unsuccessful Bidder who, requests for debriefing.
	41.4 If the bidder whose bid has been accepted fails to sign the contract as stated ITB 40.1, the Public Procurement Monitoring Office shall blacklist the bidder on recommendation of the Public Entity.

42. Complaint and Review	42.1 If a Bidder is dissatisfied with the Procurement proceedings or the decision made by the Employer in opening of the price bid or the intention to award the Contract, it may file an application to the Chief of the Public Entity within Seven (7) days of providing the notice under ITB 25.8 and ITB 39.1 by the Public Entity, for review of the proceedings stating the factual and legal grounds.
	42.2 Late application filed after the deadline pursuant to ITB 42.1 shall not be processed.
	42.3 The chief of Public Entity shall, within five (5) days after receiving the application, give its decision with reasons, in writing pursuant to ITB 42.1: (a) whether to suspend the procurement proceeding and indicate the procedure to be adopted for further proceedings; or (b) to reject the application. The decision of the chief of Public Entity shall be final for the Bid amount up to the value as stated in 42.4.
	42.4 If the Bidder is not satisfied with the decision of the Public Entity in accordance with ITB 42.3, or the decision is not given within five (5) days of receipt of application pursuant to ITB 42.1, it can, within seven (7) days of receipt of such decision, file an application to the Public Procurement Review Committee of the GoN, stating the reason of its disagreement on the decision of the chief of Public Entity and furnishing the relevant documents, provided that its Bid amount, equal or more than Rupees Twenty Million (NRs. 20,000,000). The application may be sent by hand, by post, by courier, or by electronic media at the risk of the Bidder itself.
	42.5 Late application filed after the deadline pursuant to ITB 42.4 shall not be processed.
	42.6 Within three (3) days of the receipt of application from the Bidder, pursuant to ITB 42.4, the Public Procurement Review Committee shall notify the concerning Public Entity to furnish its procurement proceedings, pursuant to ITB 42.3.
	42.7 Within three (3) days of receipt of the notification pursuant to ITB 42.6, the Public Entity shall furnish the copy of the related documents to the Public Procurement Review Committee.
	42.8 The Public Procurement Review Committee, after inquiring from the Bidder and the Public Entity, if needed, shall give its decision within thirty (30) days of the receipt of the application filed by the Bidder, pursuant to ITB 42.4.
	42.9 The Bidder, filing application pursuant to ITB 42.4, shall have to furnish a cash amount or Bank guarantee from Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law equivalent to ten percent (10 %) of amount of bid security in case of complaint against decision pursuant to ITB 25.8 and one percent (1%) of its quoted Bid amount in case of complaint against decision pursuant to ITB 39.1 with the validity period of at least ninety (90) days from the date of the filing of application pursuant to ITB 42.4.
	42.10 If the claim made by the Bidder pursuant to ITB 42.4 is justified, the Public Procurement Review Committee shall have to return the security deposit to the applicant, pursuant to ITB 42.9, within seven (7) days of such decision made.
	42.11 If the application submitted by the Bidder pursuant to ITB 42.4 is dismissed by the Public Procurement Review Committee, the security deposit (Cash or Bank Guarantee)

	submitted by the Bidder pursuant to ITB 42.9 shall be forfeited. 42.12 If the Employer does not implement the decision of the Public Procurement Review Committee, the bidder may file an application to the Public Procurement Review Committee.
--	---



Section II: Bid Data Sheet

This section consists of provisions that are specific to each procurement and supplement the information or requirements included in Section I. Instructions to Bidders.

A. General	
ITB 1.1	The number of the Invitation for Bids is: MWSDB/Tunnel-Operation/83-84
ITB 1.1	The Employer is: Melamchi Water Supply Development Board (MWSDB), Panipokhari, Kathmandu
ITB 1.1	Multiple Contract or lots (contracts) is not applicable
ITB 2.1	The name of the Project is <i>Tunnel Operation and Maintenance works for MWSP</i> The DP is None The implementing agency is <i>Government of Nepal (GoN)</i> <i>Melamchi Water Supply Development Board, Panipokhari</i> GoN Funded or DP Funded: <i>GoN Funded</i>
ITB 4.1 (a)	For GoN Funded: Maximum number of partners in a joint venture shall be: 3 (three)
ITB 4.4	For GoN: www.ppmo.gov.np/ https://blacklist.ppmo.gov.np/blacklisted and https://www.worldbank.org/en/projects-operations/procurement/debarred-firms
ITB 4.9 & ITB 4.10	For GoN Funded: The Bidder, including all parties constituting the Bidder, shall be ineligible to participate in the open competitive bidding process if it has already secured five (5) number of construction contracts (in open competitive bidding) and has not yet completed the work as stipulated in the respective contracts. Following Procurement of Works contracts shall not be counted for this purpose: a) The works for which tender were invited or contracts accepted before 2078-12-03 B.S (March 17, 2022 A.D). b) The works for which tender were invited and contracts accepted after 2078-12-03 B.S (March 17, 2022 A.D) but the work acceptance report has been approved according to Rule 117 of PPR. c) The works for which tenders were invited or contracts accepted under all types of foreign assistance.
B. Bidding Document	

ITB 7.1	For clarification purposes only, the Employer's address is: Attention: Executive Director Address: Melamchi Water Supply Development Board Telephone: : 01-4443473 Facsimile number: 01-4006541 Electronic mail address: melamchiwater@gmail.com
ITB 7.4	A Pre-Bid meeting shall held. Pre-Bid Meeting will Take place at the following date, time and place: Date: 24 September, 2026 Time: 13:00 Hrs Place: Office of Melamchi Water Supply Development Board, Panipokhari A site visit shall not be organized by the Employer.
ITB 7.5	Time for request: Requests for clarification should be received by the Employer no later than 10 days prior to the deadline for submission of bids.
C. Preparation of Bids	
ITB 10.1	The language of the bid is: English / Nepali
ITB 11.2 (i)	The Bidder shall submit with its Technical Bid the following additional documents: List of Key Personnel
ITB 11.3 (b)	In accordance with ITB 12 and ITB 14, the following schedules shall be submitted with the bid, including the priced Bill of Quantities for Unit Rate Contracts and Schedule of Prices for lump sum contracts: None
ITB 11.3 (e)	The Bidder shall submit with its Price Bid the following additional documents: None
ITB 13.1	Alternative bids shall not be permitted.
ITB 13.2	Alternative times for completion shall not be permitted.
ITB 13.4	Alternative technical solutions shall be permitted for the following parts of the Works: NA
ITB 14.6	The prices quoted by the Bidder shall be subject to adjustment during the performance of the Contract.
ITB 18.1	The bid validity period shall be: Ninety (90) days.
ITB 19.1	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 NRs 3,300,000.00 , which shall be valid for 30 days beyond the validity period of the bid.
ITB 19.2 (b)	Office Name: Melamchi Water Supply Development Board Bank Name: Rastriya Banijya Bank Bank Address: Singha Durbar, Kathmandu Account Number: 1000100200010000 Office Code: 337003502
ITB 20.1	In addition to the original of the bid, the number of copy/ies is/are: Two (One original and

	one copy)
ITB 20.2	The written confirmation of authorization to sign on behalf of the Bidder shall indicate: (a) The name and description of the documentation required to demonstrate the authority of the signatory to sign the Bid such as a Power of Attorney; and (b) In the case of Bids submitted by an existing or intended JV, an undertaking signed by all parties (i) stating that all parties shall be jointly and severally liable, and (ii) nominating a Representative who shall have the authority to conduct all business for and on behalf of any and all the parties of the JV during the bidding process and, in the event the JV is awarded the Contract, during contract execution.
D. Submission and Opening of Bids	
ITB 21.1	Bidders shall have the option of submitting their bids by mail / by hand / by courier
ITB 22.1	For bid submission purposes only, the Employer's address is: Attention: Executive Director Address: MWSDB office, Panipokhari The deadline for bid submission is: Date: October 7, 2026 Time: 12:00 Hrs
ITB 25.1	The Technical Bid opening shall take place at: Address: MWSDB office, Panipokhari, Kathmandu Date: October 7, 2026 Time: 12:30 Hrs
E. Evaluation and Comparison of Bids	
ITB 34.1	a) Contractor's proposed subcontracting: Maximum percentage of subcontracting permitted is: 25% of the total contract amount without VAT but including PS. b) Sub-contractors' qualification and experience will not be considered for evaluation of the Bidder. The Bidder on its own (without taking into account the qualification and experience of the sub-contractor) should meet the qualification criteria.
ITB 35.4	NA
ITB 35.5	The amount of the performance security be increased by Eight (8) percent of the quoted bid price without VAT but Including PS.



Section III: Evaluation and Qualification Criteria

This Section contains all the criteria that the Employer shall use to evaluate bids and qualify Bidders by post-qualification exercise. GoN/DP requires bidders to be qualified by meeting predefined, precise minimum requirements. The method sets pass-fail criteria, which, if not met by the bidder, results in disqualification. In accordance with ITB 32 and ITB 35, no other methods, criteria and factors shall be used. The Bidder shall provide all the information requested in the forms included in Section IV (Bidding Forms).

1. Evaluation

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

1.1 Adequacy of Technical Proposal

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

Non-compliance with equipment and personnel requirements described in Section VI (Works Requirements) shall not be grounds for bid rejection and such non-compliance will be subject to clarification and rectification prior to contract award.

1.2 Multiple Contracts

Multiple Contracts, if permitted under ITB 35.4, will be evaluated as follows: **Not Applicable**

Award Criteria for Multiple Contracts [ITB 35.4]:

Bidders have the option to Bid for any one or more Contracts. Bids will be evaluated taking into account discounts offered, if any, for combined contracts. The contract(s) will be awarded to the Bidder or Bidders offering the lowest evaluated cost to the Employer for combined contracts, subject to the selected Bidder(s) meeting the required qualification criteria for combination of multiple contracts as the case may be.

Qualification Criteria for Multiple Contracts:

The criteria for qualification shall be the sum of the minimum requirements for respective individual contracts as specified under items 2.3.2, 2.3.3, 2.3.4 and 2.4.2 b.

With respect to the **Contracts of Similar Size and Nature** under item 2.4.2(a) of Section III, the evaluation shall be done as below:



N is the minimum number of contracts required as per Specific Construction Experience (2.4.2(a)).

V is the minimum value of a single contract as per Note (2), ~~or~~ (3) of 2.4.2 Specific Construction Experience.

- i. Minimum requirements for combined contract(s) shall be the aggregate requirements for each contract for which the bidder has submitted bids as follows, and N1, N2, N3, etc. shall be different contracts:

Contract 1: N1 contracts, each of minimum value V1;

Contract 2: N2 contracts, each of minimum value V2;

Contract 3: N3 contracts, each of minimum value V3;

----etc.

Or

- ii. Total number of contracts is equal or less than $N1 + N2 + N3$ +--but the total value of all such contracts is equal or more than $N1 \times V1 + N2 \times V2 + N3 \times V3$ +---.

1.3 In Case, other than Multiple Contracts

Bidders have the option to Bid for any one or more Contracts. The contracts will be awarded to the Bidder or Bidders offering the **substantially responsive Bid closest to the Average Bid Price** to the Employer, subject to the selected Bidder(s) meeting the required qualification which shall be the sum of the minimum requirements for respective individual contracts. Under this case, the Contract shall be awarded based on Least Cost Combination to the Employer.

1.4 Completion Time

An alternative Completion Time, if permitted under ITB 13.2, will be evaluated as follows: **Not applicable**

1.5 Alternative Technical Solutions

Alternative technical solutions, if permitted under ITB 13.4, will be evaluated as follows: **Not applicable**

1.6 Quantifiable Nonconformities and Omissions

Subject to ITB 14.2 and ITB 35.2, the evaluated cost of quantifiable nonconformities including omissions, is determined as follows:

“Pursuant to ITB 31.3, the cost of all quantifiable nonmaterial nonconformities shall be evaluated, but excluding omission of prices in the BoQ. The Employer will make its own assessment of the cost of any nonmaterial nonconformities and omissions for the purpose of ensuring fair comparison of bids.”]

2. Qualification

2.1 Eligibility

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
2.1.1 Nationality					
Nationality in accordance with ITB sub-clause 4.2	must meet requirement	must meet requirement	must meet requirement	not applicable	Letter of Technical Bid, Forms ELI –1; ELI – 2 with attachments
2.1.2 Conflict of Interest					
No conflicts of interest in accordance with ITB Sub-Clause 4.3.	must meet requirement	existing or intended JV must meet requirement	must meet requirement	not applicable	Letter of Technical Bid
2.1.3 Government/ DP Eligibility					
Not having been declared ineligible by government /DP, as described in ITB Sub-Clause 4.4.	must meet requirement	must meet requirement	must meet requirement	not applicable	Letter of Technical Bid
2.1.4 Government-owned Entity					
Bidder required to meet conditions of ITB Sub-Clause 4.5.	must meet requirement	existing or intended JV must meet requirement	must meet requirement	not applicable	Letter of Technical Bid, Forms ELI - 1, ELI - 2, with attachments
2.1.5 UN Eligibility					
Not having been declared ineligible based on a United Nations resolution or Employer's country law, as described in ITB Sub-Clause 4.7.	must meet requirement	existing or intended JV must meet requirement	must meet requirement	not applicable	Letter of Technical Bid

2.1.6 Bidder's Running Contracts

Bidders have not yet secured five (5) number of construction Contracts ² (in open competitive bidding) as described in ITB Sub-Clause 4.9.	must meet requirement	existing or intended JV must meet requirement	must meet requirement	not applicable	Letter of Technical Bid, Form ELI-3
---	-----------------------	---	-----------------------	----------------	-------------------------------------

2.1.7 Other Eligibility

Firm or Company Registration Certificate	must meet requirement	not applicable	must meet requirement	not applicable	Document attachment
Business Registration License	must meet requirement	not applicable	must meet requirement	not applicable	Document attachment
VAT and PAN Registration certificate (<i>only for domestic bidders</i>)	must meet requirement	not applicable	must meet requirement	not applicable	Document attachment
Tax Clearance Certificate or Tax return submission evidence or evidence of time extension for the F/Y 2081/082 (<i>Only for domestic bidders</i>)	must meet requirement	not applicable	must meet requirement	not applicable	Document attachment
Additional requirements <i>None</i>					

2.2 Pending Litigation

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	

² Following Procurement of Works contracts shall not be counted for this purpose:

- The works for which tender were invited or contracts accepted before 2078-12-03 B.S (March 17, 2022 A.D)
- The works for which tender have been invited and contracts accepted after 2078-12-03 B.S (March 17, 2022 A.D) but the work acceptance report has been approved according to Rule 117 of PPR.
- The works for which tenders were invited or contracts accepted under all types of foreign assistance.

2.2.1 Pending Litigation

All pending litigation shall be treated as resolved against the Bidder and so shall in total not represent more than 50 (fifty) percent of the Bidder's net worth.	must meet requirement by itself or as partner to past or existing JV	not applicable	must meet requirement by itself or as partner to past or existing JV	not applicable	Form LIT - 1
--	--	----------------	--	----------------	--------------

2.3 Financial Situation

2.3.1 Historical Financial Performance

Submission of audited balance sheets and income statements, for the last three (3) years to demonstrate the current soundness of the Bidder's financial position. As a minimum, a Bidder's net worth for the last year calculated as the difference between total assets and total liabilities should be positive.	must meet requirement	not applicable	must meet requirement	not applicable	Form FIN - 1 with attachments
---	-----------------------	----------------	-----------------------	----------------	-------------------------------

2.3.2 Average Annual Construction Turnover

Minimum average annual construction turnover of NRs 67,500,000.00 , calculated as total certified payments received for construction contracts in progress or completed, within best three years out of last ten fiscal years.	must meet requirement	must meet requirement	must meet 25% of the requirement	must meet 40% of the requirement	Form FIN -2
---	-----------------------	-----------------------	---	---	-------------

Only the net amount shall be calculated after deducting the amount for VAT and such amount shall be adjusted to present value by applying wholesale price index of Nepal Rastra Bank.

2.3.3 Financial Resources

Using Forms FIN - 3 and FIN - 4 in Section IV (Bidding Forms) the Bidder must demonstrate access to, or availability of, financial resources such as liquid assets ³ , unencumbered real assets, and other financial resources, (other than any contractual advance payments) to meet the cash-flow requirement of NRs. 15,000,000.00 .	must meet requirement	must meet requirement	must meet 25% of the requirement	must meet 40% of the requirement	Form FIN - 3
---	-----------------------	-----------------------	---	---	--------------

2.3.4 Required Bid Capacity

The bidding capacity of the bidder should be equal to or more than the NRs. 135,000,000.00	must meet requirement	must meet requirement	must meet 25% of the requirement	must meet 40% of the requirement	Form FIN - 4 and Form FIN - 5
---	-----------------------	-----------------------	----------------------------------	----------------------------------	-------------------------------

³ Liquid Assets mean cash and cash equivalents, short-term financial instruments, short term available-for-sale-securities, marketable securities, trade receivables, short-term financing receivables and other assets that can be converted into cash within ONE YEAR.

2.4 Experience

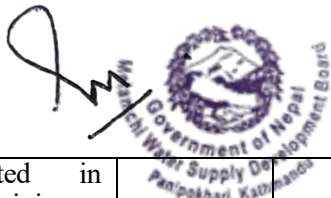
Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirement
		All Partners Combined	Each Partner	One Partner	
2.4.1 General Construction Experience					
Experience under construction contracts in the role of contractor, subcontractor, or management contractor for at least the last five (5) years prior to the applications submission deadline.	must meet requirement	not applicable	must meet requirement	not applicable	Form EXP - 1

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirement
		All Partners Combined	Each Partner	One Partner	
2.4.2 Specific Construction Experience					
(a) Contracts of Similar Size and Nature					
Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirement
		All Partners Combined	Each Partner	One Partner	
Participation as Prime contractor, management contractor, or subcontractor, within the last ten (10) years, that have been successfully or are substantially ^a completed and that are similar to the proposed works. The similarity shall be based on the physical size, complexity, methods, technology or other characteristics as described; 1. Construction or Maintenance of water tunnel for Hydropower, Irrigation or water supply	Must meet requirement in at least One (1) Contract with a value of at least NRs. 81,000,000.00	not applicable	not applicable	Must meet requirement in at least One (1) Contract with a value of at least NRs 81,000,000.00	Form EXP – 2(a)

Only the net amount shall be calculated after deducting the amount for VAT and such amount shall be adjusted to present value by applying wholesale price index of Nepal Rastra Bank.

^a A contract for which a Taking-Over Certificate has been issued shall be considered as substantially completed.

(b) Construction Experience in Key Activities* (Not Applicable)					
Participation as Prime contractor, management contractor, or subcontractor, within a last ten (10) years, For the above or other	must meet all requirements	must meet all requirements	not applicable	not applicable	Form EXP - 2(b)



contracts stipulated in 2.4.2(a) above, a minimum annual production rate on construction experience in the following key activities that have been successfully or substantially^a completed: <i>[list activities indicating number or rate of production as applicable; for the key activity (ies) in the subject contract. The rates should be about 80% of the estimated annual production rates of the key activity(ies) in the subject contract as needed to meet the expected construction schedule with due allowance for adverse climatic conditions. Contract duration less than one year shall be considered one year for calculation of annual production rates.]</i>					
--	--	--	--	--	--



2.5 Subcontractors

The experience and financial capacity of the sub-contractors shall not be added to those of the Bidder for purposes of qualification of the Bidder.

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

2.5 (a) Nature of Works that can be sub-contracted:

- (i) Security Service
- (ii) Electro-mechanical Supplier

2.7 (b) Qualification Criteria

The proposed sub-contractor (Security Service) shall meet the following requirements:

- 1) Minimum average annual construction turnover for the work being subcontracted of NRs 11,000,000.00, calculated as total certified payments received for construction contracts in progress or completed, within best three years out of last ten fiscal years.
- 2) Financial Resources: The sub contract must demonstrate that it has the financial resources to meet its current contract commitment plus three months' requirements of **NRs. 24,000,000.00** for the sub contracted work.



Section IV: Bidding Forms

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



Letter of Technical Bid

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

Date:

Name of the contract:

Invitation for Bid No.:

To: *[Insert Complete name of Employer]*

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (ITB) Clause 8.
- (b) We offer to execute in conformity with the Bidding Documents the following Works: *[Insert Description of the works]*
- (c) Our Bid consisting of the Technical Bid and the Price Bid shall be valid for a period of *[insert validity period as specified in ITB 18.1 of the BDS]* 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.
- (d) Our firm, including any subcontractors or suppliers for any part of the Contract, have nationalities from eligible countries in accordance with ITB 4.2 and meet the requirements of ITB 3.4, & ITB 3.5
- (e) We are not participating, as a Bidder or as a subcontractor, in more than one Bid in this bidding process in accordance with ITB 4.3(e), other than alternative offers submitted in accordance with ITB 13.
- (f) Our firm, its affiliates or subsidiaries, including any Subcontractors or Suppliers for any part of the contract, has not been declared ineligible by DP, under the Employer's country laws or official regulations or by an act of compliance with a decision of the United Nations Security Council;
- (g) [We are not a government owned entity] / [We are a government owned entity but meet the requirements of ITB 4.5];¹
- (h) We declare that, we including any subcontractors or suppliers for any part of the contract do not have any conflict of interest in accordance with ITB 4.3 and we have not been punished for an offense relating to the concerned profession or business.
- (i) We declare that we are solely responsible for the authenticity of the documents submitted by us. The document and information submitted by us are true and correct. If any document/information given is found to be concealed at a later date, we shall accept any legal actions by the Employer.



- (j) 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.
- (k) If our Bid is accepted, we commit to mobilizing key equipment and personnel in accordance with the requirements set forth in Section VI (Works Requirement) and our technical proposal, or as otherwise agreed with the Employer.
- (l) We declare that we have not yet secured five (5)⁴ number of construction contract (in open competitive bidding) as described in ITB Sub-Clause 4.9.

Name: *[insert complete name of the person signing the Bid]*.....

In the capacity of *[insert legal capacity of person signing the Bid]*.....

Signed *[signature of the person whose name and capacity are shown above]*.....

Duly authorized to sign the Bid for and on behalf of *[insert complete name of the Bidder]*.....

Date *[insert date of signing]*.....

¹ Note: Use one of the two options as appropriate.

⁴ Note: Following Procurement of Works contracts shall not be counted for this purpose:

- a) The works for which tender were invited or contracts accepted before 2078-12-03 B.S (March 17, 2022 A.D).
- b) The works for which tender have been invited and contracts accepted after 2078-12-03 B.S (March 17, 2022 A.D) but the work acceptance report has been approved according to Rule 117 of PPR.
- c) The works for which tenders were invited or contracts accepted under all types of foreign assistance.



Letter of Price Bid

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

Date:

Name of the contract:

Invitation for Bid No.:

To: *[Insert Complete name of Employer]*

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (ITB) Clause 8;

We offer to execute in conformity with the Bidding Documents the following Works: *[Insert Description of the works]* .

- (c) The total price of our Bid, excluding any discounts offered in item (d) below is: *[Insert one of the options below as appropriate]* or when left blank is the Bid Price indicated in the Bill of Quantities.

Option 1, in case of single contract: Total price is: *[insert the total price of the Bid in words and figures]*;

Or

Option 2, in case of multiple lots (contracts): (i) Total price of each lot (contracts): *[insert the total price of each lot in words and figures]*; (ii) Total price of subject contract [say Lot1] and Lot2 [another contract] *[insert the total price in words and figures]*; (iii) Total price of subject contract [say Lot1] and Lot3 [another contract] *[insert the total price in words and figures]*; Total price of subject contract [say Lot1], Lot2 [another contract], Lot3 [another contract],*[insert the total price in words and figures]*;

- (d) The discounts offered and the methodology for their application for subject contract [single contract] are:..... [For Bidding Documents not provisioning multiple contracts]

Add following if Bidding Document provisions applicability of multiple contracts:

The discounts offered and the methodology for their application for subject contract [say Lot1] and Lot2 [another contract] are:.....



The discounts offered and the methodology for their application for subject contract [say Lot1] and Lot3 [another contract] are:.....

The discounts offered and the methodology for their application for subject contract [say Lot1], Lot2 [another contract] and Lot3 [another contract],....., are:.....

[Note:

1. Formulate possible combinations depending upon the number of lots under Bidding Process and modify accordingly Paragraph (c) and (d)]

(e) Our bid shall be valid for a period of *[insert validity period as specified in ITB 18.1]* 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 have paid, or will pay the following commissions, gratuities, or fees with respect to the bidding process or execution of the Contract:⁵

Name of Recipient	Address	Reason	Amount
.....			
.....			

(h) 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;

(i) We understand that you are not bound to accept the bid closest to the Average Bid Price or any other bid that you may receive; and

(j) We declare that we are solely responsible for the authenticity of the documents submitted by us.

(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: *[insert complete name of the person signing the Bid]*.....

In the capacity of *[insert legal capacity of person signing the Bid]*.....

Signed *[signature of the person whose name and capacity are shown above]*

Duly authorized to sign the Bid for and on behalf of *[insert complete name of the Bidder]*.....

Date *[insert date of signing]*.....

⁵ If none has been paid or is to be paid, indicate "None".

Table of Price Adjustment Data⁶

[To be used if Price Adjustment is applicable as per GCC 53.1]

Code	Index Description	Source of Index*	Base Value and Date	Employer's Proposed Weighting Range (coefficient)	Bidder's Proposed Weighting (coefficient)**
1	2	3	4	5	6
	Non - Adjustable (A)			0.15	0.15
	Labor (b)	As per note below		0.3-0.50	
	Materials (c)***			0.10-0.40	
	Equipment usage (d)			0.05-0.10	
		Total			1.00

*Normally following source of index shall apply. Public Entity shall choose applicable Index for each item.

(a) Labor: "National Salary and Wage Rate Index"- "Construction Labor" of Nepal Rastra Bank or rate fixed by District Rate Fixation Committee

(b) Material: "National Wholesale Price Index" - Construction Materials" of Nepal Rastra Bank

(c) Equipment usage: "National Wholesale Price Index" - Machinery and Equipment" of Nepal Rastra Bank or "Fuel" Price fixed by Nepal Oil Corporation.

** Bidders proposed weightings should be within the range specified by the Employer in column - 5

*** The materials can be broken down into major construction materials if necessary. In this case the source of index shall be the specified by Employer, preferably as per the published ex-factory price or published price from the sole authorized seller.

⁶ Non-compliance of the data (stipulated by the bidder in this table) with requirements described here shall not be grounds for bid rejection and such non-compliance will be subject to clarification and rectification prior to contract award.

Table of Price Adjustment Data⁷

[To be used if Price Adjustment is applicable as per GCC 53.6]

Not Applicable

Code	Construction Material*	Unit	Base Price (NRs/Unit) (Ex-factory)	Source (Factory)**
1	2	3	4	5

* Major construction materials to be specified by Employer in column - 2.

** Base Price and source normally to be specified by Employer (or alternatively informed to be proposed by bidder) in column 4 and 5.

⁷ Non-compliance of the data (stipulated by the bidder in this table) with requirements described here shall not be grounds for bid rejection and such non-compliance will be subject to clarification and rectification prior to contract award.



Bid Security

Bank Guarantee

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

(On Letter head of the Bank)

Beneficiary:**[Insert 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**[Insert name of Contract]** under Invitation for Bids No.**[insert IFB No.]** ("the IFB").

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

At the request of the Bidder, we..... **[Insert name of Bank]** hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of Nepalese Rupees**[Insert amount in figures and 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) has withdrawn or modifies its Bid:

i) during the period of bid validity specified by the Bidder on the Letter of Technical and Price 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 Technical Bid and Price Bid, in case of hard copy submission; or

(b) does not accept the correction of errors in accordance with the Instructions to Bidders (hereinafter "the ITB"); or

(c) changes the prices or substance of the bid while providing information pursuant to clause 27.1 of ITB; or

(d) 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; or

(e) is involved in fraud and corruption in accordance with the ITB; or

(f) if the bidder fails to inform about the saturation of the maximum number of contracts as per ITB 4.10.

This guarantee will remain in force up to and including the date**number**.....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 (URDG), 2010 Revisions, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

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

Note:

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



Technical Proposal Format

Personnel

Equipment

Site Organization

Method Statement

Mobilization Schedule

Construction Schedule

Others

Personnel

Form PER - 1: Proposed Personnel

Bidders should provide the names of suitably qualified personnel to meet the specified requirements for each of the positions listed in Section VI (Work Requirements). The data on their experience should be supplied using the Form below for each candidate.

No.	Name	Position*	Academic Qualification	Total Work Experience [Years]	Experience in Similar Works [years]
1.					
2.					
3.					
4.					
5.					

* As listed in Section VI (Work Requirements).



Form PER - 2: Resume of Proposed Personnel

The Bidder shall provide all the information requested below.

Position*		
Personal Information	Name	Date of Birth
	Professional qualifications	
Present employment	Name of employer	
	Address of employer	
	Telephone	Contact (manager/personnel officer)
	Fax	E-mail
	Job title	Years with present employer

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

From	To	Company, Project, Position and Relevant Technical and Management Experience

Equipment

Form EQU: Equipment

The Bidder shall provide adequate information to demonstrate clearly that it has the capability to meet the requirements for the key equipment listed in Section VI (Work Requirements). A separate Form shall be prepared for each item of equipment listed, or for alternative equipment proposed by the Bidder.

(i) For the equipment under Bidder's ownership

No.	Equipment Type and Characteristics	Total Nos. of Equipment under Bidder's Ownership	No. of Equipment engaged/proposed for ongoing/committed contracts	Nos. of Equipment proposed for this contract
1.				
2.				
3.				
4.				
5.				

(ii) For the Equipment to be leased/hired

No.	Equipment Type and Characteristics	Total Nos. of Equipment under the ownership of lease/hire provider	No. of Equipment engaged/committed for other works	Nos. of Equipment proposed to be leased/hired for this contract
1.				
2.				
3.				
4.				
5.				
Type of Equipment				
Equipment Information		Name of manufacturer		Model and power rating
		Capacity		Year of manufacture
Current Status		Current location		
		Details of current commitments		
Source		Indicate source of the equipment ☐ Owned ☐ Rented ☐ Leased ☐ Specially manufactured		

The following information shall be provided only for equipment not owned by the Bidder.



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

The Bidder shall be solely responsible for the data provided. However, this shall not limit the right of Employer to verify the authenticity of submitted information.



Bidder's Information and Qualification Format

Site Organization

Method Statement

Mobilization Schedule

Construction Schedule

Others



Bidder's Qualification

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

Form ELI - 1: Bidder's Information Sheet

Bidder's Information	
Bidder's legal name	
In case of JV, legal name of each partner	
Bidder's country of constitution	
Bidder's year of constitution	
Bidder's legal address in country of constitution	
Bidder's authorized representative (name, address, telephone numbers, fax numbers, e-mail address)	
Attached are copies of the following original documents.	
1. In case of single entity, articles of incorporation or constitution of the legal entity named above, in accordance with ITB 4.1 and 4.2. 2. Authorization to represent the firm or JV named in above, in accordance with ITB 20.2. 3. In case of JV, letter of intent to form JV or JV agreement, in accordance with ITB 4.1. 4. In case of a government-owned entity, any additional documents not covered under 1 above required to comply with ITB 4.5.	



Form ELI - 2: JV Information Sheet

Each member of a JV must fill in this form

JV / Specialist Subcontractor Information	
Bidder's legal name	
JV Partner's or Subcontractor's legal name	
JV Partner's or Subcontractor's country of constitution	
JV Partner's or Subcontractor's year of constitution	
JV Partner's or Subcontractor's legal address in country of constitution	
JV Partner's or Subcontractor's authorized representative information (name, address, telephone numbers, fax numbers, e-mail address)	
Attached are copies of the following original documents.	
1. articles of incorporation or constitution of the legal entity named above, in accordance with ITB 4.1 and 4.2. 2. Authorization to represent the firm named above, in accordance with ITB 20.2. 3. In the case of government-owned entity, documents establishing legal and financial autonomy and compliance with commercial law, in accordance with ITB 4.5.	



Form ELI - 3: Bidder's Running Contracts⁸

Each member of a JV must fill in this form

Bidder's Running Contracts					
Name of office	Contract Identification no.	Source of Fund*	Date of issuance of Letter of Acceptance	Status of contract**	Date of Issuance of Taking Over Certificate***

* Mention GON funded or DP funded or Other PE (Insert name) funded

** Mention "Yet to sign" if contract is not signed, "Running" if contract has been signed and contract is running and "Substantially completed" if taking over certificate has been issued.

*** Insert date of issuance of taking over certificate if the awarded contract has been substantially completed and taking over certificate has been issued.

⁸:Note Following Procurement of Works contracts shall not be counted for this purpose

- The works for which tender were invited or contracts accepted before 2078-12-03 B.S (March 17, 2022 A.D).
- The works for which tender have been invited and contracts accepted after 2078-12-03 B.S (March 17, 2022 A.D) but the work acceptance report has been approved according to Rule 117 of PPR.
- The works for which tenders were invited or contracts accepted under all types of foreign assistance



Form LIT - 1: Pending Litigation

Each member of a JV must fill in this form

Pending Litigation			
☐ No pending litigation in accordance with Criteria 2.2 of Section III (Evaluation and Qualification Criteria) ☐ Pending litigation in accordance with Criteria 2.2 of Section III (Evaluation and Qualification Criteria)			
Year	Matter in Dispute	Value of Pending Claim in NRS	Value of Pending Claim as a Percentage on Net Worth



Form FIN - 1: Financial Situation

Each Bidder or member of a JV must fill in this form

Financial Data for Previous 3 Years [in NRS]		
Year 1 :	Year 2 :	Year 3 :

Information from Balance Sheet

Total Assets			
Total Liabilities			
Net Worth			
Current Assets			
Current Liabilities			

Information from Income Statement

Total Revenues			
Profit Before Tax			
Profit After Tax			
○ Attached are copies of financial statements (balance sheets including all related notes, and income statements) for the last three or above years, as indicated above, complying with the following conditions. ○ All such documents reflect the financial situation of the Bidder or partner to a JV, and not sister or parent companies. ○ Historic financial statements must be audited by a certified auditor. ○ Historic financial statements must be complete, including all notes to the financial statements. ○ Historic financial statements must correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted).			



Form FIN - 2: Average Annual Construction Turnover

Each Bidder or member of a JV must fill in this form

The information supplied should be the Annual Turnover of the Bidder or each member of a JV in terms of the amounts billed to clients for each year for work in progress or completed to NRs at the end of the period reported.

Annual Turnover Data for the Last 10 Years (Construction only)	
Year	Amount Currency

- **Average Annual Construction Turnover
(Best three years within the last 10 years)**

--



Form FIN - 3: Financial Resources

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

Financial Resources		
No.	Source of financing	Amount (in NRS)
1		
2		
3		

Form FIN – 4: Bid Capacity



Each Bidder or member of a JV must fill in this form

$$\text{Bid Capacity} = [(5 \times A) - B]$$

A = Average Annual Turnover of best three years out of last ten fiscal years.

B = Annual Value of the existing commitments and works (ongoing) to be completed, calculated from FIN-4.

SN	Name of Bidder	Pan No.	A, in Million	B, in Million	Bid Capacity, in Million
1					
2					
3					

Total Bid Capacity:

Signature of Bidder

Form FIN- 5: Current Contract Commitments / Works in Progress

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

Current Contract Commitments (For Calculation of B with reference of FIN-3)									
No.	Name of Contract	Name of the Contractor/s	Employer's Contact Address, Tel, Fax	Contract Share in % (a)	Contract Amount in Millions (b)	Contract Date(yyyy-mm) (c)	Initial or Revised Contract Duration (months) (d)	Value of outstanding works [In Millions, NRS] [#] (e)	Estimated Time in Month to Complete the outstanding works (f) = (c) + (d) – Date of Invitation of Bid (f)
1									
2									
3									
4									

Signature of Bidder

The Outstanding Works means Contract Price (excluding Vat) minus Work Evaluated by Employer till the reference date. Bidder shall have to submit the relevant documentary evidence to substantiate the facts/figures.

Note 1: “B” shall be calculated as : $B = \sum \left[\frac{(e) \times (a)}{(f)} \right] \times 12$, If (f) is less than 12, then value of (f) shall be taken as 12.

Note 2: If Initial or Revised Contract Date is run out with respect to Date of Invitation of Bid, the Estimated Time in Month to Complete the outstanding works shall be taken equal to 12 months.



Form EXP - 1: General Construction Experience

Each Bidder or member of a JV must fill in this form.

General Construction Experience				
Starting Month Year	Ending Month Year	Year	Contract Identification and Name and Address of Employer Brief Description of the Works Executed by the Bidder	Role of Bidder



Form EXP - 2(a): Specific Construction Experience

Fill up one (1) form per contract.

Contract of Similar Size and Nature			
Contract No..... of.....	Contract Identification		
Award Date		Completion Date	
Role in Contract	☐ Contractor	☐ Management Contractor	☐ Subcontractor
Total Contract Amount	☐ NRS		
If Partner in a JV or subcontractor, specify participation of total contract amount	Percent of Total	Amount	
Employer's Name Address Telephone/Fax Number E-mail			
Description of the similarity in accordance with Criteria 2.4.2 (a) of Section III			
Note : <i>The Employer should insert here contract size, complexity, methods, technology, or other characteristics as described in Section III (EQC), 2.4.2 (a) against which the bidder demonstrates similarity in the box on the right-hand-side.</i>			



Form EXP - 2(b): Specific Construction Experience in Key Activities

Fill up one (1) form per contract.

Contract of Similar Size and Nature			
Contract No..... of.....	Contract Identification		
Award Date		Completion Date	
Role in Contract	☐ Contractor	☐ Management Contractor	☐ Subcontractor
Total Contract Amount	☐ NRS		
If Partner in a JV or subcontractor, specify participation of total contract amount	Percent of Total	Amount	
Employer's Name Address Telephone/Fax Number E-mail			
Description of the similarity in accordance with Criteria 2.4.2 (a) of Section III			
Note : <i>The Employer should insert here production rate(s) for the key activity (activities) subject contract against which the bidder demonstrates in the box on the right-hand-side production rates achieved by him on previous contracts.</i>			



Section V - Eligible Countries

[This section contains the list of eligible countries. Select one option, either GoN Funded or DP Funded.]

For GoN funded: *[with estimate up to NRs. 5 billion]*

For the purpose of ITB 4.2: “**Nepal**”; and

For the purpose of Country-of-Origin ITB 5.1 and GCC 79.2: “**all Countries**”

For DP funded: [**attach list as per their list of eligible countries**]



Part II: REQUIREMENTS



Table of Clauses

Section VI: Works Requirements (WRQ)

Scope of Work	77
Specifications	78
Notes on the Specifications	78
Sample Clause: Equivalency of Standards and Codes	79
Drawings	80
Supplementary Information	81
Personal Requirements	85
Equipment Requirements	86
Section VII: Bill of Quantities	84
Notes for Unit Rate Contracts:	84
Preamble of Bill of Quantities.....	85
A. General	85
B. Day work Schedule.....	86
Provisional Sums.....	87
Bill of Quantities	88



Section VI: Works Requirements

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



Scope of Work

Operation & Maintenance of Melamchi Diversion Tunnel through Alternate Diversion System including Ancillary Civil Works, Security and Project Camp Services

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 Physical Infrastructure and Transport, DoLI and Other line Ministries 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.

(Attached in Separate Volume)

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.

(Attached in Separate Volume)

Supplementary Information

(Attached in Separate Volume)



Personnel Requirements

Using Form PER-1 and PER-2 in Section IV (Bidding Forms), the Bidder must demonstrate it has personnel that meet the following requirements:

SN.	Position	Required No.	Academic Qualification <i>[When position demands]</i>	Total Work Experience [Years]	Experience in Similar Works [years]
1.	Project Manager	As per Specification (Particular Specifications for BoQ Items; General; Point no. 4)			
2.	Mechanical Engineer				
3.	Electrical Engineer				
4.	Electrician cum instrumentation				
5.	Technical manpower (Er./Sub-Er.)				
6.	Heavy Equipment (Excavator/Wheel Loader etc.) Operator				



Equipment Requirements

Using Form EQU in Section IV (Bidding Forms), the Bidder must demonstrate it has the key equipment listed below:

No.	Equipment Type and Characteristics	Min. Number Requirement
1.	Chain Block of Capacity 10 tonne	1 No.
2.	Hydraulic, Crawler Mounted Excavator	1 No.
3.	Tipper of 7-tonne capacity	3 No.

Section VII: Bill of Quantities⁹

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.*
- (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.*

⁹In lump sum contracts, delete "Bill of Quantities" and replace with "Schedule of Activities" throughout this section.



Provisional Sums

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.

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.

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, labor, 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 Labor

1. In calculating payments due to the Contractor for the execution of day works, the hours for labor will be reckoned from the time of arrival of the labor 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 labor 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 labor is employed on day work, calculated at the basic rates entered by it in the " SCHEDULE OF DAY WORK RATES: 1. LABOR". The rates for labor shall be deemed to cover all costs to the Contractor including (but not limited to) i) the amount of wages paid to such labor, transportation time, overtime, subsistence allowances, ii) any sums paid to or on behalf of such labor 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

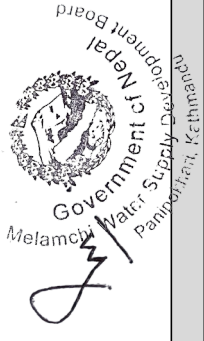
1. The Contractor shall be entitled to payment in respect of materials used for day work (except for materials for which the cost is included in the percentage addition to labor costs as detailed heretofore), at the rates entered by him in the "SCHEDULE OF DAY WORK RATES: 3 MATERIALS" and shall be deemed 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

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



A. Insurance and Provisional Sum					Procurement Item Details		
SL. No	Item Description	Unit	Quantity	Unit Rate(NPR)	Amount(NPR)		
1	Insurances for the loss of damage to works, plant, material, equipment, property and personnel injury or death and commission of bank security and performance guarantee all complete, as per specification (SS/SP-117) and instruction of engineer	PS	1.	2,000,000.00	2,000,000.00		
2	Testing and reporting mandatory and other Tests specified in specifications of material as per Engineers during Contract	PS	1.	200,000.00	200,000.00		
3	Item not covered by BOQ (As per COC)	PS	1.	700,000.00	700,000.00		
4	Supply, Installation, erection, Maintenance of Electrical, Mechanical and Electromechanical accessories of headwork and Adit gates	PS	1.	500,000.00	500,000.00		
5	Payment of Electricity bill at all site and Camp during the contract period	PS	1.	8,500,000.00	8,500,000.00		
6	Repair/maintenance of trash rack and ADS tunnel	PS	1.	200,000.00	200,000.00		
7	Supply , Major Repair,maintenance and servicing of existing diesel generator,Site Equipments,Hydraulic Power Units etc.	PS	1.	100,000.00	100,000.00		
8	Supply and installation of 1000 litre capacity Stainless steel vertical tank with stand and waer control switch height 69", diameter 38.5", Manhole diameter 16" with 8 Litre RO+UF+TDS CONTROLLER+UV Water Purifier in Melamchi Pul Bazar	PS	1.	60,000.00	60,000.00		
9	Operation and Maintenance of CCTV Camera and all related accessories at all Adit portal and Headworks including replacement of damage and non operating parts	PS	1.	200,000.00	200,000.00		
10	Providing and supplying of diesel to all sites	PS	1.	4,500,000.00	4,500,000.00		
11	Tunnel cleaning, Repair and Maintenance	PS	1.	2,500,000.00	2,500,000.00		

Bill of Quantities



12	Providing and supplying of Tools And Plants for Operation and Maintenance of all generators, control panel, hydraulic gates etc all complete as per specification and instruction of Engineer	PS	1.	300,000.00	300,000.00	
Sub Total of A				19,760,000.00		
B. Safety						
Procurement Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
1	Providing, supplying and Maintaining Safety gear at all sites as per specification and instructions of engineers.	lot	1.			
2	Providing, Supplying and Maintaining gas detectors as per specification and instruction of engineers Portable 4-Gas Detector O ₂ , CO, H ₂ S, LEL combustible gas	no	3.			
3	Providing and Supplying breathing system including Oxygen Cylinder with regulator and mask set all complete	no	4.			
Sub Total of B						

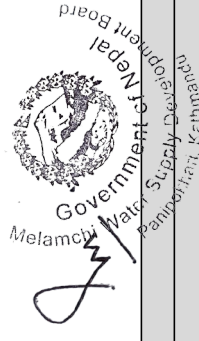
Bill of Quantities

C. Medical Support						
Procurement Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
1	Providing emergency medical service at sites including ambulance as per requirement	no	6.			
2	Providing, supplying and Maintaining First aid facilities at all sites as per specification.	lot	3.			
				Sub Total of C		
D. Manpower Deployment						
Procurement Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
1	Project Manager	month	36.			
2	Mechanical Engineer intermittent	month	4.			
3	Electrical Engineer intermittent	month	4.			



4	Electrician cum instrumentation	month	36.			
5	Plumber	month	36.			
6	Technical manpower (Er./Sub-Er.) at Ambathan, Gyalthung, Sindhu, Sundarjal and Headworks during tunnel operation (24/7)	month	180.			
7	Unskilled manpower at all sites as per the engineers instruction (24/7)	month	324.			
8	Heavy Equipment (Excavator/Wheel Loader etc.) Operator	MD	360.			
9	Office manager/ Administrator	month	36.			
						Sub Total of D

Bill of Quantities



E. Vehicles						
Procurement Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
1	Providing three numbers of Motorbike of at least 150 CC on hire including fuel, repair maintenance all complete.	month	108.			
2	Providing one numbers 4WD Jeep/Pickup on hire including driver, fuel, repair maintenance all complete	month	18.			
				Sub Total of E		
F. Other supply						
Procurement Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
1	Providing and supplying 15 number of Corporate sim and recharge for communication throughout the contract period and as per instruction of the engineer	month	36.			
2	Poviding, supplying, repairing and maintaining 2 Mbps for (Sundarijal,Sindhu,Gyalthum, HW, Ambathan Camp and Melamchi Camp 4Mbps at MPB) dedicated Internet Facilities at all sites also all the necessary accessories to be maintained for the smooth operation of internet as per Spec.	month	36.			
3	Supply and Installation of Chain Block of Capacity 10 tonne as per requirement and instruction of engineer	Set	2.			

Bill of Quantities

4	Supply and installation of 4 MP PTZ Camera as per specification	Set	3.		
5	Supply and installation of fixed 2MP IP Audio Bullet Smart Hybrid Light CCTV Camera	Set	5.		
6	Providing Monthly Progress Report as per specifications	month	36.		
Sub Total of F					
G. Camp facilities					
Procurement Item Details					
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)
1	Camp Support Staff	month	288.		
2	Security guard two nos. each at Melamchi Pul Bazar, Headworks, Ambathan, Gyalthung, sundarijal, Sindhu and Bahune pati	month	504.		
				Total Amount (NPR)	

Bill of Quantities

3	Providing consumable materials as specified at Melamchi Pul Bazar	month	18.			
4	Providing consumable materials as specified at Ambathan	month	18.			
Sub Total of G						
H. Civil Works						
Procurement Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
Restoration work of accessway from Aakase/Halde to Ambathan-Headworks-Sarkathali						
1	Temporary River Crossing at Aakase/Halde, Timbu, Ambathan Portal, headworks near down stream of gate 9 using NP3 RCC Hume Pipe (@ 8 Nos-1200mm Dia) at each location with minimum width of 5.0 m including laying at own risk during monsoon as per Specs. & instruction of Engineer	m	240.			
2	Procurement of Reinforced cement concrete NP3 Flush jointed pipe for culverts/other closed conduits including sealing joints as per Drawing and Technical Specifications: 1200 mm internal dia.	m	180.			

Bill of Quantities

3	Embankment preparation for access road from Er. Camp to Headworks	m ³	60,000.			
4	Excavation including shoring and bracing, dewatering, all safety measures, loading of excavated material in a tipper, hauling away from Site and unloading into the Dumping Area, all lift and lead of avg. 1.5 km as per drawings, technical specifications & instructions of the Engineer	m ³	25,950.			
5	Earth work in excavation of foundation of structures, including construction of shoring and bracing, removal of stumps and other deleterious matter and backfilling with approved Material as per Drawing and Technical Specifications. (In Hard Rock, by Manual Means, requiring blasting)	m ³	439.25			
6	Providing and placing machine mixed M15 cement concrete for the foundation and footing, pipe bedding etc. including compaction, curing, testing etc. all complete as per specification and drawing including formwork	m ³	45.			

Bill of Quantities

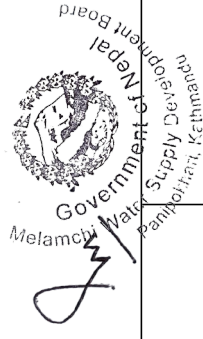
7	Providing and placing machine mixed M20 cement concrete including compaction, curing, testing and lead etc. all complete as per specification and drawing including formwork	m3	100.			
8	Providing and placing machine mixed M25 cement concrete including compaction, curing, testing and lead etc. all complete as per specification and drawing including formwork	m3	60.			
9	Providing and laying Reinforcement including cutting, bending, binding, fixing in position and lead etc. all complete as per drawing and Specifications.	ton	1.9625			
10	Providing, laying stone masonry in cement sand mortar (1:4) including curing etc all complete as per drawing and specification.	m3	150.			

Government of Nepal
Supply Development Board
Panchkhet, Kathmandu
Melanchi Water

Government of Nepal
Supply Development Board
Panchkhet, Kathmandu
Melanchi Water

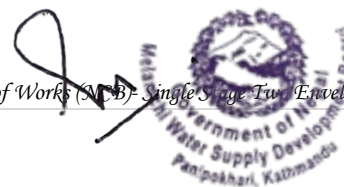
Bill of Quantities

J. Dayworks						
Procurement Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
1	Hydraulic, Crawler Mounted Excavator, 1000 litre bucket with operator & fuels	hour	360.			
2	Backhoe Loader with operator & fuels	hour	216.			
3	Crane of 40 tonne Capacity with operator & fuels	hour	120.			
4	Tractor with ripper attachment/Tractor Trolly/Mini Tipper	hour	100.			
5	Tipper 7 tonne	hour	200.			
6	Skilled Labour	hour	100.			



Bill of Quantities

7	Unskilled Labour	hour	400.			
						Sub Total of J
K. Miscellaneous item						
Procurement Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
1	Supply, installation, repair and maintenance of lighting bulb/tube light/flood light/Halogen light,Wire and related accessories all system complete in each site as per the requirement and instruction of engineer	no.	6.			
						Sub Total of K
Total of Procurement Items						
Total Item Price						
VAT (13% of [B+C+D+E+F+G+H+I+J+K])						
Grand Total						



Part III: CONDITIONS OF CONTRACT AND CONTRACT FORMS



Table of Contents

A. General	106
1. Definitions.....	106
2. Interpretation.....	108
3. Language and Law	108
4. Contract Agreement	108
5. Assignment.....	109
6. Care and Supply of Documents.....	109
7. Confidential Details	109
8. Compliance with Laws.....	109
9. Joint and Several Liability.....	109
10. Project Manager's Decisions	110
11. Delegation	110
12. Communications	110
13. Subcontracting.....	110
14. Other Contractors	111
15 Personnel and Equipment.....	111
16. Employer's and Contractor's Risk.....	111
17. Employer's Risks	112
18. Contractor's Risks	112
19. Insurance.....	112
20. Site Investigation Reports	113
21. Contractor to Construct the Works.....	113
22. The Works to Be Completed within intended Completion Date.....	113
23. Design by contractor and Approval by the Project Manager	113
24. Safety, Security and Protection of the Environment	113
25. Discoveries.....	114
26. Possession of the Site	114
27. Access to the Site	114
28. Instructions, Inspections and Audits	114
29. Dispute Settlement	114
30. Procedures for Disputes	115
B1.Staff and Labor	115
31. Forced Labor	115
32. Child Labor	115
33.Non-discrimination and Equal Opportunity	115

B. Time Control	115
34. Program	115
35. Extension of the Intended Completion Date	116
36. Acceleration	116
37. Delays Ordered by the Project Manager	116
38. Management Meetings	116
39. Early Warning	117
C. Quality Control	117
40. Identifying Defects	117
41. Tests	117
42. Correction of Defects	117
43. Uncorrected Defects	117
D. Cost Control	117
44. Contract Price	117
45. Changes in the Contract Price	118
46. Variations	118
47. Cash Flow Forecasts	118
48. Payment Certificates	118
49. Payments	119
50. Compensation Events	119
51. Tax	120
52. Currency	120
53. Price Adjustment	120
54. Retention	122
55. Liquidated Damages	123
56. Bonus	123
57. Advance Payment	123
58. Securities	124
59. Dayworks	124
60. Cost of Repairs	124
F. Force Majeure	124
61. Definition of Force Majeure	124
62. Notice of Force Majeure	125
63. Duty to Minimize Delay	125
64. Consequences of Force Majeure	125
65. Force Majeure Affecting Subcontractor	126
66. Optional Termination, Payment and Release	126

67. Release from Performance	126
G. Finishing the Contract.....	127
68. Completion.....	127
69. Taking Over	127
70. Final Account.....	127
71. Operating and Maintenance Manuals.....	127
72. Termination.....	128
73. Fraud and Corruption	129
74. Black Listing	129
75. Payment upon Termination	130
76. Property	130
77. Release from Performance	130
78.Suspension of DP Loan/Credit/ Grant.....	130
79. Eligibility.....	131
80. Project Manager's Duties and Authorities	131
81. Quarries and Spoil Dumps	131
82. Local Taxation	131
83. Value Added Tax	131
84. Income Taxes on Staff.....	131
85. Duties, Taxes and Royalties	132
86. Member of Government, etc, not Personally Liable	132
87. Approval of Use of Explosives	132
88 Compliance with Regulations for Explosives	132
89. Permission for Blasting	132
90. Records of Explosives.....	132
91.Traffic Diversion	132
92. Social Security Fund	132



Section VIII: General Conditions of Contract

Melamchi Water Supply Development Board

Tunnel Operation of Melamchi Water Supply Project

MWSDB/Tunnel-Operation/83-84



General Conditions of Contract

This Section provides the General Conditions of Contract that will apply to the Contract for which the Bidding document is issued.

A. General	
1. Definitions	1.1 Boldface type is used to identify defined terms. (a) The Accepted Contract Amount means the amount accepted in the Letter of Acceptance for the execution and completion of the Works and the remedying of any defects. (b) The Activity Schedule is a schedule of the activities comprising the construction, installation, testing, and commissioning of the Works in a lump sum contract. It includes a lump sum price for each activity, which is used for valuations and for assessing the effects of Variations and Compensation Events. (c) Bill of Quantities means the priced and completed Bill of Quantities forming part of the Bid. (d) Compensation Events are those defined in GCC 50 hereunder. (e) The Completion Date is the date of completion of the Works as certified by the Project Manager, in accordance with GCC 68.1. (f) The Contract is the Contract between the Employer and the Contractor to execute, complete, and maintain the Works. It consists of the documents listed in GCC 2.3 below. (g) The Contractor is the party whose Bid to carry out the Works has been accepted by the Employer. (h) The Contractor's Bid is the completed bidding document submitted by the Contractor to the Employer. (i) The Contract Price is the Accepted Contract Amount stated in the Letter of Acceptance and thereafter as adjusted in accordance with the Contract. (j) Days are calendar days; months are calendar-months. (k) Dayworks are varied work inputs subject to payment on a time basis for the Contractor's employees and Equipment, in addition to payments for associated Materials and Plant. (l) A Defect is any part of the Works not completed in accordance with the Contract. (m) The Defects Liability Certificate is the certificate issued by Project Manager upon correction of defects by the Contractor. (n) The Defects Liability Period is the period calculated from the Completion Date where the Contractor remains responsible for remedying defects. (o) Drawings include calculations and other information provided or approved by the Project Manager for the execution of the Contract. (p) The Employer is the party who employs the Contractor to carry out the Works, as specified in the SCC.

- (q) **Equipment** is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.
- (r) **Force Majeure** means an exceptional event or circumstance: which is beyond a Party's control; which such Party could not reasonably have provided against before entering into the Contract; which, having arisen, such Party could not reasonably have avoided or overcome; and, which is not substantially attributable to the other Party.
- (s) The **Initial Contract Price** is the Contract Price listed in the Employer's Letter of Acceptance.
- (t) **In writing** or **written** means hand written, type written, printed or electronically made, and resulting in permanent record.
- (u) The **Intended Completion Date** is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is **specified in the SCC**. The Intended Completion Date may be revised only by the Project Manager by issuing an extension of time or an acceleration order.
- (v) **Letter of Acceptance** means the formal acceptance by the Employer of the Bid and denotes the formation of the contract at the date of acceptance.
- (w) **Materials** are all supplies, including consumables, used by the Contractor for incorporation in the Works.
- (x) **Party** means the Employer or the Contractor, as the context requires.
- (y) **SCC** means Special Conditions of Contract
- (aa) **Plant** is any integral part of the Works that shall have a mechanical, electrical, chemical, or biological function.
- (bb) The **Project Manager** is the person **named in the SCC** (or any other competent person appointed by the Employer and notified to the Contractor, to act in replacement of the Project Manager) who is responsible for supervising the execution of the Works and administering the Contract.
- (cc) **Retention Money** means the aggregate of all monies retained by the Employer pursuant to GCC 54.1.
- (dd) **Schedules** means the document(s) entitled schedules, completed by the Contractor and submitted with the Letter of Bids, as included in the Contract. Such document may include the Bill of Quantities, data, lists, and schedules of rates and/or prices.
- (ee) The **Site** is the area defined as such in the SCC
- (ff) **Site Investigation Reports** are those that were included in the bidding documents and are factual and interpretative reports about the surface and subsurface conditions at the Site.
- (gg) **Specification** means the Specification of the Works included in the Contract and any modification or addition made or approved by the Project Manager.
- (hh) The **Start Date** is given **in the SCC**. It is the latest date when the Contractor shall commence execution of the Works. It does not necessarily coincide with any of the Site Possession Dates.
- (ii) A **Subcontractor** is a person or corporate body who has a Contract with

	the Contractor to carry out a part of the work in the Contract, which includes work on the Site. (jj) Temporary Works are works designed, constructed, installed, and removed by the Contractor that are needed for construction or installation of the Works. (kk) A Variation is an instruction given by the Project Manager which varies the Works. (ll) The Works are what the Contract requires the Contractor to construct, install, and turn over to the Employer, as defined in the SCC.
2. Interpretation	2.1 In interpreting these GCC, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Project Manager shall provide instructions clarifying queries about these GCC. 2.2 If sectional completion is specified in the SCC, references in the GCC to the Works, the Completion Date, and the Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion Date for the whole of the Works). 2.3 The documents forming the Contract shall be interpreted in the following order of priority: (a) Contract Agreement, (b) Letter of Acceptance, (c) Letters of Technical Bid and Price Bid, (d) Special Conditions of Contract, (e) General Conditions of Contract, (f) Specifications, (g) Drawings, (h) Bill of Quantities (or Schedules of Prices for lump sum contracts), and (i) Any other document listed in the SCC as forming part of the Contract.
3. Language and Law	3.1 The language of the Contract and the law governing the Contract are stated in the SCC. 3.2. Throughout the execution of the Contract, the Contractor shall comply with the import of goods and services prohibitions in the Employer's country when (a) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, the Employer's Country prohibits any import of goods from, or any payments to, a particular country, person, or entity. Where the employer's country prohibits payments to a particular firm or for particular goods by such an act of compliance, that firm may be excluded.
4. Contract Agreement	4.1 The Parties shall enter into a Contract Agreement within 15 days after the Contractor receives the Letter of Acceptance, unless the Special Conditions establish otherwise. The Contract Agreement shall be based upon the attached Contract forms in Section X. 4.2 Without altering the basic nature or scope of work, the contract may be

	amended upon mutual written consent as per prevailing Public Procurement Law.
5. Assignment	5.1 Neither Party shall assign the whole or any part of the Contract or any benefit or interest in or under the Contract. However, either Party (a) may assign the whole or any part with the prior agreement of the other Party, at the sole discretion of such other Party; and (b) may, as security in favor of a bank or financial institution, assign its right to any moneys due, or to become due, under the Contract.
6. Care and Supply of Documents	6.1 The Specification and Drawings shall be in the custody and care of the Employer. Unless otherwise stated in the Contract, one copy of the Contract and of each subsequent Drawing shall be supplied to the Contractor, who may make or request further copies at the cost of the Contractor. 6.2 Each of the Contractor's Documents shall be in the custody and care of the Contractor, unless and until taken over by the Employer. Unless otherwise stated in the Contract, the Contractor shall supply to the Engineer six copies of each of the Contractor's Documents. 6.3 The Contractor shall keep, on the Site, a copy of the Contract, publications named in the Specification, the Contractor's Documents (if any), the Drawings and Variations and other communications given under the Contract. The Employer's Personnel shall have the right of access to all these documents at all reasonable times. 6.4 If a Party becomes aware of an error or defect in a document which was prepared for use in executing the Works, the Party shall promptly give notice to the other Party of such error or defect.
7. Confidential Details	7.1 The Contractor's and the Employer's Personnel shall disclose all such confidential and other information as may be reasonably required in order to verify the Contractor's compliance with the Contract and allow its proper implementation. 7.2 Each of them shall treat the details of the Contract as private and confidential, except to the extent necessary to carry out their respective obligations under the Contract or to comply with applicable Laws. Each of them shall not publish or disclose any particulars of the Works prepared by the other Party without the previous agreement of the other Party. However, the Contractor shall be permitted to disclose any publicly available information, or information otherwise required to establish his qualifications to compete for other projects. 7.3 Notwithstanding the above, the Contractor may furnish to its Subcontractor(s) such documents, data and other information it receives from the Employer to the extent required for the Subcontractor(s) to perform its work under the Contract, in which event the Contractor shall obtain from such Subcontractor(s) an undertaking of confidentiality similar to that imposed on the Contractor under this Clause.
8. Compliance with Laws	8.1 The Contractor shall, in performing the Contract, comply with applicable Laws of Nepal.
9. Joint and	9.1 If the Contractor is a joint venture of two or more entities, all such entities

Several Liability	shall be jointly and severally liable to the Employer for the fulfillment of the provisions of the Contract, and shall designate one of such persons to act as a leader with authority to bind the joint venture. The contractor shall not handover the responsibility of the contract to any one member or some members of Joint Venture or any other parties, not involved in the contract. The composition or the constitution of the joint venture shall not be altered without the prior consent of the Employer.
10. Project Manager's Decisions	10.1 Except where otherwise specifically stated, the Project Manager shall decide contractual matters between the Employer and the Contractor in the role representing the Employer.
11. Delegation	11.1 The Project Manager may delegate any of his duties and responsibilities to other people after notifying the Contractor, and may cancel any delegation after notifying the Contractor.
12. Communications	12.1 Communications between parties that are referred to in the Conditions shall be effective only when in writing. Wherever these Conditions provide for the giving or issuing of approvals, certificates, consents, determinations, notices and requests, these communications shall be: (a) in writing and delivered by hand (against receipt), sent by mail or courier, or transmitted using any of the agreed systems of electronic transmission as stated in the SCC; and (b) delivered, sent or transmitted to the address for the recipient's communications as stated in the Contract. However: (i) if the recipient gives notice of another address, communications shall thereafter be delivered accordingly; and (ii) if the recipient has not stated otherwise when requesting an approval or consent, it may be sent to the address from which the request was issued. Approvals, certificates, consents and determinations shall not be unreasonably withheld or delayed. 12.2 A Notice shall be effective when delivered or on the Notice's effective date, whichever is later.
13. Subcontracting	13.1 For GON Funded: A list of approved Subcontractors including its value/works is included as Article 2 (k) of Contract Agreement Approval by the Employer for any of the Subcontractors shall not relieve the Contractor from any of its obligations, duties, or responsibilities under the contract. For DP Funded: The Contractor may subcontract with the approval of the Project Manager, but may not assign the Contract without the approval of the Employer in writing. Subcontracting shall not alter the Contractor's obligations. Bidders may propose subcontracting up to the percentage of total value of contracts as specified in the SCC. The Sub contractor shall meet the qualification requirement as specified in SCC.

	13.2 The contractor shall give prior notice to the Employer clearly specifying the nature, scope, and responsibilities of the work to be performed, to engage other subcontractors, material suppliers, equipment suppliers, service providers, or other persons or entities during the implementation of the contract. 13.3 Before notifying the Employer as per GCC 13.2, the contractor shall enter into a written agreement with the subcontractors, material suppliers, equipment suppliers, service providers, or other persons or entities clearly specifying the scope of work, responsibilities, quality requirements, duration, payment terms, security, labor-related obligations, and conditions relating to performance of the work. 13.4 Any subcontracting arrangement made in accordance with GCC 13.2 shall not relieve the Contractor of any of its obligations or liabilities under the Contract. 13.5 The contractor shall provide the Employer with details of the payments made to the subcontractors, material suppliers, equipment suppliers, service providers, or other persons or entities engaged under GCC 13.1 and/or GCC 13.2. 13.6 If the contractor is found not to have made payment to the subcontractor, material suppliers, equipment suppliers, service providers, or other persons or entities engaged under GCC 13.1 and/or GCC 13.2 in accordance with the terms of the agreement, the Employer may determine the amount payable to such subcontractor, material suppliers, equipment suppliers, service providers, or other persons or entities and make payment to them from any remaining dues to be paid to the contractor, retention money, or forfeited performance security.
14. Other Contractors	14.1 The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and the Employer between the dates given in the Schedule of Other Contractors, as referred to in the SCC. The Contractor shall also provide facilities and services for them as described in the Schedule. The Employer may modify the Schedule of Other Contractors, and shall notify the Contractor of any such modification
15 Personnel and Equipment	15.1 The Contractor shall employ the key personnel and use the equipment identified in its Bid to carry out the Works, or other personnel and equipment approved by the Project Manager. The Project Manager shall approve any proposed replacement of key personnel and equipment only if their relevant qualifications or characteristics are substantially equal to or better than those proposed in the Bid. 15.2 If the Project Manager asks the Contractor to remove a person who is a member of the Contractor's staff or work force, stating the reasons, the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the work in the Contract. 15.3 If the Employer, Project Manager, or Contractor determines, that any employee of the Contractor be determined to have engaged in corrupt, fraudulent, collusive, coercive, or other prohibited practices during the execution of the Works, then that employee shall be removed in accordance with Clause 15.2 above.
16. Employer's and	16.1 The Employer carries the risks which this Contract states are Employer's risks, and the Contractor carries the risks which this Contract states are

Contractor's Risk	Contractor's risks.
17. Employer's Risks	17.1 From the Start Date until the Defects Liability Certificate has been issued, the following are Employer's risks: (a) The risk of personal injury, death, or loss of or damage to property (excluding the Works, Plant, Materials, and Equipment), which are due to (i) use or occupation of the Site by the Works or for the purpose of the Works, which is the unavoidable result of the Works or (ii) negligence, breach of statutory duty, or interference with any legal right by the Employer or by any person employed by or contracted to him except the Contractor. (b) The risk of damage to the Works, Plant, Materials, and Equipment to the extent that it is due to a fault of the Employer or in the Employer's design, or due to war or radioactive contamination directly affecting the country where the Works are to be executed. 17.2 From the Completion Date until the Defects Liability Certificate has been issued, the risk of loss of or damage to the Works, Plant, and Materials is an Employer's risk except loss or damage due to (a) a Defect which existed on the Completion Date, (b) an event occurring before the Completion Date, which was not itself an Employer's risk, or (c) the activities of the Contractor on the Site after the Completion Date.
18. Contractor's Risks	18.1 From the Starting Date until the Defects Liability Certificate has been issued, the risks of personal injury, death, and loss of or damage to property (including, without limitation, the Works, Plant, Materials, and Equipment) which are not Employer's risks are Contractor's risks.
19. Insurance	19.1 The Contractor shall provide insurance in the joint names of the Employer and the Contractor from the Start Date to the end of the Defects Liability Period, in the amounts and deductibles stated in the SCC for the following events which are due to the Contractor's risks: (a) loss of or damage to the Works, Plant, and Materials; (b) loss of or damage to Equipment; (c) loss of or damage to property (except the Works, Plant, Materials, and Equipment) in connection with the Contract; and (d) Personal injury or death. 19.2 Policies and certificates for insurance shall be delivered by the Contractor to the Project Manager for the Project Manager's approval before the Start Date. All such insurance shall provide for compensation to be payable in the proportions of Nepalese Rupees required to rectify the loss or damage incurred. 19.3 If the Contractor does not provide any of the policies and certificates required, the Employer may affect the insurance which the Contractor should have provided and recover the premiums the Employer has paid

	from payments otherwise due to the Contractor or, if no payment is due, the payment of the premiums shall be a debt due.
	19.4 Alterations to the terms of insurance shall not be made without the approval of the Project Manager.
	19.5 Both parties shall comply with any conditions of the insurance policies.
20. Site Investigation Reports	20.1 The Contractor, in preparing the Bid, shall rely on any Site Investigation Reports referred to in the SCC , supplemented by any information available to the Contractor.
21. Contractor to Construct the Works	21.1 The Contractor shall construct and install the Works in accordance with the Specifications and Drawings.
22. The Works to Be Completed within intended Completion Date	22.1 The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the Program submitted by the Contractor, as updated with the approval of the Project Manager, and complete them within the intended Completion Date.
23. Design by contractor and Approval by the Project Manager	23.1 The contractor shall be responsible for the design of permanent works as specified in SCC .
	23.2 Contractor shall be responsible for design of the Temporary Works. The Contractor shall submit Specifications and Drawings showing the proposed Temporary Works to the Project Manager, for his approval.
	23.3 All Drawings prepared by the Contractor for the execution of the temporary or permanent Works, shall be subject to prior approval by the Project Manager before their use.
	23.4 The Project Manager's approval shall not alter the Contractor's responsibility for design of temporary works.
24. Safety, Security and Protection of the Environment	24.1 The Contractor shall, throughout the execution, and completion of the works and remedying of any defects therein: a. Have full regard for the safety of all persons entitled to be upon the site and keep the site (so as the same is under his control) and the works (so far as the same are not completed or occupied by the Employer) in an orderly state appropriate to the avoidance of danger to such persons. b. Provide and maintain at his own cost all lights, guards, fencing, warning signs and watching, when necessary or required by the Project Manager or by any duly constituted authority, for the protection of the Works of for the safety and convenience of the public or others. c. Take all reasonable steps to protect the environment on and off the site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of his methods of operation. d. Ensure that any cut or fill slopes are planted in grass or other plant cover as

	soon as possible to protect them from erosion. e. Any spoil or material removed from drains shall be disposed of to designated stable tipping areas as directed by the Project Manager. f. Shall not use fuel wood as a means of heating during the processing or preparation of any materials forming part of the works. g. The Project Manager shall have the power to disallow any working practice or activity of the Contractor or direct that such practices or activities be modified should the Project Manager consider, on the advice of the relevant Government Departments, that the practices or activities will be harmful to wildlife. h. Provide on the Site such lifesaving apparatus as may be appropriate and an adequate and easily accessible first aid outfit or such outfits as may be required by any government ordinance, factory act, etc., subsequently published and amended from time to time. 24.2 The Contractor shall comply with the Employer's Occupational Health and Safety (OHS) Policy, Guideline and/or Operating Manual, if any, as specified in the SCC.
25. Discoveries	25.1 Anything of historical or other interest or of significant value unexpectedly discovered on the Site shall be the property of the employer. The Contractor shall notify the Project Manager of such discoveries and carry out the Project Manager's instructions for dealing with them.
26. Possession of the Site	26.1 The Employer shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date stated in the SCC, the Employer shall be deemed to have delayed the start of the relevant activities, and this shall be a Compensation Event.
27. Access to the Site	27.1 The Contractor shall allow the Project Manager and any person authorized by the Project Manager access to the Site and to any place where work in connection with the Contract is being carried out or is intended to be carried out.
28. Instructions, Inspections and Audits	28.1 The Contractor shall carry out all instructions of the Project Manager which comply with the applicable laws where the Site is located. 28.2 The Contractor shall keep, and shall make all reasonable efforts to cause its Subcontractors and sub consultants to keep accurate and systematic accounts and records in respect of the Works in such form and details as will clearly identify relevant time changes and costs. 28.3 The Contractor shall permit the GoN/DP and/or persons appointed by the GoN/DP to inspect the Site and/or the accounts and records of the Contractor and its sub-contractors relating to the performance of the Contract, and to have such accounts and records audited by auditors appointed by the GoN/DP if required by the GoN/DP. The Contractor's attention is drawn to Sub-Clause 73.2 which provides, inter alia, that acts intended to materially impede the exercise of the GoN's/DP's inspection and audit rights provided for under this Sub-Clause constitute a obstructive practice subject to contract termination.
29. Dispute Settlement	29.1 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. 29.2 Any dispute between the Parties as to matters arising pursuant to this Contract which cannot be settled amicably within thirty (30) days after

	receipt by one Party of the other Party's request for such amicable settlement may be referred to Arbitration within 30 days after the expiration of amicable settlement period.
30. Procedures for Disputes	30.1 In case of arbitration, the arbitration shall be conducted in accordance with the arbitration procedures in accordance with law of Nepal at the place within the territory of Nepal given in the SCC .
B1. Staff and Labor	
31. Forced Labor	31.1 The Contractor shall not employ forced labor, which consists of any work or service, not voluntarily performed, that is exacted from an individual under threat of force or penalty. This covers any kind of involuntary or compulsory labor, such as indentured labor, bonded labor, or similar labor–contracting arrangements.
32. Child Labor	32.1 The Contractor shall not employ children in a manner that is economically exploitative, or is likely to be hazardous, or to interfere with, the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development. Where national laws have provisions for employment of minors, the Contractor shall follow those laws applicable to the Contractor. Children below the age of 18 years shall not be employed in dangerous work.
33. Non-discrimination and Equal Opportunity	33.1 The Contractor shall not make employment decisions on the basis of personal characteristics unrelated to inherent job requirements. The Contractor shall base the employment relationship on the principle of equal opportunity and fair treatment, and shall not discriminate with respect to aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, promotion, termination of employment or retirement, and discipline. In countries where national law provides for non-discrimination in employment, the Contractor shall comply with national law. When national laws are silent on nondiscrimination in employment, the Contractor shall meet this Sub clause's requirements. Special measures of protection or assistance to remedy past discrimination or selection for a particular job based on the inherent requirements of the job shall not be deemed discrimination.
B. Time Control	
34. Program	34.1 Within the time stated in the SCC , after the date of the Letter of Acceptance, the Contractor shall submit to the Project Manager for approval a Program showing the general methods, arrangements, order, and timing for all the activities in the Works. In the case of a lump sum contract, the activities in the Program shall be consistent with those in the Activity Schedule.
	34.2 An update of the Program shall be a program showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work, including any changes to the sequence of the activities.
	34.3 The Contractor shall submit to the Project Manager for approval an updated Program at intervals no longer than the period stated in the SCC . If the Contractor does not submit an updated Program within this period, the Project Manager may withhold the amount stated in the SCC from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Program has been submitted. In

	the case of a lump sum contract, the Contractor shall Provide an updated Activity Schedule within 15 days of being instructed to by the Project Manager.
	34.4 The Project Manager's approval of the Program shall not alter the Contractor's obligations. The Contractor may revise the Program and submit it to the Project Manager again at any time. A revised Program shall show the effect of Variations and Compensation Events.
35. Extension of the Intended Completion Date	35.1 The Project Manager shall extend the Intended Completion Date if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date without the Contractor taking steps to accelerate the remaining work, which would cause the Contractor to incur additional cost. 35.2 The Project Manager shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Project Manager for a decision upon the effect of a Compensation Event or Variation and submitting full supporting information at least 21 days prior to the intended completion date. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date. Along with full supporting information, the contractor shall also submit a revised work schedule and ensure that the Performance Security, Insurance, and Advance Payment Security (if any) remain valid. The contractor shall submit Performance Security, Advanced Payment Guarantee (if any) and Insurance Policy documents, as required with extended validity, within fifteen (15) days of receiving the Letter of Extension of Intended Completion Date from the Employer. 35.3 If the contractor fails to submit Performance Security, Advanced Payment Guarantee (if any) and Insurance Policy documents, as required with extended validity within the prescribed time as per GCC 35.2, the Contractor shall pay a fine at the rate of 0.01% of the final contract price (without VAT but including PS) per day for a maximum of fifteen (15) days. The Employer may deduct the fine from payments due to the Contractor.
36. Acceleration	36.1 When the Employer wants the Contractor to finish before the Intended Completion Date, the Project Manager shall obtain priced proposals for achieving the necessary acceleration from the Contractor. If the Employer accepts these proposals, the Intended Completion Date shall be adjusted accordingly and confirmed by both the Employer and the Contractor. 36.2 If the Contractor's priced proposals for acceleration are accepted by the Employer, they are incorporated in the Contract Price and treated as a Variation.
37. Delays Ordered by the Project Manager	37.1 The Project Manager may instruct the Contractor to delay the start or progress of any activity within the Works.
38. Management Meetings	38.1 Either the Project Manager or the Contractor may require the other to attend a management meeting. The business of a management meeting shall be to review the plans for remaining work and to deal with matters raised in accordance with the early warning procedure. 38.2 The Project Manager shall record the business of management meetings and provide copies of the record to those attending the meeting and to the

	Employer. The responsibility of the parties for actions to be taken shall be decided by the Project Manager either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.
39. Early Warning	39.1 The Contractor shall warn the Project Manager at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the work, increase the Contract Price, or delay the execution of the Works. The Project Manager may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Contract Price and Completion Date. The estimate shall be provided by the Contractor as soon as reasonably possible. 39.2 The Contractor shall cooperate with the Project Manager in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting instruction of the Project Manager.
C. Quality Control	
40. Identifying Defects	40.1 The Project Manager shall check the Contractor's work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities. The Project Manager may instruct the Contractor to search for a Defect and to uncover and test any work that the Project Manager considers may have a Defect.
41. Tests	41.1 If the Project Manager instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no Defect, the test shall be a Compensation Event.
42. Correction of Defects	42.1 The Project Manager shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at issuance of taking over certificate pursuant to GCC clause 69.2, and is defined in the SCC. The Defects Liability Period shall be extended for as long as Defects remain to be corrected. 42.2 Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the length of time specified by the Project Manager's notice.
43. Uncorrected Defects	43.1 If the Contractor has not corrected a Defect within the time specified in the Project Manager's notice, the Project Manager shall assess the cost of having the Defect corrected, and the Contractor shall pay this amount.
D. Cost Control	
44. Contract Price	44.1 In the case of a Unit Rate contract, the Bill of Quantities shall contain priced items for the Works to be performed by the Contractor. The Bill of Quantities is used to calculate the Contract Price. The Contractor will be paid for the quantity of the work accomplished at the rate in the Bill of Quantities for each item. 44.2 In the case of a lump sum contract, the Activity Schedule shall contain the priced activities for the Works to be performed by the Contractor. The Activity Schedule is used to monitor and control the performance of activities on which basis the Contractor will be paid. If payment for Materials on Site

	shall be made separately, the Contractor shall show delivery of Materials to the Site separately on the Activity Schedule.
45. Changes in the Contract Price	45.1 In the case of a Unit Rate contract: (a) If the final quantity of the work done differs from the quantity in the Bill of Quantities for the particular item by more than 25 percent, provided the change exceeds 2 percent of the Initial Contract Price, the Project Manager shall adjust the rate to allow for the change. (b) If requested by the Project Manager, the Contractor shall provide the Project Manager with a detailed cost breakdown of any rate in the Bill of Quantities. 45.2 In the case of a lump sum contract, the Activity Schedule shall be amended by the Contractor to accommodate changes of Program or method of working made at the Contractor's own discretion. Prices in the Activity Schedule shall not be altered when the Contractor makes such changes to the Activity Schedule.
46. Variations	46.1 All Variations shall be included in updated Programs, and, in the case of a lump sum contract, also in the Activity Schedule, produced by the Contractor. 46.2 The Contractor shall provide the Project Manager with a quotation for carrying out the Variation when requested to do so by the Project Manager. The Project Manager shall assess the quotation, which shall be given within seven (7) days of the request or within any longer period stated by the Project Manager and before the Variation is ordered. 46.3 If the Contractor's quotation is unreasonable, the Project Manager may order the Variation and make a change to the Contract Price, which shall be based on the Project Manager's own forecast of the effects of the Variation on the Contractor's costs. 46.4 If the Project Manager decides that the urgency of varying the work would prevent a quotation being given and considered without delaying the work, no quotation shall be given and the Variation shall be treated as a Compensation Event. 46.5 The Contractor shall not be entitled to additional payment for costs that could have been avoided by giving early warning. 46.6 In the case of a Unit Rate contract, if the work in the Variation corresponds to an item description in the Bill of Quantities and if, in the opinion of the Project Manager, the quantity of work above the limit stated in GCC 45.1 or the timing of its execution do not cause the cost per unit of quantity to change, the rate in the Bill of Quantities shall be used to calculate the value of the Variation. If the cost per unit of quantity changes, or if the nature or timing of the work in the Variation does not correspond with items in the Bill of Quantities, the quotation by the Contractor shall be in the form of new rates for the relevant items of work.
47. Cash Flow Forecasts	47.1 When the Program, or, in the case of a lump sum contract, the Activity Schedule, is updated, the Contractor shall provide the Project Manager with an updated cash flow forecast.
48. Payment Certificates	48.1 The Contractor shall submit to the Project Manager monthly statements of the estimated value of the work executed less the cumulative amount certified

	previously. 48.2 The Project Manager shall check the Contractor's monthly statement and certify the amount to be paid to the Contractor within 30 days of submission by contractor. 48.3 The value of work executed shall be determined by the Project Manager. 48.4 The value of work executed shall comprise: (a) In the case of a Unit Rate contract, the value of the quantities of work in the Bill of Quantities that have been completed; or (b) In the case of a lump sum contract, the value of work executed shall comprise the value of completed activities in the Activity Schedule. 48.5 The value of work executed shall include the valuation of Variations and Compensation Events. 48.6 The Project Manager may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.
49. Payments	49.1 Payments shall be adjusted for deductions for advance payments and retention. The Employer shall pay the Contractor the amounts certified by the Project Manager within 30 days of the date of each certificate. If the Employer makes a late payment, the Contractor shall be paid interest as indicated in the SCC on the late payment in the next payment. Interest shall be calculated from the date by which the payment should have been made up to the date when the late payment is made. 49.2 If an amount certified is increased in a later certificate or as a result of an award by an Arbitrator, the Contractor shall be paid interest upon the delayed payment as set out in this clause. Interest shall be calculated from the date upon which the increased amount would have been certified in the absence of dispute. 49.3 Items of the Works for which no rate or price has been entered in BOQ shall not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.
50. Compensation Events	50.1 The following shall be Compensation Events: (a) The Employer does not give access to a part of the Site by the Site Possession Date pursuant to GCC 26.1. (b) The Employer modifies the Schedule of Other Contractors in a way that affects the work of the Contractor under the Contract. (c) The Project Manager orders a delay or does not issue Drawings, Specifications, or instructions required for execution of the Works on time. (d) The Project Manager instructs the Contractor to uncover or to carry out additional tests upon work, which is then found to have no Defects. (e) The Project Manager unreasonably does not approve a subcontract to

	be let. (f) Ground conditions are substantially more adverse than could reasonably have been assumed before issuance of the Letter of Acceptance from the information issued to bidders (including the Site Investigation Reports), from information available publicly and from a visual inspection of the Site. (g) The Project Manager gives an instruction for dealing with an unforeseen condition, caused by the Employer, or additional work required for safety or other reasons. (h) Other contractors, public authorities, utilities, or the Employer does not work within the dates and other constraints stated in the Contract, and they cause delay or extra cost to the Contractor. (i) The advance payment is delayed. (j) The effects on the Contractor of any of the Employer's Risks. (k) The Project Manager unreasonably delays issuing a Certificate of Completion.
	50.2 If a Compensation Event would cause additional cost or would prevent the work being completed before the Intended Completion Date, the Contract Price shall be increased and/or the Intended Completion Date shall be extended. The Project Manager shall decide whether and by how much the Contract Price shall be increased and whether and by how much the Intended Completion Date shall be extended.
	50.3 As soon as information demonstrating effect of each Compensation Event upon the Contractor's forecast cost has been provided by the Contractor, it shall be assessed by the Project Manager, and the Contract Price shall be adjusted accordingly. If the Contractor's forecast is deemed unreasonable, the Project Manager shall adjust the Contract Price based on the Project Manager's own forecast. The Project Manager shall assume that the Contractor shall react competently and promptly to the event.
	50.4 The Contractor shall not be entitled to compensation to the extent that the Employer's interests are adversely affected by the Contractor's not having given early warning or not having cooperated with the Project Manager.
51. Tax	51.1 The Project Manager shall adjust the Contract Price if taxes, duties, and other levies are changed between the date 30 days before the submission of bids for the Contract and the date of the last Completion certificate. The adjustment shall be the change in the amount of tax payable by the Contractor, provided such changes are not already reflected in the Contract Price or are a result of GCC 53.
52. Currency	52.1 The currency of Contracts shall be Nepalese Rupees.
53. Price Adjustment	53.1 Prices shall be adjusted for fluctuations in the cost of inputs only if provided for in the SCC. If so provided, the amounts certified in each payment certificate, before deducting for Advance Payment, shall be adjusted by applying the respective price adjustment factor to the payment amounts due.

53.2 Adjustment Formulae¹⁰: The formulae will be of the following general type:

$$pn = A + b \frac{Ln}{Lo} + c \frac{Mn}{Mo} + d \frac{En}{Eo} + etc.$$

Where:

pn is a price adjustment factor to be applied to the amount for the payment of the work carried out in the subject month, determined in accordance with Clause 49;

A is a constant, specified in the Bidding Forms- Table of Price Adjustment data, representing the nonadjustable portion in contractual payments;¹¹ *b*, *c*, *d*, etc., coefficients representing the estimated proportion of each cost element (labor, materials, equipment usage, etc.) in the Works or sections thereof, net of Provisional Sums, **as specified in the SCC**;

Ln, *Mn*, *En*, etc., are the current cost indices or reference prices of the cost elements for month “n,” determined pursuant to Sub-Clause 53.4, applicable to each cost element; and

Lo, *Mo*, *Eo*, etc., are the base cost indices or reference prices corresponding to the above cost elements at the date specified in Sub-Clause 53.4.

53.3 Sources of Indices and Weightings: The sources of indices shall be those listed in the Bidding Forms- Table of Price Adjustment data, as approved by the Project Manager and stated in SCC. Indices shall be appropriate for their purpose and shall relate to the Contractor’s proposed source of supply of inputs on the basis of which his Contract shall have been computed. As the proposed basis for price adjustment, the Contractor shall have submitted with his bid the tabulation of Weightings and Source of Indices in the Bidding Forms, which shall be subject to approval by the Project Manager.

53.4 Base, Current and Provisional Indices: The base cost indices or prices shall be those prevailing on the day 30 days prior to the latest date for submission of bids. Current indices or prices shall be those prevailing on the day 30 days prior to the last day of the period to which a particular Interim Payment Certificate is related. If at any time the current indices are not available, provisional indices as determined by the Project Manager will be used, subject to subsequent correction of the amounts paid to the Contractor when the current indices become available.

53.5 Weightings: The weightings for each of the factors of cost given in the Bidding Forms shall be adjusted if, in the opinion of the Project Manager, they have been rendered unreasonable, unbalanced or inapplicable as a result of varied or additional work already executed or instructed under Clause 46 or for any other reason.

53.6 Where, price adjustment provision is not applicable pursuant to Sub-clause

¹⁰ For complex Works involving several types of construction work with different inputs, a family of Formulae will be necessary. The various items of Day work may also require different formulae, depending on the nature and source of the inputs

¹¹ Insert a figure for factor *A* only where there is a part of the Contractors’ expenditures which will not be subject to fluctuation in cost or to compensate for the unreliability of some indices. *A* should normally be 0.15. The sum of *A*, *b*, *c*, *d*, etc., should be one.

	53.1 then the Contract is subject to price adjustment only for construction material in accordance with this clause. If the prices of the construction materials stated in the contract is increased or decreased in an unexpected manner in excess of ten (10%) percent in comparison to the base price construction material stated in Section –IV, Bidding Forms-Table of Price Adjustment Data, then the price adjustment for the increase or decrease of price of the construction material beyond 10% shall be made by applying the following formulas: For unexpected increase in price $P = [R_1 - (R_0 \times 1.10)] \times Q$ For unexpected decrease in price P $= [R_1 - (R_0 \times 0.90)] \times Q$ Where: “P” is price adjustment amount “R₁” is the present price of the construction material (Source of indices shall be those listed in the Bidding forms) “R₀” is the base price of the construction material “Q” is quantity of the construction material consumed in construction during the period of price adjustment consideration If the Base price and source is to be proposed by the Bidder as per the provision made in Section –IV, Bidding Forms-Table of Price Adjustment Data then the Base price and source filled by Bidder for the construction material stated in the Bidding Form shall be subject to the approval of the Project manager and shall be as stated in SCC. 53.7 The Price Adjustment amount shall be limited to a maximum of the initial Contract Amount as specified in the SCC. 53.8 The Price Adjustment provision shall not be applicable for delayed period if the contract is not completed in time due to the delay caused by the contractor or the contract is a Lump sum Contract.
54. Retention	54.1 The Employer shall retain from each payment due to the Contractor the proportion stated in the SCC until Completion of the whole of the Works. 54.2 Upon the issue of a Defects Liability Certificate by the Project Manager, in accordance with GCC 70.1, half the total amount retained shall be repaid to the Contractor and half when the Contractor has submitted the evidence of submission of tax return to the concerned Internal Revenue Office. 54.3 The Contractor may substitute retention money with an unconditional bank guarantee issued from Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law if: (a) at least eighty (80) percent of the whole works have been completed, (b) progress of the works is satisfactory in accordance with the Contract as per approved work schedule, and (c) it can be assured that the works can be completed at the intended

	completion date. The validity of the bank guarantee under this sub-clause shall be at least 30 days beyond the end of Defect Liability Period. 54.4 If retention money is substituted by bank guarantee in accordance with clause 54.3, the bank guarantee shall be submitted either using the Retention Money Security Form included in Section X (Contract Forms) or in another Form acceptable to the employer. The validity of the bank guarantee shall be at least one month more than the end of defect liability period.
55. Liquidated Damages	55.1 The Contractor shall pay liquidated damages to the Employer at the rate per day stated in the SCC for each day that the Completion Date is later than the Intended Completion Date. The total amount of liquidated damages shall not exceed the amount defined in the SCC. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not affect the Contractor's liabilities. 55.2 If the Intended Completion Date is extended after liquidated damages have been paid, the Project Manager shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate. The Contractor shall be paid interest on the overpayment, calculated from the date of payment to the date of repayment, at the rates specified in GCC 49.
56. Bonus	56.1 The Contractor shall be paid a Bonus calculated at the rate per calendar day stated in the SCC for each day (less any days for which the Contractor is paid for acceleration) that the Completion is earlier than the Intended Completion Date. The Project Manager shall certify that the Works are complete, although they may not be due to be complete.
57. Advance Payment	57.1 Unless otherwise stated in SCC, the Employer shall make advance payment to the Contractor of the amounts stated in the SCC in a separate bank account maintained for the contract 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. The validity of the bank guarantee under this sub-clause shall be at least 30 days beyond the end of intended completion date. The contractor shall submit the list of activities for which the Advance Payment for mobilization is to be used along with their time schedules. 57.2 The Contractor is to use the advance payment only to pay for the purpose of construction site preparation, establishment of temporary camp facilities, construction of workers' housing, mobilization of labors, materials or equipment etc. 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. 57.3 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. 57.4 If the advance provided under GCC 57.1 is not repaid 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 57.1, and shall also recover interest on the advance amount from the Contractor at a rate stated in SCC.
58. Securities	58.1 The Performance Security, including any additional security required as per ITB 35.5, 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 X (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 Defect Liability Period. However, any additional performance security required as per ITB 35.5 shall be valid until a date 30 days beyond the end of the intended completion date. 58.2 The performance security issued by any foreign Bank outside Nepal must be counter guaranteed by Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law in Nepal.
59. Dayworks	59.1 If applicable, the Dayworks rates in the Contractor's Bid shall be used for small additional amounts of work only when the Project Manager has given written instructions in advance for additional work to be paid for in that way. 59.2 All work to be paid for as Dayworks shall be recorded by the Contractor on forms approved by the Project Manager. Each completed form shall be verified and signed by the Project Manager within two days of the work being done. 59.3 The Contractor shall be paid for Dayworks subject to obtaining signed Dayworks forms.
60. Cost of Repairs	60.1 Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Correction periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions.
F. Force Majeure	
61. Definition of Force Majeure	61.1 In this Clause, "Force Majeure" means an exceptional event or circumstance, (a) which is beyond a Party's control; (b) which such Party could not reasonably have provided against before

	entering into the Contract; (c) which, having arisen, such Party could not reasonably have avoided or overcome; and (d) which is not substantially attributable to the other Party. 61.2 Force Majeure may include, but is not limited to, exceptional events or circumstances of the kind listed below, so long as conditions (a) to (d) above are satisfied: (a) war, hostilities (whether war be declared or not), invasion, act of foreign enemies; (b) rebellion, terrorism, sabotage by persons other than the Contractor's Personnel, revolution, insurrection, military or usurped power, or civil war; (c) riot, commotion, disorder, strike or lockout by persons other than the Contractor's Personnel; (d) munitions of war, explosive materials, ionizing radiation or contamination by radio-activity, except as may be attributable to the Contractor's use of such munitions, explosives, radiation or radio-activity; and (e) natural catastrophes such as earthquake, hurricane, typhoon or volcanic activity.
62. Notice of Force Majeure	62.1 If a Party is or will be prevented from performing its substantial obligations under the Contract by Force Majeure, then it shall give notice to the other Party of the event or circumstances constituting the Force Majeure and shall specify the obligations, the performance of which is or will be prevented. The notice shall be given within 14 days after the Party became aware, or should have become aware, of the relevant event or circumstance constituting Force Majeure. 62.2 The Party shall, having given notice, be excused performance of its obligations for so long as such Force Majeure prevents it from performing them. 62.3 Notwithstanding any other provision of this Clause, Force Majeure shall not apply to obligations of either Party to make payments to the other Party under the Contract.
63. Duty to Minimize Delay	63.1 Each Party shall at all times use all reasonable endeavors to minimize any delay in the performance of the Contract as a result of Force Majeure. 63.2 A Party shall give notice to the other Party when it ceases to be affected by the Force Majeure.
64. Consequences of Force Majeure	64.1 If the Contractor is prevented from performing its substantial obligations under the Contract by Force Majeure of which notice has been given under GCC 62, and suffers delay and/or incurs Cost by reason of such Force Majeure, the Contractor shall be entitled subject to GCC 30 to

	(a) an extension of time for any such delay, if completion is or will be delayed, under GCC35; and (b) if the event or circumstance is of the kind described in subparagraphs (a) to (d) of GCC 61.2 and, in the case of subparagraphs (b) to (d), occurs in the Country, payment of any such Cost, including the costs of rectifying or replacing the Works and/or Goods damaged or destructed by Force Majeure, to the extent they are not indemnified through the insurance policy referred to in GCC 19.
	64.2 After receiving this notice, the Project Manager shall proceed in accordance with GCC 10 to agree or determine these matters.
65. Force Majeure Affecting Subcontractor	65.1 If any Subcontractor is entitled under any contract or agreement relating to the Works to relief from force majeure on terms additional to or broader than those specified in this Clause, such additional or broader force majeure events or circumstances shall not excuse the Contractor's nonperformance or entitle him to relief under this Clause.
66. Optional Termination, Payment and Release	66.1 If the execution of substantially all the Works in progress is prevented for a continuous period of 90 days by reason of Force Majeure of which notice has been given under GCC 62, or for multiple periods which total more than 150 days due to the same notified Force Majeure, then either Party may give to the other Party a notice of termination of the Contract. In this event, the termination shall take effect 7 days after the notice is given, and the Contractor shall proceed in accordance with GCC 72.5. 66.2 Upon such termination, the Project Manager shall determine the value of the work done and issue a Payment Certificate, which shall include (a) the amounts payable for any work carried out for which a price is stated in the Contract; (b) the Cost of Plant and Materials ordered for the Works which have been delivered to the Contractor, or of which the Contractor is liable to accept delivery: this Plant and Materials shall become the property of (and be at the risk of) the Employer when paid for by the Employer, and the Contractor shall place the same at the Employer's disposal; (c) other Costs or liabilities which in the circumstances were reasonably and necessarily incurred by the Contractor in the expectation of completing the Works; (d) the Cost of removal of Temporary Works and Contractor's Equipment from the Site and the return of these items to the Contractor's works in his country (or to any other destination at no greater cost); and (e) the Cost of repatriation of the Contractor's staff and labor employed wholly in connection with the Works at the date of termination.
67. Release from Performance	67.1 Notwithstanding any other provision of this Clause, if any event or circumstance outside the control of the Parties (including, but not limited to, Force Majeure) arises, which makes it impossible or unlawful for either or both Parties to fulfill its or their contractual obligations or which, under

	the law governing the Contract, entitles the Parties to be released from further performance of the Contract, then upon notice by either Party to the other Party of such event or circumstance, (a) the Parties shall be discharged from further performance, without prejudice to the rights of either Party in respect of any previous breach of the Contract; and (b) the sum payable by the Employer to the Contractor shall be the same as would have been payable under GCC 66 if the Contract had been terminated under GCC 66.
G. Finishing the Contract	
68. Completion	68.1 The Contractor shall request the Project Manager to issue a certificate of Completion of the Works, and the Project Manager shall do so upon deciding that the work is completed. 68.2 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.
69. Taking Over	69.1 In the contractor's Opinion, if the works are complete and ready for taking over, the contractor may apply by notice to the Project Manager for a Taking-Over Certificate. If the Works are divided into Sections, the Contractor may similarly apply for a Taking-Over Certificate for each Section. 69.2 The Project Manager shall, within 30 days after receiving the Contractor's application: (a) issue the Taking-Over Certificate to the Contractor if physical progress of works is at least ninety (90) percent in accordance with the Contract except for any minor outstanding work and defects (as listed in the Taking-Over Certificate) which will not substantially affect the use of the Works or Section for their intended purpose (either until or whilst this work is completed and these defects are remedied); or (b) reject the application, giving reasons and specifying the work required to be done by the Contractor to enable the Taking-Over Certificate to be issued. The Contractor shall then complete this work before issuing a further notice under this Sub-Clause. 69.3 If the Engineer fails either to issue the Taking-Over Certificate or to reject the Contractor's application within the period of 30 days, and if the Works or Section (as the case may be) are substantially completed in accordance with the Contract, the Taking-Over Certificate shall be deemed to have been issued on the last day of that period.
70. Final Account	70.1 The Contractor shall supply the Project Manager with a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Project Manager shall issue a Defects Liability Certificate and certify any final payment that is due to the Contractor within 60 days of receiving the Contractor's account if it is correct and complete. If it is not, the Project Manager shall issue within 60 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Project Manager shall decide on the amount payable to the Contractor and issue a payment certificate.
71. Operating	71.1 If "as built" Drawings and/or operating and maintenance manuals are required,

and Maintenance Manuals	the Contractor shall supply them by the dates stated in the SCC. 71.2 If the Contractor does not supply the Drawings and/or manuals by the dates stated in the SCC pursuant to GCC 71.1, or they do not receive the Project Manager's approval, the Project Manager shall withhold the amount stated in the SCC from payments due to the Contractor.
72. Termination	72.1 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. 72.2 The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract. 72.3 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 Project Manager gives two consecutive Notices to update the Program and accelerate the works to ensure compliance with GCC Sub clause 22.1 and the Contractor fails to update the Program 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; 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 73.1. k. If the Contractor fails to submit Performance Security, Advanced Payment Guarantee (if any) and Insurance Policy documents even after the time period indicated in GCC 35.3. 72.4 When either party to the Contract gives notice of a breach of Contract to the Project Manager for a cause other than those listed under GCC 72.3 above, the Project Manager shall decide whether the breach is fundamental or not. 72.5 Notwithstanding the above, the Employer may terminate the Contract for

	convenience. 72.6 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.
73. Fraud and Corruption	73.1 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. 73.2 Should any employee of the Contractor be determined to have engaged in corrupt, fraudulent, collusive, coercive, or obstructive practice during the execution of the Works, then that employee shall be removed in accordance with GCC Clause 15. For the purposes of this GCC 73; (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 audit rights provided for under GCC28.3. 73.3 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.
74. Black Listing	74.1 Without prejudice to any other rights of the Employer under this Contract, GoN, Public Procurement Monitoring Office (PPMO), on the recommendation of procuring entity, may blacklist a Bidder or contractor for its conduct for a period of one (1) to three (3) years on the following grounds and seriousness of the act committed by the bidder or contractor: (a) if it is established that the Contractor has committed substantial defect in implementation of the contract or has not substantially fulfilled its

	obligations under the contract or the completed work is not of the specified quality as per the contract. (b) If convicted from a court of law in a criminal offense liable to be disqualified for taking part in procurement contract, (c) If it is established that the Contractor has engaged in corrupt or fraudulent practices in competing for or in executing the Contract.
75. Payment upon Termination	75.1 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 less 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. 75.2 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. 75.3 If the Contract is terminated because of fundamental breach of Contract or for any other fault by the Contractor, the Employer may: (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. (c) forfeit the Performance Security. 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.
76. Property	76.1 All Materials on the Site, Plant, Equipment, Temporary Works, and Works shall be deemed to be the property of the Employer if the Contract is terminated because of the Contractor's default.
77. Release from Performance	77.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Employer or the Contractor, the Project Manager shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which a commitment was made.
78. Suspension of DP Loan/Credit/Grant	78.1 In the event that the DP suspends the loan/ credit/grant to the Employer from which part of the payments to the Contractor are being made: a. the Employer is obligated to notify the Contractor of such suspension within 7 days of having received the DP's suspension notice; and b. if the Contractor has not received sums due him within the 30 days for payment provided for in GCC 49.1, the Contractor may immediately issue a 15-day termination notice.

79. Eligibility	79.1 The Contractor shall have the nationality of an eligible country as specified in Section V of the bidding document. The Contractor shall be deemed to have the nationality of a country if the Contractor is a citizen or is constituted, or incorporated, and operates in conformity with the provisions of the laws of that country. This criterion shall also apply to the determination of the nationality of proposed subcontractors or suppliers for any part of the Contract including related services. 79.2 The materials, equipment, and services to be supplied under the Contract shall have their origin in eligible source countries as specified in Section V of the bidding document and all expenditures under the Contract will be limited to such materials, equipment, and services. At the Employer's request, the Contractor may be required to provide evidence of the origin of materials, equipment, and services. 79.3 For purposes of GCC 79.2, "origin" means the place where the materials and equipment are mined, grown, produced, or manufactured, and from which the services are provided. Materials and equipment are produced when, through manufacturing, processing, or substantial or major assembling of components, a commercially recognized product results that differs substantially in its basic characteristics or in purpose or utility from its components.
80. Project Manager's Duties and Authorities	80.1 The Project Manager's duties and authorities are restricted to the extent as stated in the SCC.
81. Quarries and Spoil Dumps	81.1 Any quarry operated as part of this Contract shall be maintained and left in a stable condition without steep slopes and be either refilled or drained and be landscaped by appropriate planting. Rock or gravel taken from a river shall be removed over some distance so as to limit the depth of material removed at any one location, not disrupt the river flow or damage or undermine the river banks. The Contractor shall not deposit excavated material on land in Government or private ownership except as directed by the Project Manager in writing or by permission in writing of the authority responsible for such land in Government ownership, or of the owner or responsible representative of the owner of such land in private ownership, and only then in those places and under such conditions as the authority, owner or responsible representative may prescribe.
82. Local Taxation	82.1 The prices bid by the Contractor shall include all taxes that may be levied in accordance to the laws and regulations in being in Nepal on the date 30 days prior to the closing date for submissions of Bids on the Contractor's equipment, plant and materials acquired for the purpose of the Contract and on the services performed under the Contract. Nothing in the Contract shall relieve the Contractor from his responsibility to pay any tax that may be levied in Nepal on profits made by him in respect of the Contract.
83. Value Added Tax	83.1 The Contract is not exempted from value added tax. An amount specified in the schedule of taxes shall be paid by the Contractor in the concerned VAT office within time frame specified in VAT regulation.
84. Income Taxes on Staff	84.1 The Contractor's staff, personnel and labor will be liable to pay personal income taxes in Nepal in respect of their salaries and wages, as are chargeable under the laws and regulations for the time being in force, and the Contractor shall perform such duties in regard to such deductions as may be imposed on

	him by such laws and regulations.
	84.2 The issue of the Final Account Certificate pursuant to clause GCC 70 shall be made only upon submittal by the Contractor of a certificate of income tax clearance from the Government of Nepal.
85. Duties, Taxes and Royalties	85.1 Any element of royalty, duty or tax in the price of any goods including fuel oil, and lubricating oil, cement, timber, iron and iron goods locally procured by the Contractor for the works shall be included in the Contract rates and prices and no reimbursement or payment in that respect shall be made to the Contractor. 85.2 The Contractor shall familiarize himself with GON the rules and regulations with regard to customs, duties, taxes, clearing of goods and equipment, immigration and the like, and it will be necessary for him to follow the required procedures regardless of the assistance as may be provided by the Employer wherever possible. 85.3 The Contractor shall pay and shall not be entitled to the reimbursement of cost of extracting construction materials such as sand, stone/boulder, gravel, etc. from the river beds or quarries. Such prices will be levied by concerned Local Government as may be in force at the time. The Contractor, sub-contractor(s) employed directly by him and for whom he is responsible, will not be exempted from payment of royalties, taxes or other kinds of surcharges on these construction materials so extracted and paid for to the concerned Local Government.
86. Member of Government, etc, not Personally Liable	86.1 No member or officer of GoN or the Employer or the Project Manager or any of their respective employees shall be in any way personally bound or liable for the act or obligations of the Employer under the Contract or answerable for any default or omission in the observance or performance of any of act, matter or thing which are herein contained.
87. Approval of Use of Explosives	87.1 No explosives of any kind shall be used by the Contractor without the prior consent of the Employer in writing and the Contractor shall provide, store and handle these and all other items of every kind whatsoever required for blasting operations, all at his own expense in a manner approved in writing by the Employer.
88 Compliance with Regulations for Explosives	88.1 The Contractor shall comply with all relevant ordinances, instructions and regulations which the Government, or other person or persons having due authority, may issue from time to time regarding the handling, transportation, storage and use of explosives.
89. Permission for Blasting	89.1 The Contractor shall at all times maintain full liaison with and inform well in advance, and obtain such permission as is required from all Government authorities, public bodies and private parties whatsoever concerned or affected, or likely to be concerned or affected by blasting operation.
90. Records of Explosives	90.1 Before the beginning of the Defects Liability Period, the Contractor shall account to the satisfaction of the Project Manager for all explosives brought on to the Site during the execution of the Contract and the Contractor shall remove all unused explosives from the Site on completion of works when ordered by the Project Manager.
91. Traffic Diversion	91.1 The Contractor shall include the necessary safety procedures regarding and pedestrian traffic diversion that is needed in execution of the works. The Contractor shall include in his costing of works, any temporary works or diversion that are needed during the construction period. All traffic diversion should be designed for the safety of both the motoring public and the men at

	work. It shall ensure the uninterrupted flow of traffic and minimum inconvenience to the public during the period concerned. As such, adequate warning signs, flagmen and other relevant safety precautionary measures shall be provided to warn motorists and pedestrians well ahead of the intended diversion as directed by the Project Manager. All traffic devices used shall be designed in accordance with the instruction of Project Manager.
92 Social Security Fund	92.1 The contractor shall enroll the laborers, employees, or other workforce engaged in such work in the Social Security Fund in accordance with prevailing laws.
	92.2 The contractor shall be responsible to disburse the remuneration, benefits, and other payments of the laborers, employees, or workforce into the bank account of the concerned individual.
	92.3 The contractor shall be responsible for ensuring that the required work permit has been obtained in accordance with prevailing laws in respect of foreign personnel.,



Section IX: Special Conditions of Contract

The following Special Conditions of Contract shall supplement the GCC. Whenever there is a conflict, the provisions herein shall prevail over those in the GCC.

Melamchi Water Supply Development Board

Tunnel Operation of Melamchi Water Supply Project

MWSDB/Tunnel-Operation/83-84



Special Conditions of Contract

A. General	
GCC 1.1 (p)	The Employer is Melamchi Water Supply Development Board (MWSDB), Panipokhari, Kathmandu
GCC 1.1 (u)	The Intended Completion Date for the whole of the Works shall be: 36 months
GCC 1.1(bb) & GCC10.1	The Project Manager is Executive Director or designated by the Employer and notified to the Contractor. The Project Manager and Engineer are synonyms.
GCC 1.1 (ee)	The Site is located at Kathmandu and Sindhupalchowk District. Tunnel starting from Melamchi headworks at Ambathan and ending at Sundarijal Water Treatment Plant. Adits and Portals are at Sundarijal, Sindhu, Gyalthum and Ambathan The Site location is defined in drawing provided with bidding document
GCC 1.1 (hh)	The Start Date shall be within 7 days from the contract agreement date
GCC 1.1 (ll)	The Works consist of operation - Civil works in debris removal to channelize River after every monsoon, Civil works to maintain the Gate 1 frontal area debris free and ensure smooth entry of water to Gate 1 and ADS after/ during rains, Civil works to keep the ADS free from debris - Operation & Maintenance (O&M) of Melamchi Diversion Tunnel and Alternate - Diversion System (ADS) at Headworks as per approved Standard Operating Procedures (SOP) - Flushing works from Gate 9 and 21 as required - Flow Monitoring of River Melamchi, Monitoring of Left Bank Slope (LBS) at Headworks, - Monitoring of Vent Shafts (VS) and Adits / Portal Pressure Gauges, - Monitoring of Upstream Catchment Rainfall and Flow, - Maintenance of Diesel Generators at adits, portals, - Safety of all civil works and safe operation of tunnel - Establishing reliable communication and Co-ordination with the Project Consultants, Employer MWSDB and WTP authorities. - Monthly reporting of works, operational services undertaken along with submission of data of all pressure gauges at adits, vent shafts, discharge in flushing valves if any, etc
GCC 2.2	Sectional Completions are: Not Applicable
GCC 2.3(i)	The following documents also form part of the Contract: Performance Monitoring Checklists for tunnel O&M/ Minute of the meetings

GCC 3.1	The language of the contract is ENGLISH/NEPALI The law that applies to the Contract is the law of NEPAL
GCC 11.1	The Project Manager <i>may</i> delegate any of his duties and responsibilities.
GCC 12.1 (a)	The agreed electronic transmission shall be melamchiwater@gmail.com and
GCC 13.1	Maximum percentage of subcontracting permitted is 25% of the total contract amount (without VAT but including PS). Nature of Works that agreed to be subcontracted and Details of Sub-Contractors: 1. 2.
GCC 14.1	Schedule of other contractors: Not Applicable
GCC 19.1	The minimum insurance amounts and deductibles shall be: 1. The minimum cover for loss of or damage to the Works, Plant and Materials is: 115% of the Contract Amount. 2. The maximum deductible for insurance of the Works and of Plant and Materials is: as per the provision of Nepal Insurance Authority. 3. The minimum cover for loss or damage to immovable Equipment/ plants is: 100 % (i.e Replacement Cost). 4. The maximum deductible for insurance of immovable Equipment/ plant is: as per the provision of Nepal Insurance Authority. 5. The minimum cover for loss of or damage to other property is: NRs. 10,00,000 with unlimited number of occurrences. 6. The maximum deductible for insurance of other property is: as per the provision of Nepal Insurance Authority]. 7. The minimum cover for personal injury or death insurance i. for the Contractor's employees is that specified in the Labor act of Nepal and i. ii. for other people is: 1 million with an unlimited number of occurrences.
GCC 20.1	Site Investigation Reports are: Previous Operation and Maintenance Data,
GCC 23.1	The following shall be designed by the Contractor: None
GCC 24.2	Add the following at the end of the Sub-clause: The contractor shall designate one dedicated fulltime Safety Officer throughout the contract period with the experience and qualification as set out in the Employer's Requirement/ Scope of the Works. The Safety Officer should be fully acquainted with the personnel risks associated with the operation and maintenance of the tunnel and other civil engineering works. The Contractor's Safety officer shall

	conduct awareness programs and give training to workers/personnel in site frequently and maintain safety checklist on all the Occupational Health and Safety aspects associated with the works.
GCC 26.1	The Site Possession Date(s) shall be: <i>The Date of Contract Agreement</i>
GCC 30.1	The place of arbitration shall be: Nepal Council of Arbitration (NEPCA) Lalitpur, Nepal
C. Time Control	
GCC 34.1	The Contractor shall submit for approval a Program for the Works within 30 days from the date of the Letter of Acceptance.
GCC 34.3	The period between Program updates is 60 days . The amount to be withheld for late submission of an updated Program is NRs. 50,000,00
D. Quality Control	
GCC 42.1	The Defects Liability Period is: 365 days
E. Cost Control	
GCC 49.1	5%
GCC 53.1	The Contract is subject to price adjustment, and the following information regarding coefficients “does” apply. The coefficients and indices for adjustment of prices in Nepalese Rupees shall be as specified in the Table of Adjustment Data submitted by bidder together with the Letter of Price Bid which is approved by the Project manager and attached as Annex-1.
GCC 53.6	Not Applicable
GCC 53.7	The Price Adjustment amount shall be limited to a maximum of: 25 % percentage of the initial Contract Amount (without VAT but including PS)
GCC 54.1	The proportion of payments retained is: 5 (five) percent .
GCC 55.1	The liquidated damages for the whole of the Works are 0.05 Percent of the final Contract Price (without VAT but including PS) per day. The maximum amount of liquidated damages for the whole of the Works is 10 Percent of the final Contract Price (without VAT but including PS).
GCC 56.1	The provision of bonus is <i>Not Applicable</i> in the contract.
GCC 57.1	The Advance Payments shall be: 10 % of Contract Price excluding PS and VAT and shall be paid in two equal installments and to the Contractor 1st Installment: 5% shall be paid after signing the Contract Agreement and after submission of an unconditional bank guarantee from Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law in Nepal 2nd Installment : 5 % shall be paid after the Contractor’s mobilization at the site

	after submission of an unconditional bank guarantee from Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law in Nepal and with fulfillment of the following conditions: i. Mobilization of personnel as mentioned in Scope of Works/Specification ii. Deployment of equipment iii. Smooth operation of camp and security facility iv. Completion of Insurance procedures as required by Contract. v. Submitting evidence for the use of first installment of mobilization
GCC 57.3	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 20% 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.
GCC 57.4	Recover interest on the advance amount from the Contractor should be at a rate of 10 % .
GCC 58.1	The Performance Security amount is as per ITB 40.1 and/or ITB 35 .
G. Finishing the Contract	
GCC 71.1	Replace “operating and maintenance manuals” by “operation and maintenance report “ The date by which operating and maintenance report are required is; 15 days prior to issue of the Certificate of completion.
GCC 71.2	The date by which “as built” drawings are required is: 30 days after work acceptance date. The amount to be withheld for failing to produce “as built” drawings and/or Operating and maintenance manuals is: 500,000.00
GCC 72.3 (i)	The maximum number of days is: 200
GCC 80	The Project Manager has to obtain the specific approval of the Employer for taking any of the following actions : a. Approving subcontracting of any part of the works under General Conditions of Contract Clause 13; b. Certifying additional costs determined under General Conditions of Contract Clause 50; c. Determining start date under General Conditions of Contract Clause 1; d. Determining the extension of the intended Completion Date under General Conditions of Contract Clause 35; e. Issuing a Variation under General Conditions of Contract Clause 1 and 46, except in an emergency situation, as reasonably determined by the Project Manager; emergency situation may be defined as the situation when protective measures must be taken for the safety of life or of the works or of adjoining property. f. Adjustment of rates under General Conditions of Contract Clause 45;



Section X: 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 and Retention Money Security shall only be completed by the successful Bidder after contract award.

Letter of Intent

[on letterhead paper of the Employer]

Date:

To: *Name and address of the Contractor*.....

Subject: Issuance of letter of intent to award the contract.....

This is to notify you that, it is our intention to award the contract *[insert date]*for execution of the *[insert name of the contract and identification number, as given in the Contract Data/SCC]* to you as your bid price Nepalese Rupees *[insert amount of contract price in figures and words including taxes]* as corrected and modified in accordance with the Instructions to Bidders is hereby selected as substantially responsive evaluated bid closest to the Average Bid Price.

Authorized Signature:

Name:

Title:

CC:

[Insert name and address of all other Bidders, who submitted the bid]***[Notes on Letter of Intent***

The issuance of Letter of Intent is the information of the selection of the bid of the successful bidder by the Employer and for providing information to other unsuccessful bidders who participated in the bid as regards to the outcome of the procurement process. This standard form of Letter of Intent to Award should be filled in and sent to the successful Bidder only after evaluation and selection of substantially responsible evaluated bid closest to the Average Bid Price.]



Letter of Acceptance [on letterhead paper of the Employer]

Date:

To:*Name and address of the Contractor*.....

Subject:*Notification of Award*

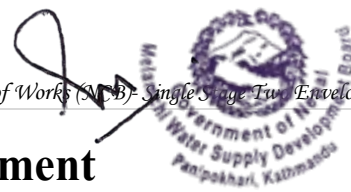
This is to notify that your Bid for the Invitation of Bids dated[*Insert date of bid invitation*]for execution of the.....[*Insert name of the contract and identification number, as given in the Contract BDS/SCC*] for the Contract price of Nepalese Rupees [*insert amount of contract price in figures and words including taxes*], 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 15 days with Performance Security of **NRs.** in accordance with the Conditions of Contract, using for that purpose the Performance security Form included in Section X (Contract Forms) of this Bidding Document.

Authorized Signature:

Name and Title of Signatory:

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 Bid 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. This Agreement shall prevail over all other Contract documents.
 - (a) the Letter of Acceptance;
 - (b) the Letters of Technical and Price Bid;
 - (c) the Addenda Nos *Insert addenda numbers if any*
 - (d) the Special Conditions of Contract;
 - (e) the List of Eligible Countries that was specified in Section V of the bidding document,
 - (f) the General Conditions of Contract;
 - (g) the Specification;
 - (h) the Drawings;
 - (i) Bill of Quantities (or Schedules of Prices for lump sum contracts), and
 - (j) Table of Price Adjustment Data
 - (k) List of Approved Subcontractors [For GoN funded project]
 - (l)[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.

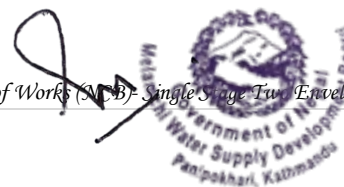
IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of Nepal on the day, month and year indicated above.

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

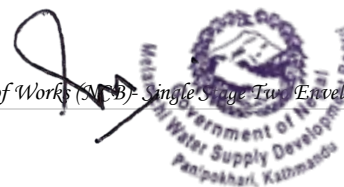
Witness, Name, Signature, Address, Date



List of Approved Subcontractors

In accordance with GCC Sub-Clause 13.1, The following Subcontractors are approved for carrying out the work as specified below.

Name of Subcontractors	Description of Works	Value/Percentage of subcontract



Performance Security

(On letterhead paper of the Bank)

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

Beneficiary: **[insert Name and Address of Employer]**

Date:

Performance Guarantee No.:

We have been informed that **[insert name of the Contractor, which in the case of a joint venture shall be the name of the joint venture]** (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 Nepalese Rupees.....**[insert amount in figures*and 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.....**[insert day]**.Day of**[insert month, year]**, **, and any demand for payment under it must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG), 2010 Revisions, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

.....
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.*



Advance Payment Security (On letterhead paper of the Bank)

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

Beneficiary:**[insert Name and address of employer]**

Date :

Advance Payment Guarantee No.....

We have been informed that **[insert name of the Contractor, which in the case of a joint venture shall be the name of the joint venture]** (hereinafter called "the Contractor") has entered into Contract No.**[insert refrence number of the contract]** dated**[date]**..... with you, 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, an advance payment in the sum Nepalese Rupees **[Insert amount in figures*and in words]** is to be made against an advance payment guarantee.

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 Nepalese Rupees**[insert amount in figures* and 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:

- (a).....Used the advance payment for purposes other than the costs of mobilization in respect of the Works; or
- (b)... Has failed to repay the advance payment when it has become due and payable in accordance with the conditions of the contract, specifying the amount payable by the contractor.

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**[date]**..... day of ...**[month],[year]**...**, whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG), 2010 Revisions, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

.....
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.*



Retention Money Security

(On letterhead paper of the Bank)

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

Beneficiary: **[Insert name and Address of Employer]**

Date: **[Insert date of issue]**

RETENTION MONEY GUARANTEE No.: **[Insert guarantee reference number]**

We have been informed that **[insert name of Contractor, which in the case of a joint venture shall be the name of the joint venture]** (hereinafter called "the Contractor") has entered into Contract No. **[insert reference number of the contract]** dated with the Beneficiary, for the execution of **[insert name of contract and brief description of Works]** (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, the Beneficiary retains moneys up to the limit set forth in the Contract ("the Retention Money"), and that when at least eighty (80) percent of the whole works have been completed, progress of the works is satisfactory in accordance with the Contract as per approved work schedule and it can be assured that the works can be completed at the intended completion date, payment of **[insert the amount of the Retention Money]** is to be made against a Retention Money guarantee.

At the request of the Contractor, we, .. **[insert name of the Bank]**, as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of Nepalese Rupees **[insert amount in figures and amount in words]**¹ upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or show grounds for your demand or the sum specified therein.

This guarantee shall expire no later than the day of, ...², and any demand for payment under it must be received by us at the office indicated above on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG), 2010 Revisions, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

.....
[Seal of Bank and signature(s)]

Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.

¹ The Guarantor shall insert the amount of the Retention Money.

² Insert the same expiry date which is 30 days more than the end of Defect Liability Period. The Employer should note that in the event of an extension of this date 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.



Annex-1

**Table of Price Adjustment Data
[SCC 53.1]**

Code	Index Description	Source of Index*	Base Value and Date	Employer's Proposed Weighting Range (coefficient)	Bidder's Proposed Weighting (coefficient)**
1	2	3	4	5	6
	Non - adjustable (A)			0.15	0.15
	Labor (b)				
	Materials (c)				
	Equipment usage (d)				
	...				
		Total			1.00

Note: Base value and Bidder's proposed weighting coefficient to be filled as per "Bid Form of Table of Price Adjustment Data" in Bidding Forms (Section-IV) after verification by the Employer in case of the alternative provision of Bidder proposed value and weighting coefficient.

**Table of Price Adjustment Data
[SCC 53.6]**

Code	Construction Material*	Unit	Base Price (NRs/Unit) ** (Ex-factory)	Source (Factory)**
1	2	3	4	5

** For the purpose of calculation of price adjustment, the Ex-factory price of the same source mentioned in the table shall be taken into consideration.

Note: Base Price and source to be filled as per "Bid Form of Table of Price Adjustment Data" in Bidding Forms (Section-IV) after verification by the Employer in case of the alternative provision of Bidder proposed source and base price.

SPECIFICATIONS

TUNNEL OPERATION AND MAINTENANCE

SECTION VI: WORKS REQUIREMENTS _GENERAL SPECIFICATION

Table of Contents

1- INTRODUCTION

- 1.01 Description of the Works
- 1.02 Standards
- 1.03 Materials
- 1.04 Workmanship
- 1.05 Work Scheduling and Programming

2- GENERAL ITEMS AND PRELIMINARIES

- 2.01 General Requirements
- 2.02 Infrastructure
- 2.03 Requirements on Social Issues, Occupational Health and Bio-Physical Environment
- 2.04 Mobilization and Demobilization

3- EARTHWORKS

- 3.01 Scope
- 3.02 Definition And General Requirements
- 3.03 Classification Of Excavated Materials
- 3.04 Explosives And Blasting
- 3.05 Excavation For Foundation
- 3.06 Refilling Of Foundation Pits And Trenches, Removal Of Supports And Filling To Structures
- 3.07 Forming Of Embankment And Others Areas Of Fill
- 3.08 Measurement
- 3.09 Payment

4-CONCRETE

- 4.01 Scope of work
- 4.02 Concrete constituent materials
- 4.03 Concrete mixes and proportioning
- 4.04 Batching and mixing of concrete
- 4.05 Transport, handling and placing of concrete
- 4.06 Curing of concrete
- 4.07 Testing of concrete
- 4.08 Repair of blemishes
- 4.09 Measurement
- 4.10 Payment



5-CONCRETE ANCILLARIES.

- 5.01 Scope works
- 5.02 Formwork
- 5.03 Steel reinforcement
- 5.04 Tolerances and surface finishes
- 5.05 Embedding of items
- 5.06 Measurement
- 5.07 Payment

6-MASONRY FOR STRUCTURES

- 6.01 Scope
- 6.02 Materials
- 6.03 Construction
- 6.04 Random Rubble Coursed or Uncoursed
- 6.05 Test and Standard Acceptance
- 6.06 Measurement
- 6.07 Payment

7-PROTECTION WORKS

- 7.01 Gabions
- 7.02 Geotextiles
- 7.03 Measuremen
- 7.04 Payment

8-PIPE DRAINS, PIPE CULVERTS AND CONCRETE CHANNELS

- 8.01 Pipe Drains And Pipe Culvert
- 8.02 Concrete Channelling
- 8.03 Completion Of Drainage Works.....



SECTION VI: WORKS REQUIREMENTS _PARTICULAR SPECIFICATION

Table of Contents

1. Safety Provisions:
2. Gas Detector:
3. Medical Support
4. Manpower
5. Vehicle 4 WD:
6. Motorbike:
7. Chain Block of Capacity of 10 tonne
8. PTZ 360 Camera:
9. Monthly Progress Report:
10. Camp support and Facilities:
11. Supply of Diesel Generators:



Particular Specification for BOQ Items:

General

1. Safety Provisions:

The Contractor shall be responsible for maintaining the safety arrangements in all the camps and work premises with utmost carefulness. For this purpose, the contractor, amongst others shall fulfill the following requirements:

The contractor shall designate one dedicated fulltime Safety Officer throughout the contract period with the experience and qualification as set out in the Employer's Requirement/ Scope of the Works. The Safety Officer should be fully acquainted with the personnel risks associated with the operation and maintenance of the tunnel and other civil engineering works. The Contractor's Safety officer shall conduct awareness programs and give training to workers/personnel in site frequently and maintain safety checklist on all the Occupational Health and Safety aspects associated with the works

The contractor shall provide and make arrangements of the safety gears necessary for the occupational health and safety assurances in the working places and make compulsory for use of such gears in all working spaces. The provision of safety gears includes but not limited to the following items:

Melamchi Water Supply Project

Tunnel Operation and Maintenance Work

Safety Gear

Item No.	Description	Quantity	Unit	Rate (NPR)	Amount (NPR)	Remarks
1	Safety helmet	60	no			
2	Safety boots	30	no			
3	Gumboot	60	no			
4	Reflective safety jacket	100	no			
5	KF94/N95 Masks /4-3Layer Protection	150	no			
6	Cotton & Rubber Hand gloves	30	no			
7	Raincoat set with better water resistance	30	no			

[Signature]

[Signature]

[Signature]

8	Better Quality Umbrella (medium and big size)	35	no			
9	Safety goggles for construction Site	35	no			
10	Torches (both battery & rechargeable)	15	nos			

2. Gas Detector:

The Contractor shall supply and provide for testing of Gas mainly oxygen, carbon monoxide, Hydrogen sulphide and all other combustible gases. It shall also measure the content of gas level inside the Tunnel.

The Gas Detector should be free from the established/ reputed company and should be purchased and supplied only with the prior approval of Engineer

The Contractor shall supply and provide breathing systems to be used inside the tunnel including portable oxygen cylinder with masks and other accessories all complete in the number as specified in the BOQ (Oxygen gas cylinder and other provided as per the WHO provisions).

The specifications for the oxygen gas cylinder is mentioned below

- i. Working Duration: 537 min
- ii. O2 Capacity: 1074 Ltr.
- iii. Weight of kit: 6.5 kg
- iv. Duration specified is @2 liter per minute
- v. A complete oxygen medical kit that is 45 % lighter than traditional steel cylinders.
- vi. Refillable and reusable.
- vii. With its cylinder made from aluminum alloy, OxyGo is completely rust free, unlike steel.
- viii. The simple finger operated valve and regulator that can be used by the patient.
- ix. Oxygen quality within the cylinder maintained due to its internal aluminum finish and special internal cleaning process.)





3. Medical Support

The contractor shall be responsible for providing necessary first-hand medical services and assure quick response to any untoward incidences in the site.

For this purpose, the Contractor shall make arrangements for response for any emergency incidents with provision of medical services including ambulances. The payment in this regard shall be made as provisioned in the BOQ.

The Contractor shall supply and provide first aid facilities in all sites which should include at the minimum the following items:

Melamchi Water Supply Project Tunnel Operation and Maintenance Work

First Aid Medicine List

Item No.	Description	Quantity	Unit	Rate (NPR)	Amount (NPR)	Remarks
1	Handi plast	5	Packs			
2	Scissors	5	Nos.			
3	Cottons	5	Roll			
4	Strepsils	5	Srips			
5	Ear drop	5	Nos.			
6	Povidone	5	Nos.			
7	T. d. Vaccine	20	Nos.			
8	Syringe (3 & 5 ml)	10	Nos.			
9	Mupirocin ointment	10	Nos.			
10	Thermometre (Digital)	5	Nos.			
11	Diclofenac gel	5	Nos.			
12	Azithromycin	5	Strips			
13	Sterile gauge pad, 10cm x 10cm x 12 Ply	5	Box			
14	Rollar bandage	5	Roll			
15	Cough Syrup	5	Nos.			
16	Multivitamine With Vitamin C	5	Strips			
17	Flexon	5	Strips			





18	Gentamycin cream	5	Nos.			
19	Paracetamol	5	Strips			
20	Ibuprofen/Dolopar	5	Strips			
21	Surgical Gloves	30	Pairs			
22	ORS	50	Packs			
23	Adhesive elastic tape	10	Nos.			
24	D-cold/sinex	5	Strips			
25	Amoxycillion capsule	5	Strips			
26	Betadine	5	Bottle			
27	Ointment moves	10	Nos.			
28	Swiss Designed Aneroid Sphygmomanometer Bp Measuring Machine/Digital Sphygmomanometer	1	Nos.			
29	Silver Sulfadiazine cream	5	Nos.			

4. Manpower

The Contractor shall be responsible for the Operation and Maintenance of the Melamchi Diversion Tunnel, including the Alternate Diversion System (ADS), by deploying competent, experienced, qualified, and skilled personnel to ensure the efficient operation of the tunnel and the uninterrupted supply of water.

The Contractor's personnel shall perform their duties with due diligence in a timely and well-coordinated manner. Furthermore, all deployed manpower shall have their daily attendance verified and certified by the Site Representative/client. The Contractor shall also submit a daily work report detailing the manpower deployment, activities performed, work progress, and any significant observations or issues encountered during the execution of the works. The general tasks of the Contractor's personnel amongst others will be as follows:

➤ Project Manager:

The Project Manager shall be assigned for the whole contract period at the project site and shall be responsible for the following duties and responsibilities:

1. Lead and manage the overall contract works in a well-organized, coordinated, and efficient manner.





2. Deploy and manage all required personnel at the site and assign duties and responsibilities in a clear and systematic manner for smooth tunnel operation works.
3. Identify all potential risks associated with tunnel operation and maintenance and provide necessary training and awareness to all site personnel regarding safety and risk mitigation measures.
4. Maintain effective coordination and communication with the Employer, Engineer, local authorities, and other concerned stakeholders.
5. Ensure proper understanding and implementation of all contractual obligations, technical specifications, and project requirements with professional competence.
6. Carry out all reporting, documentation, and communication requirements in a timely and efficient manner.
7. Remain stationed at the project Headworks site during the contract period and coordinate all project activities effectively.
8. Monitor overall site activities, safety practices, workforce performance, and progress of works to ensure smooth project operation.
9. Ensure compliance with project safety standards, environmental requirements, and operational procedures at all times.
10. Take immediate action in emergency situations and coordinate with concerned authorities for effective resolution of issues related to tunnel operation and maintenance.

➤ **Mechanical Engineer:**

The involvement of Mechanical Engineer will be in intermittent and will perform in as and when required basis. The Melamchi Diversion Tunnel System is equipped with many mechanical components like gates, pipes, valves and efficient and intact use of such components is most for uninterrupted flow of water through the channel. For certain time, the repair and maintenance of such components are to be carried out and for this purpose, the engagement of qualified and experienced mechanical engineer will be essential. The Mechanical Engineer shall be responsible for timely response in such instances and overall inspection of mechanical components in periodically as agreed with Engineer/Employer.

➤ **Electrical Engineer:**

The involvement of Electrical Engineer will be in intermittently and will perform in as and when required basis. The Melamchi Diversion Tunnel System is equipped with many electro-mechanical components like Diesel Generators, Control Panels, and efficient and intact use of such components is most for uninterrupted flow of water through the channel. For certain time, the repair and maintenance of such components are to be carried out and for this purpose, the engagement of qualified and experienced mechanical engineer is essential. The Electrical Engineer shall be responsible for timely response in such instances and overall inspection of electro-mechanical components in periodically as agreed with Engineer/Employer.



➤ **Office administrator:**

The Contractor shall assign a competent Office Administrator for the whole contract period to carry out and assist in all office-related works at the project site. The Office Administrator shall be responsible for the following duties and responsibilities:

1. Manage and coordinate all office-related administrative works at the site office in an organized and efficient manner.
2. Ensure timely fulfilment of all logistical and office support requirements necessary for smooth project operation.
3. Assist in preparation, compilation, and timely submission of all reports, records, and documents as required under the contract.
4. Maintain proper filing, documentation, correspondence records, and office data in systematic and organized manner.
5. Coordinate communication between the Contractor, Employer, Engineer, and other concerned stakeholders regarding office and administrative matters.
6. Ensure proper maintenance, cleanliness, and management of the site office and office facilities.
7. Maintain records of manpower attendance, office inventories, materials, equipment, and other administrative documents.
8. Support the Project Manager and other technical staff in office coordination, document preparation, and administrative activities.
9. Ensure availability and proper management of office supplies, stationery, communication facilities, and other logistic requirements.
10. Remain stationed at the melamchi Site Office during the contract period and coordinate all office-related activities effectively.
11. Handle site office maintenance issues and ensure smooth operation of office equipment, utilities, and facilities.
12. Maintain confidentiality and proper security of all official project documents and records.

➤ **Electrician/Plumber:**

- **Electrician:** he should have experienced and knowledge to handle electrical power supply, lightning, control panel, motors and other electrical equipment to operate the system of electrical supply.
- **Plumber:** He should have experienced and knowledge in connection of pipes, gate valves and other sanitary and water supply works.

➤ **Technical Manpower (Civil Sub Engineer):**

- Technical Manpower should be well trained and experienced in the respective field. He/she should follow the instruction of Engineer, Project Manager and senior person.



- The Technical Manpower shall be responsible for regular monitoring of tunnel pressure, maintaining hourly pressure sheet, discharge monitoring and supervision of civil construction activities and other works as per the instruction of engineers. Also carry out timely response in critical instances and overall construction in periodically as agreed with Engineer/Employer.

➤ **Unskilled manpower:**

- Assist to the Technical Personnel and the Supervisor and maintaining cleanliness of the adit, camp and construction site as per the instruction of the engineers.
- The unskilled personnel shall be deployed to all the sites (Sundarijal, Sindhu, Gyalthum, Ambathan-camp & Adit, Headworks, Melamchi Camp etc.) as per the requirement of the engineers/Client depending on the nature of work to be executed.

Requirement of manpower is shown in the following Table:

S. N.	Description	Melamchi Pul Bazar	Ambathan	Head works	Gyalthung	Sindhu	Sundarijal	Bahune pati	Total	Remarks
1	Project Manager	-	1	-	-	-	-	-	1	Responsible for all site but base station is Ambathan
2	Mechanical Engineer intermittent	-	1	-	-	-	-	-	1	
3	Electrical Engineer intermittent	-	1	-	-	-	-	-	1	
4	Electrician/ instrumentation/ Plumber	1	1	-	-	-	-	-	2	
5	Technical Manpower	-	1	1	1	1	1	-	5	
6	Unskilled manpower	-	1	3	2	2	1	-	9	One in each shift
7	Office manager/ Administrator	-	1	-	-	-	-	-	1	
8	Camp Support Staff	3	2	-	1	1	1	-	8	
9	Security guard	2	2	2	2	2	2	2	14	One in each shift
10	Heavy Equipment (Excavator/			1					1	







Wheel Loader etc.) Operator									
Total	6	11	7	6	6	5	2	41	

The Qualification and Experience of Key Personnel shall be as follows:

SN	Position	Required No.	Academic Qualification [When position demands]	Total Work Experience [Years]	Experience in Similar Works [years]
1.	Project Manager	1	BE Civil	6	4
2.	Mechanical Engineer	1	BE Mech	5	3
3.	Electrical Engineer	1	BE Electric	5	3
4.	Electrician	1	Experience in related field	5	3
5.	Plumber	1	Experience in related field	5	3
6	Technical Manpower	5	Diploma in Civil Engineering	3	1
7	Office manager/ Administrator	1	+2/ Intermediate level in any field	3	2

Apart from these aforementioned, the Contractor may deploy other additional manpower for smooth operation and management of contract works effectively.





5. Vehicle 4 WD:

The Contractor shall provide one numbers of 4 WD Jeep/Pickup (Hilux or equivalent) vehicles for use in contract works throughout the contract period, including all associated costs such as driver salary, fuel, repair, maintenance, insurance, taxes, and other operational expenses. The vehicles shall be used as per project requirement and Engineer's instruction.

The responsibilities and requirements shall include the following:

1. One number of 4 WD Jeep/Pickup vehicles shall be provided in good operating condition throughout the contract period.
2. The vehicle shall be stationed at Ambathan Site and shall be mobilized to all working sites as per project requirement.
3. The vehicle shall be used for transportation of personnel, fuel, materials, equipment, inspection works, and other contract-related activities (up to KTM).
4. All operation costs including driver, fuel, servicing, repair, maintenance, insurance, taxes, and spare parts shall be borne by the Contractor.
5. The vehicle shall remain under the control and instruction of the Engineer/Client for official project-related works.
6. Vehicle movement and use shall be carried out based on instruction and requirement of the Client/ Engineer and project management team.
7. Proper vehicle log sheets shall be maintained regularly and verified/signed by the Engineer or authorized representative.
8. The Contractor shall ensure availability, reliability, and proper condition of vehicles at all times during the contract period.
9. In case of breakdown or maintenance, the Contractor shall arrange immediate (within one day) replacement to avoid interruption of project activities.
10. Payment shall be made as per BOQ under vehicle-month basis in accordance with the contract provisions.

6. Motorbike:

The Contractor should make provision of three number of motorbikes for the use in contract works including all the cost associated with fuel, repair & maintenance all complete. These Motorbikes will be exclusively used for the project sites at Headworks, Sindhu, Gyalthum and at the places instructed by the Er/client.

Payment modality will be as per BOQ in vehicle-month and signed log sheet from the respective users and verified by Er/client.

7. Chain Block of Capacity of 10 tonne

The main function of Chain block is for lifting platform. The features of the product include:

- Standard Lift: 3m, 9m
- Packaging Type: Box
- Load Chain Size: 6.3mm-10mm
- Hand Chain Size: 5mm-6mm
- Effort: 30 kg -39kg

8. PTZ 360 Camera:

PTZ is an abbreviation that stands for pan-tilt-zoom. This includes 25 times optical zoom camera that allows for closer viewing of subject in expansive areas up to 50m IR range which ensures safety at night. This shall be water and dust resistant (IP 66) with 4MP resolution of high-quality imaging so that every detail can be viewed with vivid clarity and a pixilated video feed can be avoided. The camera rotates 360 degrees horizontally and rotates 120 degrees vertically. The mobile phone can control the rotation angle of the gimbal and see the direction you want to see.

9. Monthly Progress Report:

The Contractor should submit a Monthly Progress report on a regular basis within the 7 days of next month. The MPR, amongst others should contain Current site issues, Site progress, review of previous target and future plan of work activity, photographs, resources available/required etc.

10. Camp support and Facilities:

For the smooth running and maintenance of office/project camps, the Contractor is required to supply and provide following manpower and consumables as listed below

Melamchi Water Supply Project

Tunnel Operation and Maintenance Work



Camp Facilities

Item No	Description	Specifications	Quantity	Unit	Rate (NPR)	
1	Watercase	Mineral Water Bottle 1 Ltr.	10	Case		
2	Handwash dettol	200 ml	5	bottle		
3	Floor cleaner liquid	1ltr	5	bottle		
4	Odonil	pack of 4	2	packet		
5	Toilet paper (10 pcs in a pack, 3ply)	packet	3	packet		
6	Tissue paper (100 pulls)	Premium Facial Box Tissue 100 Pulls 200 Sheets - Pack Of 6	5	pack		
7	Harpic	Harpic Original 1 lit	5	bottle		
8	Colin Glass and Multisurface Cleaner	500 mL	5	bottle		
9	Room air freshner	220ml	4	canister		
10	Baygon	400ml	3	canister		
11	Dish wash soap with lemon fragrance	150gm	5	pack		
12	Kitchen towel, (Best Quality 100% Cotton)	(17 X 17 Inch)	4	pcs		
13	Broom/Jhadu/Kucho	Jhadu/Kucho	3	pcs		
14	Spin Mop Handle and Refil	Stainless Steel Pole Spin Mop Extendable Handle 360 Degree Rotating Floor Cleaning Mop	3	pcs		
15	Toilet brush		2	pcs		
16	Phenol	White Phenyl 1 ltr Lemon Fragrance 1 lit	5	pcs		

[Signature]

[Signature]

[Signature]

17	Detergent	Detergent Powder 1 Kg Fragrance that leaves clothes smelling fresh	10	kg		
18	Bathing soap containing moisturing ingredients	125 gm	4	pcs		
19	Washing Laundry soap	200 gm	10	pcs		
20	Gas cylinder, Refill	14.2 kg cylinder	2	nos.		

Above listed items to be provided at Melamchi pul bazar & Ambathan site Camp as per engineer's/Client instruction.

The personnel provided by the Contractor shall be of good moral and ethical value. They should be cooperative in nature and sociable amongst others. The person not conducting good manners shall be subject to immediate replacement.

The consumables supplied by the Contractor should be of good quality and acceptable standard.

11. Supply of Diesel:

The Contractor should supply the diesel at various sites of the project for diesel generator, office site vehicle/s and other required works during the contract period for the smooth operation of the project as per the requirement with the prior approval of Client's authorized representative.





SECTION VI
WORKS REQUIREMENTS
SPECIFICATION

1- INTRODUCTION



Table of Contents

1	INTRODUCTION	Error! Bookmark not defined.
1.01	Description of the Works	1
1.02	Standards	1
1.03	Materials	3
1.04	Workmanship	3
1.05	Work Scheduling and Programming	3



1 INTRODUCTION

1.01 Description of the Works

Description of works is described in Scope of Works.

1.02 Standards

All materials used in the Works shall generally be of standard quality available in Nepal and, except where otherwise specifically instructed or where specific standards are referred to, comply with any of the current issues of the relevant Standards and Codes of Practices published by the following internationally recognised organisations:

ASTM	The American Society of Testing of Materials
ACI	The American Concrete Institute
BS	The British Standards Institute
DIN	The German Institute for Standardisation
EN	European Standards
IS	The Indian Standards Institute
ISO	The International Organisation for Standardisation
ITA	International Tunnelling Association
NS (Nepal)	The Nepal Bureau of Standards and Metrology

Where proprietary standards are specified, similar standards from other organisations will be permitted only with the advance approval of the Engineer.

Particular standards based on the particular work areas referring to their specification titles are listed below.

In the event of any of these standards having been withdrawn and updated, the relevant updated standard shall apply.

The following standards shall apply to all works, but for ease of presentation is listed according to the Specification Section where they are most likely to be relevant.

Wherever "relevant standards" are referred to in the Specification, the standards listed below shall take precedence over any other relevant standards.

Specification 3 -Earthworks

- 1.02 Standards
BS 1377 Methods of Test of Soils for Civil Engineering Purposes.
BS 6100 Glossary of Building and Civil Engineering Terms.

Specification 4 - Concrete

- ASTM C33 Standard Specification for Concrete Aggregates
ASTM C40 Standard Specification for Organic Impurities in Fine Aggregates for Concrete
ASTM C138 Unit Weight, Yield, and Air Content (Gravimetric) of Concrete
ASTM C173 Air Content of Freshly Mixed Concrete by Volumetric Method
ASTM C231 Standard Test Method for Air Content of Freshly Mixed Concrete by Pressure Method
ASTM C232 Standard Test Method for Bleeding Concrete
ASTM C260 Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C494 Standard Specification for Chemical Admixtures for Concrete
ASTM C618 Standard Specification for Fly-Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture in Portland Cement Concrete
BS 12 Specification for Portland Cements
BS 812 Testing Aggregates
BS 1370 Specification for Low Heat Portland Cement
BS 1881 Testing Concrete
BS 3148 Methods for Test of Water for making Concrete
BS 3892 Pulverized Fuel Ash
BS 5072 Concrete Admixtures
NBC 105-94 Seismic Design of Buildings in Nepal

Specification 5 - Concrete Ancillaries

- BS 12 Specification for Portland Cements
BS 882 Specification for Aggregates from Natural Sources for Concrete
BS 8666 Specification for Carbon Steel Bars for the Reinforcement of Concrete
BS 4466 Specification for Scheduling, Dimensioning, Bending and Cutting of Steel Reinforcement for Concrete

Drawings to be prepared by the Contractor (All Specification Sections)

The Contractor shall prepare and submit for the Engineer's approval working drawings for both the permanent and temporary works including the bar cutting & bending schedules in Drawings to be prepared by the Contractor shall be prepared using the latest, mutually agreed, version of AutoCAD and submitted to the Engineer both in hardcopy and auto-CAD format.

Issued for Tender

1.03 Materials

As soon as practically possible after the Contract has been awarded, the Contractor shall submit to the Engineer a list of the suppliers from whom he proposes to purchase the materials necessary for the execution of the Works.

Samples or details of all materials proposed for use in the Works, whether from an outside supplier or supplied by the Contractor from his own resources shall be submitted to the Engineer. If required by this Contract, testing of the materials shall be performed prior to the delivery of the materials to Site. The Contractor shall provide the samples and the testing required for approval of materials free of charge.

All material supplied for use in the Works shall conform, within the specified tolerances, to the quality of the approved samples, which will be retained at the Engineer's office until the completion of the Contract. Where the requirements for any materials are not stated in this Specification, the material shall conform to such other specification as the Engineer may approve.

Unless specifically stated otherwise, any reference in this Specification or on the Drawings to trade names or to a particular manufactured product does not imply that the article or the product is the only one that may be supplied or used. Any reference so made is purely given as a standard of the quality, class, type, and finish of the items specified to be used. Articles or products of equivalent or higher quality produced by other manufacturers may be submitted by the Contractor to the Engineer for approval for use.

All materials including concrete additives to be used in structures in contact with water downstream of the intake shall be suitable and safe to be used in potable water systems.

Stock of all essential materials at all sites shall be replenished at least 1 month before running out of the current stock of the respective essential material.

1.04 Workmanship

Methods of work and workmanship shall be such that all works completed or in progress will meet the requirements of the Contract. All work shall be subject to the approval of the Engineer, but such approval shall not relieve the Contractor of any obligation or responsibility under this Contract.

1.05 Work Scheduling and Programming

The Contractor shall, in accordance with the Conditions of Contract, submit to the Engineer a Programme for the execution of the works. The Programme shall be prepared using Microsoft Project or similar project programming software approved by the Engineer.

The Contractor is to employ on Site a full-time qualified planning engineer, experienced in the use of the programme referred to above, to closely monitor progress and make all necessary revisions to the programme for the execution of the Works.



SECTION VI
WORKS REQUIREMENTS
SPECIFICATION

2- GENERAL ITEMS AND PRELIMINARIES

Table of Contents

2	GENERAL ITEMS AND PRELIMINARIES	Error! Bookmark not defined.
2.01	General Requirements	Error! Bookmark not defined.
2.02	Infrastructure	2
2.03	Requirements on Social Issues, Occupational Health and Bio-Physical Environment	7
2.04	Mobilization and Demobilization	16



Issued for Tender

2 General Items and Preliminaries

2.01 General Requirements

2.01.01 General

This Specification Section refers to the technical requirements in general and to particular specified requirements in respect of the Works.

These matters include those of a preliminary nature in connection with mobilisation and also, with demobilisation, together with all other activities of the Contractor on fulfilling his obligation to design (to the extent provided for by the Contract), execute and complete the Works including the remedying of any defects therein in accordance with all the provisions of the Contract, and for services, facilities, Temporary Works, testing and other obligations.ther Contract documents.

The Contractor shall only work within the site boundaries or as otherwise directed by the Engineer.

The Contractor shall generally pay attention and provide assistance to all the Employer's and Engineer's staff in the execution of their duties under the Contract and according to the specifications.

2.01.02 Security in the Melamchi Valley

Civil unrest and insurgency has occurred in Nepal and the Melamchi valley in resent years. All parties to the Contract acknowledge the prevailing security situation in the project area.

The Contractor shall fully co-operate with the Employer and the Engineer and shall comply with the required security procedures of the Security Authority in the execution of the Contract that may include but shall not necessarily be limited to:

- (i) security associated with protection of temporary and permanent facilities of the project and of the project personnel and workers.
- (ii) restriction of movements or removal from the Contractor's work force of certain personnel and/or, workers if identified to be necessary by the security forces from security point of view.

Day to day security arrangements in the Melamchi Valley will be made following close consultations and coordination between the Security Authority, the Employer's representative and Contractor at the site.

The Contractor shall be responsible for co-ordinating his contract activities within the Security Authority procedure prevailing at the time and shall perform the regular site security work as prescribed in the Specification.

The Contractor shall appoint a separate Security Coordination Officer for the responsibility of dealing with all security incidents and preparing Security Incident Reports on a standard approved report format. Security Incident Report shall be

Issued for Tender

submitted to the Engineer's Representative and shall be copied to the Employer's Representative as soon as possible but not later than three days of the incident.

The Security Authority shall have free access for lawful checks and searches at all the Contractors premises, whenever and wherever they consider it necessary.

Security Co-ordination Meeting (SCMs) will be chaired by the Employer's Representative and will be attended by the Engineer's Representative and the Contractor who will present the security incident reports and other pertinent security matters that require to be brought to the attention of the meeting. The Employer's Representative may choose to invite the Security Authorities in the Melamchi Valley to attend these meetings. Minutes of the meetings will be

Specified requirements also apply to work other than the Permanent Works. They are classed to distinguish them as obligations the Contractor is expressly required to perform to the extent stipulated in the Specification, Drawings or recorded and prepared by the Engineer's Representative. The prime purpose of the SCMs will be to discuss and resolve how to deal with any present and future security issues that impact on the Contract, and for the Contractor to provide any services, information or advance schedules of his contract activities that the Employer's Representative may deem necessary to assist in providing security. The Contractor's attendance at the SCMs shall be compulsory.

All formal correspondence from the Security Authority will be communicated via the Employer and Engineer and all correspondences from the Contractor regarding security related issues shall be addressed to the Engineer.

Normally there shall be no restriction imposed by the Security Authority on the working hours and on the movement of personnel and equipment within and outside of the working areas. There may, however, be from time to time, restrictions placed on the Contractor's activities.

The Contractor shall issue identification cards to all Contractor's personnel and workers. The format of the identification cards shall be approved by the Engineer.

The Contractor shall all times maintain a complete name list of all his personnel. A copy of the name list shall be made available to the Engineer at any time.

2.02 Infrastructure

2.02.01 Power Supplies and Telecommunication

2.02.01.1 Power

Now Power in Melamchi valley, including Sindhu, Melamchi Pul Bazaar camp, Gyalthum and Ambathan Site has been supplied through 11kV from Melamchi Feeder taken from 66/11 kV sub-station by Nepal Electricity Authority, from Indrawati Power House(NHPC). The Contractor shall be entirely responsible for the provision of sufficient and continuous power to the tunnel adits and construction camps, including all of the Employer's and Engineer's temporary and permanent facilities.

The Employer provides no undertaking or warranty whatsoever for continuity of the power supply to MPB which may be interrupted from time to time. The Contractor shall therefore operate the available diesel generator sets as required to maintain a continuous supply of power. The Contractor shall bear all costs associated with the

Issued for Tender

provision of power to MPB. The contractor shall be liable to the operation, servicing and regular maintenance of the available diesel generators.

2.02.01.2 Telecommunications

The Contractor shall be entirely responsible for the provision of reliable, continuous telecommunications to the tunnel adits and construction camps, including all of the Employer's and Engineer's temporary and permanent facilities. The cost of such is to be allowed for in the sums or rates. The contractor shall submit the monthly payment receipt of internet facilities during the submission of IPC.

Telecommunications shall include telephone and broadband internet access for the exclusive use of the Employer and Engineer. A back-up telephone or radio communication system shall also be provided.

2.02.02 Water Supplies and Waste Management

2.02.02.1 Raw Water

The Contractor shall be responsible for provision of sufficient supply of raw water.

The tunnel adits and camps are located close to rivers, which have historically been perennial, with a large variation in flow from the monsoon period to the dry season. It is assumed that these rivers will provide sufficient raw water for the construction works. The Contractor shall make his own assessment of whether sufficient water is available in the local streams and, if necessary, arrange for an alternative supply.

2.02.02.2 Drinking Water

Sufficient drinking water is required for Contractor's, Employer's and Engineer's staff and their families at all camp facilities. Tapping sources of acceptable water quality can normally provide this, but to safeguard the quality the Contractor shall provide and commission equipment and consumables for continuous chlorination.

There are several potentially suitable water sources throughout the project area but such sources are unlikely to be available for the Sindhu camp and the camps in the main Melamchi Valley. If these sources prove to be insufficient for the drinking water requirements, then the Contractor shall obtain alternative supplies (e.g. Melamchi River) and provide necessary water treatment facilities and treat the raw water to appropriate potable water standards.

2.02.02.3 Waste

Waste must be handled and disposed of according to its nature and potential negative impacts. All waste generated by the project must be disposed off in a manner appropriate to its classification and in accordance with clause 2.03.06.

2.02.02.4 Sewerage

Sewage handling and disposal systems shall be established by the Contractor for all sites. (Doesn't include construction of new sewerage network).

2.02.03 Maintenance of adit access roads.

For the duration of the Contract the Contractor shall maintain all the four adit access roads - Sundarijal, Sindhu, Gyalthum and Ambathan / Headworks). This includes

Issued for Tender

the removal of landslides, slope maintenance, cleaning of drainage ditches, cut-off trenches, culverts, road furniture etc. and grading / regravelling / repair of damaged surface of the roads. It also includes both routine maintenance as described above and periodic maintenance, the latter including re-gravelling of the road surface with approved material and re-cutting of drains, all to the satisfaction of the Engineer.

The adit access roads are public roads and the Contractor shall cooperate with local road authorities concerning diversion and maintenance works.

Immediately prior to the Time for Completion of the Works the Contractor shall rehabilitate the adit access roads to the same standard they were in at the start of the Contract.

A joint survey by the Engineer and Contractor shall be conducted at the commencement of the Contract and immediately prior to completion of the Contract to demonstrate compliance with this requirement.

2.02.04 Camp facilities

The Contractor shall operate and maintain the camp facilities in good order and to the satisfaction of the Engineer.

Immediately prior to the Completion of the Works a general refurbishment of all the facilities shall be carried out. This includes redecoration and upgrading / replacement of the technical installations for buildings, upgrading of camp roads, water and sewage supply, power supply and reticulation system, telecommunication system etc. so as to hand back the facilities in the same condition as at the commencement of the Contract.

Construction, operation and maintenance of the Contractor's facilities shall be part of the general obligations of the Contractor and they shall, be constructed on a temporary basis and unless otherwise directed by the Engineer, removed immediately after the time of the Taking-Over Certificate for the Works.

2.02.05 Laboratories

For laboratory tests the tests shall be performed at an approved Laboratory in Kathmandu/Melamchi or elsewhere as agreed with the Engineer. The cost for testing is Provisioned as Provisional Sum which shall be paid as per actual cost.

All tests shall be conducted with prior notice served to the Engineer for the Engineer's Representative to be present during the test. The Engineer shall be given full access to the laboratory/field test operations throughout the Contract Period.

2.02.06 Camps Accommodation/Housing facilities for the Employer and Engineer at adits

All the facilities at the adit camps for the Employer and Engineer shall be operated and maintained by the Contractor. This includes 24 hour utilities (water, electricity, telecommunications including broadband internet access, etc.), disposal of solid waste and maintenance of sewage works, roads etc.

Issued for Tender

The Contractor shall include for the care and maintenance of the buildings themselves including their equipment such as water heaters, fans and air conditioners, plumbing and electrical works, furniture etc. The services shall include cleaning of the houses, offices and ancillary buildings, as well as laundry services for both communal and personal laundry.

The Employer and Engineer will also have resident staff at the adits and camp facilities shall be available at each of the adits as laid out below.

2.02.06.1 Sindhu Camp

The Contractor shall maintain these types of houses (see Drawing A399-26T20) for accommodation for the sole use of the Employer's and Engineer's staff:

Type IV house:	9 No.
Type V house:	4 No.

2.02.06.2 Gyalthum Camp

The Contractor shall maintain these types of houses (see Drawing A399-26T20) for accommodation for the sole use of the Employer's and Engineer's staff:

Type IV house:	9 No.
Type V house:	4 No.

2.02.06.3 Ambathan Camp

For the sole use of the Employer's and Engineer's staff the Contractor shall maintain these types of houses for accommodation:

Type B house:	1 No.
Type "Operators house":	7 No. (Note: double houses)

Issued for Tender

The houses, Kitchen/canteen/recreation facilities at all Sites shall be furnished and equipped.

The office local area network (LAN) shall be linked to a telecommunications facility to provide 24hr broadband internet access to all workstations.

Immediately prior to the Time for Completion of the Works a general refurbishment of all the facilities shall be carried out. This includes redecoration and upgrading/replacement of the technical installations for buildings, upgrading of camp roads, water and sewage supply, power supply and reticulation system, telecommunication system etc.

2.02.07 Health services for the staff of the Employer and Engineer

The Clinical Health services to be provided by the Contractor shall be made available to the Employer's and Engineer's staff free of charge, this to include for all necessary drugs for the daily preventive doses for tropical diseases and any other drugs prescribed by the nurse and/or doctor.

Furthermore, all personnel working for the Employer and Engineer on Site shall have access to transport if necessary to hospital in Kathmandu/Melamchi. Transportation includes all modes of transport including air-transport in case of emergency. Helicopters shall also be used if available and in urgency.

2.02.08 Vehicle services for the staff of the Employer and Engineer

The Contractor shall provide and maintain 4 WD vehicle for the exclusive use of the Employer and the Engineer. The Contractor shall provide fuel, driver, operation and maintenance and bear all ancillary costs for providing vehicles in good and serviceable condition. An annual average driving distance of 30,000 km per car shall be assumed.

In case, any of the vehicles provided remain out of service due to lack of repair & maintenance, unavailability of the driver or any other default of the Contractor for a period of more than 1 day, the Contractor shall arrange a replacement vehicle immediately. Should the Contractor fail to provide such a replacement, the applicable payments will be deducted and the Employer may arrange the replacement vehicle at the cost of the Contractor.

Issued for Tender

2.02.09 Access/transport to all sites

The Employer and Engineer shall be allowed access to all sites at any time for inspection and observation of both temporary works and permanent works. The Contractor shall provide transport for the Employer and Engineer to and from any part of the site when so requested. This is especially important for transport in the tunnel where rail-bound equipment may be used. Access and transport shall be provided so the Employer/Engineer can perform their tasks.

2.02.10 Attendance upon other contractors

The general obligations of the Contractor include planning the interface schedule and working with the Works of other contractors if any.

Sub-contractor or nominated sub-contractors are to be part of the Contractor's Personnel, i.e. general obligations such as accommodation, transportation, dispensary, recreation etc. is also included as Contractor's responsibility as if they were within the Contractor's own organisation. Any future operators to be nominated to the Contractor shall also be accommodated by the Contractor.

2.02.11 Dayworks

Work shall not be executed as Daywork except by written order of the Engineer. Payment of work to be carried out on a Daywork basis will be made at the rates entered in the Daywork Schedules for furnishing the respective classes of labour, plant and/or equipment and materials.

The Contractor shall carry out all Daywork within normal working hours from 6 a.m. to 6 p.m., unless the Engineer has given written approval to work outside these hours.

2.03 Requirements on Social Issues, Occupational Health and Bio-Physical Environment

2.03.01 Scope

This Specification Section covers the requirements on social issues, Occupational Health and Safety, and Biophysical Environment to be taken due account of by the Contractor in the Works and under the Contract. The obligations herein do not prejudice any other clauses in the Specification and the General Conditions.

The Contractor shall include in his planning contingencies for general environmental and social issues which are likely to arise under the construction works, ref. Conditions of Contract.

2.03.02 General

Unless specifically stated otherwise, the Contractor shall comply with the Statutory Regulations in force in Nepal regarding occupational health, environmental protection and waste disposal and shall liaise with the responsible national and local authorities. Where no Nepalese statutory regulations are in force, and no regulations are specified in this Contract, internationally accepted Good Practice is required.

For those of his activities which have, or are likely to have, an impact on the local community, occupational health and safety of the workforce, and on the physical


Issued for Tender

and biological environment, the Contractor shall establish a credible monitoring and reporting system, and keep adequate records relating to:

- Social issues
- Occupational health and safety
- The physical and biological environment

The Contractor shall afford the officials of the relevant regulatory authorities' free access to inspect records and reports, the project site, plant, workshops and the like to check whether the provisions in the relevant Statutes are being complied with.

Contractor's staff and immediate family means: spouse and children.

2.03.03 Social Requirements

(a) Grievance Committee

Some misunderstandings, complaints and conflicts of interests are inevitable on a large project such as this. The Contractor shall establish and publicise a Grievance Committee for the project. The Public Relations Officer shall be the secretary for the Committee.

The Grievance Committee shall deal with complaints and social problems in a fair and efficient manner and benefit all parties involved by avoiding escalation of conflicts and unnecessary delays, recourse to the courts and administration. The Committee shall include all the major stakeholders such as the Contractor's senior management, the Engineer, representatives from the workers, and surrounding communities (VDCs, represented by Local Consultative Groups (LCGs)). The Committee shall not be permanent, but shall meet as the need arises. The proceedings of the meetings shall be properly documented and reported in terms of meetings held, issues discussed, agreements reached, and actions taken.

(b) Compensation procedures

The Contractor shall review and as a minimum adhere to the relevant regulations and policies regarding compensation for damage to local property. The Contractor's attention is drawn to the content of the Resettlement Plan of the Melamchi Water Supply Project.

No clearance or construction activities will be allowed before affected landowners have been duly compensated.

Buildings close to adits, spoil tips, roads and other construction sites, which might be damaged by vibrations caused by the project, shall be surveyed/inspected before construction activities to avoid illegitimate claims and demands from third parties being placed on the project.

(c) Food supply

  
Issued for Tender

The Contractor shall prohibit hunting, fishing and collection of firewood for all Contractor's Personnel and ensure that Contractor's Personnel does not purchase local wildlife, fish and firewood.

(d) Security and crime

The Contractor shall be responsible for his external and internal security arrangements. Adequate security shall be established to prevent theft and robbery of project material, equipment, arms and explosives. The Contractor is fully responsible for all Contractor's Personnel and also responsible for preventative measures against crime for workers after working hours. Security arrangements in villages that may be negatively impacted by construction activities shall be discussed and established in co-operation with local village leaders.

(e) Girl-trafficking

The Contractor is responsible to prevent any involvement of Contractor's Personnel in the practise of girl-trafficking. In case of violations, personnel involved shall immediately be dismissed by the Contractor.

The Contractor agrees to insert and enforce this Clause in all sub-contracts which involve the Works.

(f) Child labour

The Contractor is required to fully comply with the conditions in the International Convention on Child Labour.

The Contractor agrees to insert and enforce this Clause in all sub-contracts which involve the Works.

(g) Occupation of land around Contractor's camps and facilities

Public and non-project related personnel may be attracted to the vicinity of the Contractors camps and facilities. The Contractor shall be responsible for actively discouraging and preventing establishment of non-project related dwellings, businesses and similar activities around his camps and facilities. The Contractors shall take reasonable steps to maintain the areas surrounding his camps and facilities in their original condition and without occupation by unauthorised personnel.

2.03.04 Occupational Health and Safety (OHS) Requirements

(a) Clinical health services available

The Contractor shall provide first-line qualified medical assistance located no more than half an hours' travel time from each major construction site or work area for the benefit of Contractor's Personnel, the Employer's personnel, the Engineer's personnel and their families.

The Contractor shall establish, operate and maintain a health clinic at the main camp and a dispensary and a sick bay at each adit camp. In addition, the Contractor shall ensure that there is an ambulance service from the first-line to second-line medical assistance.

(b) Safety equipment and regulations

The main purpose of this system is to control entry, to have a complete overview of personnel present in such work scenarios at all times, and also ensure that such


Issued for Tender

personnel are fully equipped with safety gear/equipment as stipulated in this Contract. Admittance control shall also be enforced at all other work sites.

The Contractor shall provide adequate Personal Protective Equipment (PPEs), all other safety equipment at site and draw up emergency regulations. Fire prevention and control systems, and electric shock prevention systems, stretchers and first aid boxes, together with rescue facilities, and properly trained personnel should be there to administer these.

The Contractor shall provide hearing protection for all workers working around equipment or at locations with noise levels of 80 dB(A) or more (e.g. heavy equipment, drilling and breaking activities). The Contractor shall make basic safety equipment available, and enforce use of such equipment during all working operations, which may expose workers to occupational health hazards.

The Contractor will field a safety supervisor on a full-time basis for implementation and supervision of safety procedures at site and monitoring of worker's behaviour and activities. Compliance should be maintained with the applicable occupational safety and health standards and with all rules and regulations with respect to the occupational safety and health program.

The Contractor shall provide and maintain safe, sound ropes, slings, pulleys and other lifting tackle; (each² appliance having a valid testing certificate where appropriate).

The Contractor shall install sufficient lighting for the working operations and to prevent accidents and safeguard the health of the workforce. Where workers may be exposed to hazards in case of a light failure/blackout, emergency lights shall be installed.

The Contractor shall provide safety notices written in Nepali, English and any other language in use by his personnel to be erected at points used by the workers or visitors to enter the relevant parts of the Works. These notices shall be in addition to any statutory requirements on the Contractor.

The Contractor shall regularly monitor the amount and concentration of hazardous substances (health hazards, fire hazards or risk of explosions) in the tunnel atmosphere using properly calibrated air quality measuring equipment.

If measurements show that there is a significant risk of health hazards, fire or explosions, equipment for continuous measurement of air quality (gases and dust content) shall be installed by the Contractor. In such cases automatic alarms and automatic shutdown system for electrical equipment and combustion engines shall be installed.

The Contractor shall ensure that all tunnel working areas have sufficient ventilation to keep the concentration of hazardous gases as low as possible, and as a minimum below a level which will represent a health risk for tunnel workers. For NO and CO the maximum permitted value is 25 ppm. The value can be exceeded by 50% for a period of no more than 15 minutes during an 8 hours shift. For NO₂




Issued for Tender

the maximum permitted value shall be a value of 2ppm. The maximum permissible value for CO₂ shall be 5000 ppm.

A minimum oxygen concentration of 19% shall be maintained at all times when persons are at work underground.

Any approval of a method statement by Engineer does not relieve the Contractor from any of his responsibilities as stated in the Conditions of Contract.

2.03.05 Biophysical Requirements

Prevention of water pollution

(a) General

The Contractor's construction activities shall be performed by methods that will prevent entrance, or accidental spillage, of solid matter, contaminants, debris, and other pollutants and wastes into streams, flowing or dry watercourses, lakes, and underground water sources. Such pollutants and wastes include, but are not restricted to, refuse, garbage, cement, concrete, sanitary waste, industrial waste, oil and other petroleum products, aggregate processing tailings and mineral salts.

Turbidity increases in a stream or other bodies of water that are caused by construction activities shall be strictly controlled. Wastewaters from aggregate processing, concrete batching, or other construction operations shall not enter streams, watercourses, or other surface waters without the use of such turbidity control methods as settling ponds, gravel-filter entrapment dikes, approved flocculating processes that are not harmful to fish, recirculation systems for washing of aggregates, or other approved methods

If wells or other water sources are polluted as a result of the Contractor's operations, it is the responsibility of the Contractor to compensate for this and provide the consumers with clean drinking water transported through pipes from an unpolluted source if required in the opinion of the Engineer.

Abatement of air pollution

In conduct of construction activities and operation of equipment, the Contractor shall utilise such practicable methods and devices as are reasonably available to control, prevent, and otherwise minimise atmospheric emissions or discharges of air contaminants.

The emission of dust shall be strictly controlled during the manufacture, handling, and storage of concrete and road aggregates, and the Contractor shall use such methods and equipment as are necessary for the collection and disposal, or prevention, of dust during these operations. The Contractor's methods of storing and handling cement and pozzolans shall also include means of eliminating atmospheric discharges of dust.

Equipment and vehicles that show excessive emissions of exhaust gases due to poor engine adjustments, or other inefficient operating conditions, shall not be operated until corrective repairs or adjustments are made.

Issued for Tender

Burning of materials resulting from clearing of trees and bush, combustible construction materials, and rubbish will be permitted only when atmospheric conditions for burning are considered favourable and when authorised by the Engineer.

(a) Dust abatement

The Contractor shall be held liable for any damage resulting from dust originating from his operations under these specifications on the right-of-way or elsewhere. The Engineer may direct sprinkling or other measures for dust abatement if necessary to obtain adequate control.

(b) Noise abatement

Workers shall be sufficiently supplied with ear protection devices as required in the opinion of the Engineer and instructed in using them. No worker shall be exposed to higher noise levels or for a longer period than as specified by the latest OSHA regulations.

The noise level at any residential location due to any construction activity shall not exceed the following noise levels:

Maximum Noise Levels in dB(A) from Construction Activities¹ in Residential Areas

	Day time ² 6 AM – 7 PM	Evening time 7 PM - 9 PM	Night time 9 PM - 6 AM
Maximum noise level in dB(A) in residential areas	70	65	55

- 1 The table is not applicable for impulsive noise
- 2 For short term activities during day time, the following modifications are applicable:
 - a) For activities with a total duration less than one week, a maximum noise level of 75 dB(A) is acceptable
 - b) For activities lasting less than 2 hours per day a maximum noise level of 75 dB(A) is acceptable

2.03.06 Pesticides, toxic waste and hazardous substances

Pesticides include herbicides, insecticides, fungicides, rodenticides, pesticides, surface disinfectants, animal repellents, and insect repellents. Should the Contractor find it necessary to use pesticides in work areas of this contract, he shall submit his plan for such use to the Engineer for written approval.

The Contractor shall read and comply with all labelling requirements when using pesticides.

Toxic waste must be collected in appropriate containers (depending on the compound) and kept in approved storage. Depending on the compound in question different ways of destruction will be necessary.

It is the responsibility of the Contractor to seek the required permissions to handle substances or compounds that are defined as hazardous, i.e. the Contractor must be up to date on the definitions and regulations pertaining to hazardous substances. These are defined as substances (or compounds thereof) which may endanger

Issued for Tender

health of human, animals or the environment by reason of its toxic, corrosive, irritant, sensitising, inflammable or radioactive nature. Hazardous substances are also such as depletes the ozone layer.

For hazardous substances a permit for the possessing, handling, import etc. is needed. The Contractor must ensure that he obtains the required permits for hazardous substances from a Licensing Officer appointed by the Minister. The Contractor must allow a certified inspector to control the Contractor's handling of hazardous compounds.

Cleanup and disposal of waste materials

(a) Cleanup

The Contractor shall, at all times, keep the construction area, including storage areas, free from accumulations of waste materials or rubbish.

All waste water and sewage from office, residential and mobile camps shall be piped to septic tanks and soakaways or other treatment systems approved by the Engineer. All used fuels, oils, other plant or vehicle fluids, and old tyres and tubes shall be collected to a central disposal point, on a regular basis and disposed of as specified below.

All household, office, workshop and other solid waste shall be collected to a central disposal area, on a daily basis and disposed of in a manner approved by the Engineer.

Servicing of plant, equipment and vehicles shall whenever possible be carried out at a workshop area. This workshop area shall be equipped with secure storage areas for fuel oils and other fluids constructed in such a way as to contain any spillage which may occur, and similar storage where used fluids can be stored securely prior to their disposal.

When servicing of plant, equipment and vehicles is carried out away from the workshop area it shall be done at locations and in such a manner as to avoid spillage and contamination of streams and other drainage courses. Any spillage shall be cleaned up by either burning in place or collecting the contaminated soils and burning them at the central disposal area, all to the satisfaction of the Engineer.

Prior to completion of the work, the Contractor shall remove from the vicinity of the work all plant facilities, buildings, rubbish, unused materials, concrete forms, and other like material, belonging to him or used under his direction during construction. All work areas shall be graded and left in a neat manner conforming to the natural appearance of the landscape as provided elsewhere in the Specifications.

Any residue deposited on the ground from washing out transit mix trucks or any similar concrete operations shall be buried or cleaned up in a manner acceptable to the Engineer.

In the event of the Contractor's failure to perform the above work, the work may be performed by the Employer, at the expense of the Contractor, and his surety or sureties shall be liable therefor.




Issued for Tender

(b) Disposal of waste material

(i) General

Waste materials including, but not restricted to, refuse, garbage, sanitary wastes, industrial wastes, and oil and other petroleum products, shall be disposed of by the Contractor. Disposal of combustible materials shall be by burying, where burial of such materials is approved by the Engineer; by burning, where burning of approved materials is permitted; or by removal from the construction area. Disposal of non-combustible materials shall be by burying, where burial of such materials is approved by the Engineer, or by removal from the construction area. Waste materials removed from the construction area shall be dumped at an approved dump. Disposal of all waste material shall be in accordance with all locally applicable laws and regulations.

(ii) Disposal of material by burying

Only materials approved by the Engineer may be buried. Burial shall be in pits the location, size and depth of which shall be approved by the Engineer. The pits shall be covered by at least 0.6 metre of earth material prior to abandonment.

(iii) Disposal of material by burning

For the burning of wood, approval of the Engineer is required. Burning of wood will only in exceptional cases be approved. Usable wood will be stockpiled along the road alignment for use by the local population.

All materials to be burned shall be piled in designated burning areas in such a manner as will cause the least fire hazards. Burning shall be thorough and complete and all charred pieces remaining after burning, except for scattered small pieces, shall be removed from the construction area and disposed of as otherwise provided in this Sub-Clause.

The Contractor shall, at all times, take special precautions to prevent fire from spreading beyond the piles being burned and shall be liable for any damage caused by his burning operations. The Contractor shall have available, at all times, suitable equipment and supplies for use in preventing and suppressing fires and shall be subject to all laws and regulations locally applicable for suppression, suppression, and prevention of fires.

(iv) Disposal of material by removal

Material to be disposed of by removal from the construction area shall be removed from the area prior to the completion of the work under these specifications. All materials removed shall become the property of the Contractor.

Materials to be disposed of by dumping shall be hauled to an approved dump. It shall be the responsibility of the Contractor to make any necessary arrangements with private parties and with local officials pertinent to locations and regulations of such dumping. Any fees for charges required to be paid for dumping of materials shall be paid by the Contractor and shall be included in the prices bid in the Bill of Quantities for other items of work.

Issued for Tender

2.04 MOBILIZATION AND DEMOBILIZATION

2.04.01 Scope

The work consists of the mobilization and demobilization of the contractor's forces and equipment necessary for performing the work required under the contract. It does not include mobilization and demobilization for specific items of work for which payment is provided elsewhere in the contract.

2.04.02 Personnel, Equipment and Materials

Mobilization shall include all activities and associated costs for transportation of contractor's personnel, equipment, plant and operating supplies to the site required for the Works under the Contract including Dayworks as listed out in the Bill of Quantities. It shall also include complete assembly, in working order, of the Contractor's equipment and plants and all personnel services and preparatory works such as clearing and preparation of the Contractor's work area, establishment of other necessary general facilities for the contractor's operations at the site, etc. for the commencement and performance of Works.

Demobilization shall include all activities and costs for transportation of personnel, equipment, and supplies from the site once all the Contractual requirements have been fulfilled or all the relevant work items under the Contract have been performed and accepted by the Engineer. This includes the disassembly; removal; and site cleanup of offices, camps, and other facilities assembled on the site specifically for this contract as instructed by the Engineer and also general clean-up; housekeeping and disposing of all garbage, night soils, and waste needed to restore a neat and orderly project site.

The minimum list of equipment to be mobilized at site for the execution of the Works (in addition to those listed under the Dayworks) are as follows:

- Hydraulic Excavator (10 Numbers)
- Hydraulic Excavator with Breaker attachment (4 Numbers)
- Loader (4 Numbers)
- Tipper / Dump Truck (24 Numbers)
- Dozer (1 Number)
- Vibratory Roller (1 Number)
- Plate Compactor/ Power Rammer (2 Numbers)
- Motor Grader (1 Number)
- Tractor with rotavator/ripper attachment (1 Number)
- Air Compressor with Hoses (2 Numbers)
- Jack Hammer and Steels /Rock Drill with Drill Rods & Bits (12 Numbers)
- Wheel-barrows (12 Numbers)
- Crow-bar (20 Numbers)
- Mattock (10 Numbers)
- Spade/Shovel (50 Numbers)
- Baskets (Doko/Thunse)
- Total Station (1 complete Set)
- Survey Level Machine (1 complete Set)




Issued for Tender

- Generators
- Diesel Tank
- Dewatering Pumps

There should be an uninterrupted supply of spare parts at the site for the operation and maintenance of each equipment.

The minimum list of Personnel to be mobilized at site for the execution of the Works (in addition to those listed under the Dayworks) are as follows:

- Project Manager
- Deputy Project Manager / Site Incharge
- Chief Engineer
- Civil Engineers – At least 3 Engineers should be present for each shift at Site
- Senior Surveyor
- Safety Incharge/Officer
- Safety Supervisors
- Surveyor
- Survey Assistant
- Manual Labors
- Heavy Equipment Operator
- Electricians/ Plumber
- Mechanics
- Office Administrator

The Personnel should be sufficient in number and adequate in competency to perform the works within the intended time of completion as per the technical and safety standards. The man-power, equipments and site arrangements should be so managed that there is no interruption of equipment operation and 24/7 work process at the site. The items under Dayworks as and when needed should be mobilized as per the instructions of the Project Manager within the time notified by him.

Issued for Tender

SECTION VI
WORK'S REQUIREMENTS
SPECIFICATION
3- EARTHWORKS



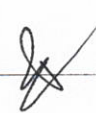

Issued for Tender

Table of Contents

3	EARTHWORKS	Error! Bookmark not defined.
3.01	Scope	Error! Bookmark not defined.
3.02	Definition And General Requirements	1
3.03	Classification Of Excavated Materials	2
3.04	Explosives And Blasting	3
3.05	Excavation For Foundation.....	5
3.06	Refilling Of Foundation Pits And Trenches, Removal Of Supports And Filling To Structures.....	7
3.07	Forming Of Embankment And Others Areas Of Fill.....	8
3.08	Measurement.....	9
3.09	Payment.....	10

Issued for Tender

3. EARTHWORKS

3.01 SCOPE

This Section covers the works related to the roadway excavation, roadway filling, excavation for foundation, backfilling, excavation for drains, channels, intercepting drains etc.

3.02 DEFINITIONS AND GENERAL REQUIREMENTS

1. Earthwork includes two types of operations i.e.

- (i) Earth excavation and disposal of the excavated materials.
- (ii) Earth excavation and use of excavated materials. The use of excavated material may be in the form of filling embankment, backfilling, filling other areas as required.

Earth excavation and disposal implies excavation of all types of materials including part of the structures below ground level within and outside of the limit of the right of way except for otherwise specified, shaping the exposed surface of excavation as specified or directed by the Engineer, removal, hauling and disposal of the excavated material at the locations and in the manner as specified or directed by the Engineer.

Excavation and filling implies excavation of materials and shaping the exposed surface of excavated as stated, removal hauling and use of the excavated material at the location and in the manner as specified or directed by the Engineer. Excavation and disposal shall include:

- i. Excavation and disposal of any type of material included on the Drawing.
- ii. The excavation and disposal of existing surfacing.
- iii. Excavation and disposal of slides, breakages and caving-ins.
- iv. Excavation and disposal for stream channel, trenches and drains etc.
- v. Excavation required in cuts or under embankments below the lowest normal limit of excavation as indicated on the Drawing or below ground line.
- vi. Excavation and disposal of unsuitable materials.
- vii. Removal or partial removal of existing embankments and disposal of the materials as shown on the Drawing or as directed by the Engineer.
- viii. Excavation for foundation and disposal of materials. Excavation and filling shall include:
 - I. Filling for embankment
 - II. Filling for guide bunds, coffer dams, etc.
 - III. Backfilling in trenches, foundation pits etc.
 - IV. Any type of other filling or backfilling whereby the ground level is raised or a hole is filled up.

2. The following definitions of earthworks materials shall apply to this and other Clauses of these specifications, if otherwise not specified.

3. No excavated suitable material other than surplus to requirements of the contract shall be removed from the site except on the direction of the Engineer. Should the Contractor be permitted to remove suitable material from Site to suit his operational

Issued for Tender

procedure, then he shall make good at this own expense any consequent deficit of filling arising therefrom.

4. Material in surplus to the total requirements of works, and all unsuitable material shall, unless the Engineer permits otherwise, be run to spoil dumps.
5. Where the excavation reveals a combination of suitable and unsuitable materials the Contractor shall carry out the excavation in such a manner that the suitable materials are excavated separately for use in the works without contamination by the unsuitable materials.
6. The Contractor shall make his own arrangements for the stockpiling of top-soil and/or suitable material.
7. At all times the Contractor shall ensure that earthworks are not damaged by weather or traffic. In event of such damage, the Engineer may withdraw approval from the affected works until the Contractor has carried out repairs to restore the works to their original condition. The cost of all such repairs and any additional testing shall be borne by the Contractor.
8. Prior to commencement of any earthwork, the work shall be set out where required as specified following the clearing and grubbing as per Section and survey of the existing ground shall be conducted jointly by the Contractor and the Engineer. The survey records shall serve as initial measurements for the determination of the final quantities of earthwork performed under the contract.
9. Works on embankments and/or cutting in areas required for the construction of bridges and other structures shall not be carried out until the Engineer agrees that construction of such structures is sufficiently advanced that there is no interference or damage to them.
10. The Contractor shall get approval of the Engineer in respect of method of earthwork, type of equipment to be used, disposal and other details before commencement of the earthwork.

3.03 CLASSIFICATION OF EXCAVATED MATERIALS

The excavated materials shall be classified under the following categories. The decision of the Engineer in respect of the classification of excavated materials shall be the final and binding upon the Contractor.

Classification:

All materials involved in excavation shall be classified by the Engineer in the following manner:

(1) Soil

This shall comprise topsoil, turf, sand, silt, loam, clay, mud, peat, black cotton soil, soft shale or loose moorum, a mixture of these and similar material which yields to the ordinary application of pick, spade and/or shovel, rake or other ordinary digging implement. Removal of gravel or any other nodular material having dimension in any one direction not exceeding 75 mm occurring in such strata shall be deemed to be covered under this category.

Issued for Tender

(2) Ordinary Rock (not requiring blasting)

This shall include:

Rock types such as laterites, shales and conglomerates, varieties of limestone and sandstone etc., which may be quarried or split with crow bars, also including any rock which in dry state may be hard, requiring blasting but which, when wet, becomes soft and manageable by means other than blasting; macadam surface such as water bound and bitumen/tar bound; soling of roads, paths etc. and hard core; compact moorum or stabilized soil requiring grafting tool or pick or both and shovel, closely applied; gravel and cobble stone having maximum dimension in any one direction between 75 and 300 mm; lime concrete, stone masonry in lime mortar and brick work in lime/cement mortar below ground level, reinforced cement concrete which may be broken up with crow bars or picks and stone masonry in cement mortar below ground level; and bounders which do not require blasting having maximum dimension in any direction of more than 300mm, found lying loose on the surface or embedded in river bed, soil, talus, slope wash and terrace material of dissimilar origin.

(3) Hard Rock (requiring blasting)

This shall comprise:

- (i) any rock or cement concrete for the excavation of which the use of mechanical plant and/or blasting is required;
- (ii) reinforced cement concrete (reinforcement cut through but not separated from the concrete) below ground level; and
- (iii) Boulders requiring blasting.

3.04 EXCAVATION FOR FOUNDATION

1. Slope

Excavation shall consist of the removal of material for the construction of foundations for drainage structures, retaining walls, head walls, cut off walls, culvert, bridges and other similar structures to the lines and dimensions shown on the Drawing or as instructed by the Engineer in accordance with the requirements of these specifications. The work shall include construction of the necessary cofferdams and cribs and subsequent removal of all necessary sheeting, shoring, bracing, diversion of water/flow, draining and pumping, the removal of all logs, stumps, grubs and other deleterious matters and obstructions necessary for placing the foundation; trimming bottoms of excavations; and cleaning up the site and the disposal of all surplus material.

2. Excavation

Excavation shall be taken to the length and width of the lowest step of the footing and the sides shall be left to plumb where the nature of soil allows it. Where the nature of soil or the depth of the trench does not permit vertical sides, the Contractor at his own expense shall put up necessary shoring, strutting and planking or cut slopes to a safer to a safer angle or both with due regard to the safety of personnel and works and to the satisfaction of the Engineer.

The depth to which the excavation is to be carried out shall be as shown on the Drawing or as directed by the Engineer.

Issued for Tender

Where blasting is to be restored to, the same shall be carried out in accordance with Clause 3.04.

3. Dewatering, Diversion of Flow and Protection

Normally, open foundation shall be laid dry. Where water is encountered in excavation due to stream flow, seepage, spring, rain or other reasons, the Contractor shall take adequate measure such as bailing, pumping, constructing diversion channels, drainage channels, bunds, cofferdams and other necessary works to keep the foundation pit or trenches dry, when so required and to protect the green concrete/masonry against damage by erosion, failure of cut slope or sudden rising of water level. The methods to be adopted in this regard and other details thereof shall be left to the choice of the Contractor, but subject to approval of the Engineer. Approval of the Engineer shall, however, not relieve the Contractor of the responsibility for the adequacy of the Engineer shall, however, not relieve the Contractor of the responsibility for the adequacy of dewatering and protection arrangements and for the quality and safety of the works.

Where cofferdams are required, these shall be carried to adequate depths and heights, be safely designed and constructed and be made as watertight as is necessary for facilitating construction to be carried out inside them. The interior dimensions of the cofferdams shall be such as to give sufficient clearance for the construction and inspection and to permit installation of pumping equipment, etc., inside the enclosed area.

Cofferdam sheet-piling shall be carried down well below the bottom of the pile caps or footings, but without interference with any bearing piles. Cofferdams shall be rigidly constructed and efficiently braced to withstand external pressures when water is pumped out. Sheet piling shall be reasonably watertight and all appreciable leaks encountered during the operations shall be stopped so that construction of pile caps can be carried out in the dry. The Contractor shall rectify any cofferdam which, for any reason, has moved, tilted, or changed its shape and/or size.

Pumping form, 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 a period of at least 24 hours thereafter, unless it is done from a suitable sump and is separated from the concrete work by a watertight wall or other similar means.

At the discretion of the Contractor, cement grouting or other approved methods may be used to prevent or reduce seepage and to protect the area of excavation.

The Contractor shall take all precautions in diverting flow and in discharging the drained water as not to cause damage to the works, crops or any other property. If any such damage is caused due to any negligence of the Contractor, it shall be the sole responsibility of the Contractor to repair/restore to the original at his own cost or compensate for the damage.

4. Preparation of Foundation Base

The bottom of the foundation pit shall be levelled both longitudinally and transversely or stepped as directed by the Engineer. Before footing is laid, the surface shall be slightly watered and rammed, if surface is not wet. In the event of excavation having

Issued for Tender

XX

been made deeper than that shown on the Drawing or as otherwise ordered by the Engineer, the extra depth shall be made up with concrete or masonry of the foundation grade at the cost of the Contractor. Ordinary filling shall not be allowed for the purpose to bring the foundation to level. When rock or other hard strata is encountered, it shall be freed of all soft and loose materials, cleaned and cut to firm surface either levelled or stepped as directed by the Engineer. All seams shall be cleaned out and filled with cement mortar or grout to the satisfaction of the Engineer. In the case of rock excavation, annular space around footing shall be filled with concrete of grade M 10 up to top level of rock.

After the excavation is completed, the Contractor shall inform the Engineer to that effect and no footing, bedding materials or structures shall be placed until the Engineer has approved the depth and the suitability of foundation material.

If, at any point, in any foundation excavation, material unsuitable for foundations is encountered, the Contractor shall, if so instructed by the Engineer, shall remove all such materials and refill with suitable materials thoroughly compacted by tamping or rolling in layers of not more than 150mm thick each.

5. Slips and Blows

If there are any slips or blows in the excavation, these shall be removed by the Contractor at his own cost.

6. Public Safety

Where required, trenches and foundations pits shall be securely fenced, provided with proper caution signs and marked with red lights at night to avoid accident.

The Contractor shall take adequate protective measures to see that the excavation operations do not affect or damage adjoining structures.

3.05 REFILLING OF FOUNDATION PITS AND TRENCHES, REMOVAL OF SUPPORTS AND FILLING TO STRUCTURES

Refilling of foundation pits and trenches shall consist of previous backfill and/or common backfill as shown on the Drawing or as directed by the Engineer.

1. Materials

a) Pervious Backfill

Unless otherwise specified in the contract, it shall of gravel, crushed gravel, crushed rock, natural sands, manufactured sands or combinations thereof. It shall conform to the grading limits set out in Table.

Grading Limits of Pervious Backfill

Sieve Size (mm)	Percentage Passing by Weight
40	100
10	45-100
2.36	25-80
0.6	8-48

Issued for Tender

0.075

0-6

(b) Common Backfill

Common backfill materials other than pervious backfill shall be suitable material as defined in Sub-clause 3.02 (2).

1. **Method of Filling**

Backfilling material shall be placed and compacted in layers in compliance with the requirements. Any support structures for the excavation shall be withdrawn as the filling proceeds unless described in the contract or ordered by the Engineer to be left in. The backfill shall be placed in by such methods which shall avoid loading the structure in any manner which may affect its stability or overload its underlying foundation material or substructure. The backfill in front of abutments and wing walls shall be placed first to avoid the Possibility of forward movement. Precautions shall be taken to prevent any wedge action against upright surfaces, and the slopes bounding the excavation shall be stepped as directed by the Engineer before backfill is placed. The backfill material around box culverts, piers and curtain walls shall be placed simultaneously on both sides of the structure. When the structure is so designed that its strength is dependent on the restraining effect of the superstructure (such as in portal frames and propped abutments), the back-fill shall not be placed the superstructure has been completed to the extent and strength necessary to provide the required restraint. When the Contract requires wedges between steel superstructure and the parapet of wing type abutments, the wedges shall be placed in advance of placing any fill above the lower 1/3 of the abutment and shall be removed when directed by the Engineer.

3.06 FORMING OF EMBANKMENT AND OTHERS AREAS OF FILL

1. The work shall consist of the construction of embankment, filling on other areas and backfill not specified elsewhere by providing material as specified or approved by the Engineer, placing, compacting and shaping to lines, levels, grades and cross sections as shown on the Drawing or as directed by the Engineer. The maximum size of the coarse material in the mixture shall not exceed 75 mm for general earth fill.
2. The limits of embankment shall be built sufficiently wider than the design dimension to facilitate in achieving required compaction nearby outer faces of the embankment. The surplus material shall be trimmed to conform the specified side slopes and width of the embankment.
3. Where necessary, the original ground shall be scarified, mixed with water, levelled and then compacted so as to achieve the density. Where the height of embankment, as measured from formation level to the original ground level, is less than 200 mm, the embankment foundation shall be compacted in accordance with the requirements such that the required compaction is achieved within the upper 300 mm below formation level. Where necessary, embankment foundations shall be excavated/furrowed and brought under OMC and re-compacted in layers of 150 mm each in order to achieve the required level of compaction.
4. Embankments shall be built up evenly over the entire width and shall be maintained at all times with a sufficient camber to enable surface water to drain rapidly from

Issued for Tender

them. Damage to compacted layers by constructional or other traffic shall be made good by the Contractor.

5. The natural moisture content and the optimum moisture content of the material to be placed in the embankment shall be checked before start of the placing material. If found to be out of the specified limits, the same shall be made good. Where water is required to be added in such constructions, water shall be sprinkled uniformly and thoroughly mixed in soil by blading or harrowing until a uniform moisture content as specified is obtained.

Moisture content, checked in accordance with IS 2720 (Part 2), at the time of compaction shall be between 90% and 105% of the Optimum Moisture Content as determined in accordance with IS 2720 (Part 8).

If the material delivered for fill/backfill is too wet, it shall be dried by aeration and exposure to sun, till the moisture content is acceptable for compaction. Should circumstances arise, where owing to wet weather, the moisture content cannot be reduced by the above procedure, compaction work shall be suspended.

If the material deposited as fill subsequently reaches a condition such that it cannot be compacted in accordance with the requirements of the specifications the Contractor shall

- I. Make good by removing the material off the embankment and placing suitable material; or
 - II. Make good by tipping it elsewhere it elsewhere until it is in a suitable physical condition for re-use; or
 - III. Make good the material by mechanical or chemical means to improve its properties acceptable to the Engineer.
6. If the Contractor wishes to continue to use the surface of embankments including shallow filling for constructional traffic before trimming to formation level, he shall bring up and maintain the area between the extremities of the carriageway including (if any) central reserve and hard shoulders to a level not less than 150 mm above formation level whereupon constructional traffic shall be allowed to use the surface and shall be made good by the Contractor at his own expense. When it is necessary to complete the formation level and this has been done, the movement and use of construction equipment thereon shall be in accordance.

III.08 MEASUREMENT

1. The quantities of the various classes of earthwork to be measured for payment under the contract shall be limited to the lines, grades, slopes and dimensions shown on the Drawing or as determined by the Engineer.
2. Foundation excavation for structures shall be measured in cubic meters irrespective of all classes of materials except rock encountered. The quantities to be measured shall be the net cubic content of the voids formed by the removal of

Issued for Tender

the materials enclosed between the bottom of the footing and existing ground level by a surface generated by vertical lines passing through the periphery of the bottom of the footing.

No payment shall be made for any excavation other than the limited excavation described above. Excavation over increased width or length, cutting of slopes, removal of slides, shoring, shuttering and planking shall be deemed as convenience for the Contractor in executing the work and shall not be measured and paid for.

Backfill to be measured shall be limited to this void only with due consideration of the nature of the structure. Foundation excavation in rock shall be deemed to be covered by the rate for rock excavation.

3. Consumption of explosive materials, levelling, watering and compaction of original ground, construction of coffer dams, pumping out water and other ancillary and incidental works necessary to complete the item as per this specification shall not be measured for payment. They are deemed included in the measurement of the concerned item.
4. Unless stated otherwise, Lead and Lift of excavated materials for disposal shall not be measured for payment. They are deemed to be included in the quoted rates for the earthwork operations irrespective of haulage distance and lift height.

III.09 PAYMENT

- (1) Foundation excavation for structures, measured as described above, shall be paid for at the contract unit rate for all classes of excavation. The contract unit rate for foundation excavation shall be the full and the final compensation to the Contractor and for the cost of carrying out the required operations to excavate to the lines and levels as required by the Drawing or as directed by the Engineer.
- (2) No payment shall be made for the disposal of the excavated materials irrespective of all leads and lifts, preparation of foundation base, cofferdams, cribs, sheeting, shoring and bracing, foundation sealing, dewatering including pumping, removal of logs and stumps, cleaning and grubbing, diversion of flow/channel, if required and all incidentals works necessary to complete the item in accordance with this Specification

Issued for Tender

SECTION VI
WORKS REQUIREMENTS
SPECIFICATION

4-CONCRETE

Table of Contents

4	CONCRETE	1
4.01	Scope of work	1
4.02	Concrete constituent materials	1
4.03	Concrete mixes and proportioning	6
4.04	Batching and mixing of concrete	11
4.05	Transport, handling and placing of concrete	14
4.06	Curing of concrete	21
4.07	Testing of concrete	23
4.08	Repair of blemishes	27
	All surface blemishes exceeding 15 mm in any dimension shall be cleaned for laitance, and filled with dry mortar of mix proportions cement: sand= 1:2 as soon as the formwork is removed. Repair at a later point in time shall be done with Epoxy-mortar. In all cases repairs to concrete shall only be carried out with the prior written approval of the Engineer.	27
4.09	MEASUREMENT	28
(1)	Concrete	28
	Concrete laid in place as specified in the Drawing or directed by the Engineer shall be measured in cubic metre separately for each class. No deduction shall be made in the measurement for:	28
(a)	Bolt holes, pockets, box outs and cast in components provided that the volume of each is less than 0.15 cubic metres;	28
(b)	mortar beds, fillets, drips, rebates, recesses, grooves, chamfers and the like of 100 mm total width or less;	28
(c)	Reinforcement	28
(2)	Admixtures, Workability and Hardening Agents and Curing Compounds	28
	Unless stated otherwise, rate of concrete shall be deemed to include admixture, workability, hardening agent and curing compounds.	28
4.10	PAYMENT	28
	Every class of concrete shall be paid as per respective contract unit rate. In addition to those specified in Clause 4.01 the respective rate shall also include the cost of:	28
(a)	All materials including admixture and workability agent, curing agent, labour, Tools, Plants and equipment required for mixing, transporting and placing in position, vibrating and compacting, finishing and curing including all incidental expenses.	28
(b)	Unless mentioned separately as an item in contract sampling and testing, quality assurance and supervision	28

4 CONCRETE

4.01 Scope of work

The portion of the Works specified by this Specification Section shall consist of supplying all labour, plant and material and doing everything necessary to ensure the required quality of concrete and concrete works. This clause includes concrete constituent materials, concrete mixes and proportioning, batching, mixing, transport, handling placing and curing of concrete,

4.02 Concrete constituent materials

4.02.01 Cement

Low alkaline cement shall be used for all concrete works due to possible aggregate reactivity (see Bid Documents Section 6 - Supplementary Information total alkaline content (Na_2O equivalent) in the concrete shall be less than 3 kg/m^3 .

4.02.01.1 Standards

All cement used throughout the Works shall be low alkaline Portland cement complying with BS12, unless otherwise specified or permitted by the Engineer.

4.02.01.2 Certificates of cement

For each consignment of cement, the Contractor shall obtain and file Certificate of Conformity, which shall be available to the Engineer upon request. The certificate in question shall confirm compliance with the Contract requirements.

4.02.01.3 Testing of cement

Each consignment shall be followed by a certificate documenting:

- Specific surface (fineness), ref. BS12.
- Setting time (Vicat apparatus), ref. BS12.
- Bending strength and compressive strength of mortar prisms, cement: aggregate = 1:3, w/c = 0.50.
- Chemical composition.
- Heat of hydration (Solution method, ref. BS1370.
- Soundness ("Le Chatelier"-method, ref. BS12.

4.02.01.4 Transport and storage of cement

All cement shall be protected against rain and moisture during transport. The cement temperature shall not exceed 45°C .

All cement filled in sacks shall be stored in a waterproof shed with concrete floor on an elevated wooden floor raised at least 0.15 m. Surface water shall be effectively diverted away from the shed. Each consignment shall be stored separately and used in order of delivery. Cement in sacks shall be stacked not higher

XX

Signature

Signature

Issued for Tender

than fourteen sacks for periods up to 4 weeks. For longer periods, maximum 7 sack high piles shall be used.

All bulk cement shall be stored in waterproof silos specially designed for the purpose.

All stored cement shall be accessible for inspection by the Engineer at all reasonable times. Any cement which has become injuriously affected by moisture or other causes shall at once be removed from the Site.

Any cement having been stored for more than two months at the Site shall not be used without the Engineer's consent.

Rebagged cement shall not normally be accepted, but may be used in special cases and in certain parts of the Work if the prior written consent of the Engineer is obtained.

4.02.02 Pozzolanas and fillers

Pozzolana (pulverized Fuel-Ash and/or Silica fume) may be used in combination with Ordinary Portland Cement if the prior written consent of the Engineer is obtained.

The pozzolana shall meet the requirements of BS 3892: 1965, Pulverized-Fuel Ash for use in Concrete.

Material designation shall be according to the standard, BS 3892 / Zone B / 2.5% SO₃.

For each consignment of pozzolanas and fillers, the Contractor shall obtain and file a Certificate of Conformity, which shall be available to the Engineer upon request. The certificate in question shall confirm compliance with the Contract requirements. Pozzolana shall be transported and stored in the same way as cement.

The Contractor shall carry out all tests necessary to prove the benefits of using pozzolana, and for assessment of all relevant concrete properties. The optimum percentage of pozzolana with cement shall be decided on basis of a test programme outlined in 4.07.04. The content of pulverized Fuel-Ash shall be 20-25% and Silica fume 6-12% of the cement weight.

With reference to the water/binder relation w/c, the Silica fume content (s) can be included by using the relation $w/(c+2s)$.

All data from the tests shall be submitted to the Engineer for approval. When the optimum weight percentage is decided, the content of pozzolana replacing the cement shall be kept within $\pm 3\%$ of the said optimum. The pozzolana shall be premixed with Portland cement into a homogeneous blend before entering the concrete mixer (ref. 10.04.04).

Depending on the content of fine material in the sand fraction and the properties of the pozzolana, additional fillers may be necessary. The filler shall have a specified surface area (fineness) greater than 2000 cm²/g Blaine. The variation in fineness shall not exceed ± 500 cm²/g Blaine. The percentage retained on the 90 μ m sieve shall not exceed 15%.

Issued for Tender

2

1

9

9

- 10

1

2

11

1

- 1

1



tests to show that the quarry material is sufficiently homogeneous in respect of grading, soundness and mechanical strength, to fulfil the requirements. The Contractor shall also test the properties of the crushed aggregates.

4.02.04.2 Aggregate properties and testing

The concrete aggregates shall be tested for compliance with the Specifications as stated below. Sampling of aggregates shall be in accordance with BS 812. Before opening a new quarry for production, all relevant tests stated in the following shall be carried out. During concrete production the test frequency shall be the minimum in the table 4.02 below:

Table 4.02 concrete testing

TEST	LIMIT, FREQUENCY
Clay lumps	Max permissible 2.0% by weight. To be tested twice a week.
Material passing the 75 µm sieve	Max permissible 3.0% by weight. To be tested twice a week.
Organic matter, NaOH-test ASTM C40	Colour comparison. To be tested twice a week.
Soluble sulphates, expressed as SO ₃ Sodium sulphate Soundness, ASTM C88	Max permissible 0.25% by weight. Chemical/petrographical determination. To be tested once for each type of aggregate. Max. permissible weight loss after 5 cycles is 10%, One test for each type of aggregate.
Alkali-Silica reaction by comparison of petrography	Petrographical analysis, one test per 3,000 m ³ concrete.
Specific gravity	One test per 3,000 m ³ concrete.
Aggregate Crushing Value, BS812.	Shall not exceed 30% as an average, 35% as an absolute maximum for individual samples.
Flakiness Index, BS 812	Maximum 20%. To be tested once a week for coarse aggregates.
Particle shape,	The ratio of length to width, measured and averaged for 100 sand grains shall be less than 2.0. This ratio shall be tested once a week on the 2-4 mm fraction.
Grading	To be tested once a day for each type of aggregates. Once a suitable grading has been decided on basis of mix design, the maximum permissible deviation from this curve should be $\pm 7\%$ on the 4mm sieve, $\pm 3\%$ on the 1mm sieve and $\pm 1\%$ on the 0.125 mm sieve.

4.02.04.3 Aggregate fractioning and stockpiling

Aggregates for structural concrete shall comprise the following fractions:

- Fine aggregates to pass through a 5 mm mesh sieve
- Fine aggregates to pass through a 10 mm mesh sieve
- Coarse aggregates to pass through a 20 mm mesh sieve
- Coarse aggregates to pass through a 40 mm mesh sieve

Washing of the aggregates, especially crushed sand, may be necessary to control the contents of dust and mica.

The Contractor shall submit sufficient documentation to demonstrate the ability to process aggregates within the specifications with the intended plant.

The various grades of aggregate for concrete shall be stockpiled in separate heaps or bins and shall be kept clean and free of all other material. If the aggregates are stockpiled on the ground, the bottom 0.15 m of the pile shall not be used in the production of concrete.

The finest fraction shall be stockpiled in two separated heaps. The aggregates in one heap shall be controlled and approved for use in the work. In the other heap the aggregate from the production shall be stocked and continuously controlled. Each heap shall contain aggregates for minimum 5 days work.

Stockpiling of aggregates delivered by lorry shall be done in layers not exceeding 2 m in height to diminish separation potential.

4.02.04.4 Rock quarrying

The quarried rock shall be fresh and free from soil or other deleterious material.

Crushed tunnel rock shall preferably be used for aggregate production, subject to achieved quality.

4.02.04.5 Crusher plant

Attention shall be given to obtain roughly cubical shape of particles of all sizes. Inter-particle crushers and/or aggregate mills shall be employed to improve the particle shape if necessary.

The Contractor shall submit plans for the crushing and screening plant for approval by the Engineer not later than 10 weeks after the issue of the Letter to Commence

4.02.05 Water

Water for concrete production shall be clean, fresh and free from organic or inorganic material in solution or suspension, which may impair the strength or durabil-

Issued for Tender

ity of the concrete. Only water of approved quality shall be used for moistening formwork and hydrated concrete, curing concrete or similar purposes.

Water shall be sampled and tested according to BS 3148.

If the water affects the quality of concrete adversely, the Contractor shall immediately consider methods for purification of the water. Any additional work and associated costs shall be borne by the Contractor and included in the unit rates.

4.03 Concrete mixes and proportioning

4.03.01 General requirements

The Contractor is responsible for the concrete mix design to the approval of the Engineer. Cement, silica fume and additives shall, as far as possible, be purchased locally providing they meet quality standards.

All concrete is to be dense, durable, and consistent and cast accurately to the lines and dimensions shown on the Drawings and to present a dense and uniform surface free from blemishes. The concrete shall fill the form completely with intimate contact between the concrete and reinforcement. The concrete is to be thoroughly and uniformly compacted.

Concrete mixes shall be proportioned with regard to the minimum cement content and the maximum density possible, consistent with these Specifications, and workability (assessed as stability, workability and compactability) deemed appropriate by the Engineer for executing the work.

The concrete mix and grade to be used shall be of the class and type shown on the Drawing, described in the Bills of Quantities, or ordered by the Engineer.

4.03.02 Class and strength of concrete

The concrete mixes described are "characteristic" mixes, in the sense that no fixed proportions are given. The required concrete strength is defined by the grade and specified on the Drawings. The Contractor shall be responsible for selecting the mix proportions in accordance with the requirements as laid down hereunder for the relevant classes/types.

The structural concrete shall generally be of grade C25, but concrete up to grade C45 may be required for certain structures. A C60 Silica fume concrete is also adopted on certain parts of the works, where extraordinary abrasion from gravel and boulders in the water is expected. The figures represent the 28 day minimum strength in N/mm² (MPa) of the test cubes prepared and tested in a standardised manner.

The requirement for each class of concrete is considered fulfilled if statistically it can be proven that there is a maximum 25% probability that more than 10% of the actual concrete volume has strength below the required minimum for the class.

The statistical proof is given by the formula

$$X_m = X_c + K \cdot S$$

Issued for Tender

Where:

X_m = the arithmetical mean strength of n tests.

X_c = required minimum strength.

S = the standard deviation of strength, calculated from the n tests by the formula

$$S = \sqrt{\sum (X_i - X_m)^2 / n - 1}$$

K = a numerical factor depending on the number of tests n as shown, e.g.

Number n = 14 gives a K = 1.59.

No. of test results:

n	0	1	2	3	4	5	6	7	8	9
0				2.50	2.13	1.96	1.86	1.79	1.74	1.70
10	1.67	1.65	1.62	1.61	1.59	1.58	1.57	1.55	1.54	1.54
20	1.53	1.52	1.51	1.51	1.50	1.50	1.49	1.49	1.48	1.48
30	1.47	1.47	1.46	1.46	1.45	1.45	1.45	1.45	1.45	1.45
40	1.44									
50	1.43									

The set of test results used to calculate the statistical proof shall be taken from a 6 months period. Structural concrete of the same class constitutes one group for calculation of the statistical proof, regardless of consistency and maximum size of aggregate. Massive and structural concrete of the same class shall, however, constitute separate groups.

In addition to the 28 days strength, the development of the strength shall be documented by taking test over a period from 7- 90 days.

4.03.03 Concrete mixes

4.03.03.1 *General*

All concrete constituent materials shall comply with the Specifications.

If not otherwise agreed upon or directed by the Engineer, all concrete shall contain water-reducing admixture at a dosage giving at least 8% water reduction. Retarding admixture shall be used where directed by the Engineer.

[Signature]

[Signature]

[Signature]

Issued for Tender

Normally, no concrete shall have an air content exceeding 4%, but higher air content may be ordered, and air-entraining agent may be necessary to achieve this.

No concrete shall normally have slump values exceeding 150 mm. Slump values exceeding 100 mm shall be obtained by increasing the dosage of water-reducing admixture.

The combined grading of aggregate shall, if gap grading is not explicitly specified, be a smooth curve, and within the envelope of standards.

The concrete mixes are classified and named in accordance with:

- Grade required (minimum compressive strength in MPa of test cubes at 28 days age).
- The nominal maximum size of aggregate in mm.

4.03.03.2 Impermeable concrete

Impermeable concrete is required for several structures. The Contractor is responsible for all necessary tests and his proposals, including all test results, shall be submitted to the Engineer for approval.

Special attention must be paid to handling and compaction of the concrete to avoid separation.

Special attention shall also be paid to placing and compaction of concrete at "cold" (hydrated concrete) joints to achieve tightness. The percentage of coarse aggregate should be reduced by 25-30% compared to normal when laying a 20-30 cm thick bottom layer. The water/cement ratio shall be as low as possible with regard to workability and shall not exceed 0.48 for such layers.

The concrete shall be placed and compacted in layers not exceeding 0.4 m in depth. Each layer must be thoroughly compacted with the layer underneath.

To prevent the risk of excessive slump loss and early stiffening of the concrete, the initial concrete temperature as cast shall be kept as low as possible and shall not exceed 27 °C.

4.03.03.3 The maximum concrete temperature during curing shall not exceed 65 °C. Standard mixes

The grade of concrete and maximum size of aggregate shall be as stated on the Drawings. The following table (Table 4.03) shows the concrete grades required, together with limitations on the mix design parameters for durability.

Concrete grades and limitations on the mix design parameters for durability

Issued for Tender

Table 4.03 Concrete Grades

Concrete grade	Maximum nominal size of aggregate (mm)	Maximum free water/cement ¹ ratio	Cement ¹ content	
			Minimum kg/m ³	Maximum kg/m ³
C15	20	0.70	220	400
C20	40	0.60	220	400
C25	20	0.65	250	425
	40	0.65	240	425
C35	20	0.55	300	550
	40	0.55	270	550
C35A	40	0.50	325	400
C45	40	0.50	295	550
C60 ²		20 ³	0.40	400 kg/m ³ OPC 40 kg/m ³ silica fume

1. Inclusive of pozzolana such as silica fume, fly ash (pulverised fuel ash) or ground granulated blast furnace slag.
2. Experience indicates that it is difficult to achieve C60 concrete in Nepal. Abrasive resistance is more important than strength.
3. Production of C60 will require coarse aggregate from hard materials such as quartzite or granite, and fine aggregate with less mica than otherwise allowed in this Specification.

Common uses:

C15 Blinding

C20 Fill – plum concrete

C25 Structural with mild to moderate exposure

C35 Structural with severe exposure and higher strength

C35A Water retaining structures and structure where heat reduction in thick walls is required

C45 Higher Strength concrete

C60 Abrasion resistant high strength concrete
Fiber reinforced concrete

Issued for Tender

4.03.04 Plum/Fill Concrete

Plum concrete may be used by the Contractor where specified on the Drawings.

The size (D) of any plum (rock boulder) shall not exceed one-third of the least dimension to be concreted and in any case shall not exceed 300 mm. The volume of plums shall not exceed 30 per cent of the total volume of the finished concrete.

The source of the plums shall be to the approval of the Engineer. Plums shall be thoroughly cleaned before placing. Plums shall be moistened with clean water for at least one hour before they are used, by a method that ensures each is thoroughly and uniformly wetted. Surface water shall be drained off before use.

Plums shall be well dispersed throughout the concrete mass and shall be placed by alternately placing a layer of concrete, then spreading the plums, followed by another layer of concrete and so on. No plum shall be placed closer than D to an exposed surface, nor nearer than 0.5D to an adjacent plum. Each layer of concrete shall be of sufficient thickness to ensure at least 0.5D of concrete between plums in successive layers

4.03.05 Stone Lining

4.03.05.1 *Hard stone lining*

Dressed stone masonry is used for protection of concrete at places where abrasive conditions are expected, such as weirs, bed load excluder hopper and culvert, retaining walls, and gravel flushing culverts.

Dressed stone masonry shall be dressed stone of rock types including quartzite and granite, or other approved stone. The stone shall be of good hard durable quality, free from defects of any kind. The rebound hardness measured by Schmidt hammer shall be 60 minimum.

The mortar joint at the base of the layer shall be 10mm minimum to 40mm maximum. Lining shall include 12mm anchors drilled and grouted into at least 20% of all blocks, distributed such that every unanchored block is in contact with at least one anchored block.

The dimensions of blocks shall be 150mm minimum in the direction of flow and 200mm minimum generally perpendicular to the flow direction. At the edge of a panel the dimension of blocks in both directions may be 150mm minimum to create staggered jointing. Larger blocks shall be used if possible.

Blocks shall be dressed and placed so that the finished surface is within 8mm of prescribed levels and grades. In addition abrupt irregularities in the finished surface shall be less than 3mm step up or 6mm step down in the direction of flow. Internal faces of blocks shall be dressed to 10mm tolerance so that internal joints shall be 5mm minimum thickness and 15mm maximum. Joints shall be kept as small as practicable, especially at the exposed surface, but never less than 5mm. Dressing on the bottom face will not be required, provided that the tolerance on the base mortar thickness is met.

Lining of slabs shall be laid in courses at right angles to the direction of the flow, with joints between adjacent courses staggered. Lining of walls shall be laid in horizontal courses, with joints between adjacent courses staggered. Foliation planes in quartzite shall be perpendicular to the flow.

4.03.05.2 Boulder lining in concrete

Boulder lining is used for erosion protection at places where abrasive conditions are expected, such as stilling basins and downstream sill.

Boulders shall be quartzite, granite, or other approved stone. The stone shall be of good hard durable quality, free from defects of any kind. Foliation planes in quartzite shall be perpendicular to the flow.

The dimensions of blocks shall be as described on the Drawings.

The boulders shall be placed on fresh concrete, otherwise a mortar joint must be made at the base. Unless otherwise specified by the Engineer, concrete shall be poured around the boulders to approximately half the boulder height.

Filling with concrete between boulders can also be used at other places for reinforcement purposes of boulder fillings.

4.03.06 Trial mix

The design and quality control of mixes shall be carried out by the Contractor. The proposed trial mix shall be submitted to the Engineer before trials are carried out.

Before any concrete is used in the Permanent Works, the Contractor shall prepare trial mixes for each grade of concrete, maximum size of aggregate and degree of workability, using representative samples under normal production conditions.

Three separate batches of each trial mix shall be made and tested for workability and six cubes shall be taken from each batch for testing of three cubes each at 7 and 28 days.

The mix proportions for each grade of concrete shall be approved when the 28 day mean crushing strength of 9 cubes for each trial mix is at least equal to the values in the table under Specification Section 4.03.02.

4.04 Batching and mixing of concrete

4.04.01 General

The Contractor shall submit plans for the batching to the satisfaction of the Engineer not later than 10 weeks after Letter to Commence.

The Contractor shall supply reliable plant of approved type and adequate size/capacity. Fully automatic batching plant, equipped with data-logging and available print-outs of each batch will be preferred, but other types may be approved.

All equipment used in connection with production and control of concrete shall be cleaned and maintained such that its proper function is always ensured. In

Issued for Tender

this respect the Contractor shall at all times have sufficient spare parts in stock at the site.

4.04.02 Plant

General.

Access to the batching plant area shall be restricted and limited to specifically assigned and competent personnel. The plant area shall at all times be kept clean and tidy, and not used for other purposes.

The plant shall be equipped with separate silos for cement and each aggregate fraction. The silos, conveyor arrangement and batching plant shall be covered against rain, protected against contamination of any kind, and also arranged in a way that the aggregates are protected against heating from sunlight.

The above shall also apply for the area between the cement storage and silo feeding area.

Sufficient water for cleaning shall be available anywhere at the plant area, and cleaning shall be done in such a way that the water does not splash on cement or aggregates. Cleaning water shall be discharged via settling ponds, and no contaminated water shall be discharged to ground. The settling ponds shall be emptied on a regular basis.

The control room shall be of good standard, and kept clean and tidy at all times. The operator shall be able to monitor visually all batching processes from inside the control room.

A laboratory equipped for testing of constituent concrete materials and fresh and cured concrete shall be located close to the mixing plant.

All activities at the plant, such as batching, controls, maintenance etc, shall be recorded in the plant log. The plant log shall be kept in the control room, and shall be available for the Engineer at any time.

4.04.03 Batching

The batching shall be done on the basis of approved proportion tables. The quantities of all materials except water and liquid admixtures shall be measured separately by weighing. Water and liquid admixtures shall be added by either weight or volume. The equipment provided for measuring materials shall be suitably designed, constructed and maintained, so that their function is ensured; they can easily be controlled and adjusted; and the total amount of each material can be read.

Cement and aggregates shall be weighed on separate balances. The cement balance shall have an accuracy of at least $\pm 2\%$ during use ($\pm 1\%$ adjustment tolerance). As an exception cement may be added as a whole number of original sacks. The aggregate balance(s) shall have an accuracy of at least $\pm 3\%$ during use ($\pm 1.5\%$ adjustment tolerance). The accuracy of the cement and aggregate balances are to be calculated in relation to the maximum load according to the proportioning tables.

Mixing water shall be measured to an accuracy of at least $\pm 2\%$.

Issued for Tender

Admixtures shall be measured to an accuracy of at least $\pm 5\%$. Approved automatic equipment for dosage of admixtures shall be installed.

4.04.04 Mixing

The batch mixing plant facilities shall ensure that the operator can visually control all constituent materials to enter the mixer. He shall be able to control the concrete mass before it is discharged and ensure that the batch is discharged into the correct transportation device. Every truck load of concrete is to be correctly labelled.

The volume of the mixed material per batch shall not exceed the manufacturers rated capacity of the mixer. The mixing speed shall be that specified by the manufacturer. The mixing shall continue until the concrete is a homogeneous mass and all materials are uniformly distributed throughout the mass. For mixers of capacity of 1.5 m^3 or less the mixing time shall be at least 90 seconds after all materials, except water for adjustment of the consistency, have entered the mixing drum. For larger mixers the minimum mixing time shall be increased beyond 90 seconds by 20 seconds for each additional m^3 .

The mixing and the consistency shall be checked by ampere or watt meters coupled to the feeders of the mixer motors. The instruments shall be so positioned and designed that they can easily be read by the operator. The ampere- or wattmeter readings shall be correlated with standardised measurements of concrete consistency regularly, at least once per shift. The prescribed water content must not be exceeded.

4.04.05 Check of equipment

Before the plant is taken into operation at the site, it shall be checked, balanced and commissioned by specialised personnel with detailed knowledge of the plant and all its operations, and the checks and controls recorded in the plant log.

If any balance becomes damaged, it shall be repaired and all balances rechecked to provide documentation of sufficient accuracy, before concrete production restarts.

The concrete production shall be under the supervision and responsibility of a qualified production leader, having wide experience in production and control of fresh and hardened concrete. Documentation of the qualifications of the leader shall be submitted to the Engineer upon request. The production leader shall be in close contact with personnel at the concrete plants and the concrete laboratory. He shall personally inspect in detail each plant at least once a week. If the production leader is not present at the plant, a qualified engineer shall be assigned his duties.

The plant operators shall have a clear understanding of the concrete production process and what factors can affect the concrete quality. No operator shall be allowed to operate on his own until he has been trained and proved to be reliable and qualified.

Every irregularity concerning the constituent materials or the functioning of equipment shall be reported to the production leader in charge, corrected and documented in the plant log immediately. Concrete not having the required quality shall be dumped at an approved location.

Issued for Tender

In case concrete of lower quality than specified is discovered after the concrete is cast, the Engineer shall immediately be called upon to decide the actions to be taken.

4.05 Transport, handling and placing of concrete

4.05.01 General

Concrete shall be transported and handled in such a way that segregation is avoided and that the concrete is delivered to the site of work as a thoroughly mixed and homogeneous mass and discharged uniformly. The transport equipment shall be designed to suit local conditions, so that the concrete properties are not changed during transport.

Containers for concrete transport and intermediate storage shall be watertight, have clean and smooth inner surfaces and made of materials that do not absorb water from the concrete.

The concrete shall be protected against rain and drying out during transport and handling, to the satisfaction of the Engineer.

The concrete proportions and temperature shall be adjusted according to the required time and method of transport. Concrete which has been injuriously affected during transport or handling shall not be used.

Retempering of concrete is not allowed.

At every place where concreting is proceeding one of the Contractor's qualified superintendents, well experienced in concrete works, shall be present and responsible for the work. All concrete casting shall be carried out by skilled workers under the supervision of foremen with sound technical knowledge and experience.

During concreting a sufficient number of workers shall be present to handle the concrete, and an adequate number of competent steel fixers and carpenters shall continuously check over the reinforcement and formwork.

No concreting works shall be carried out in the dark. Sufficient lighting to the satisfaction of the Engineer shall be provided at the mixing stations and at every place where concrete is being placed.

A communication system linking the Engineer's and the Contractor's offices, the concrete laboratory, the mixing station, and the places where concrete is being deposited, shall be made available.

4.05.02 Authority to commence concreting

At least 24 hours before the Contractor proposes to place any concrete in the Works, the Contractor shall notify the Engineer as to his proposed time of commencing.

When the Contractor has completed all preparatory work such as rock or concrete surface preparations, shuttering, reinforcement and grouting systems, water-stops etc., he shall request the Engineer for an inspection of these works and a written consent to commence concrete casting, the notice given not less than three hours before commencement of concreting and the response given within 3 hours.

Issued for Tender

The Contractor in any case shall not place any mortar layer or concrete until he has obtained the necessary written permission from the Engineer to do so.

After the inspection by the Engineer no other work except the actual concreting shall take place either in or above the formwork until the concreting is completed.

4.05.03 Transport methods

4.05.03.1 *Transport by non-agitating containers/hoppers*

Plant mixed concrete, which is designed taking account of the transport method, may be transported in suitable non-agitating equipment, when consented to by the Engineer.

The containers shall be equipped with gates that will permit discharge of the concrete in a controlled way. Transport time and handling time should be kept to a

minimum, to minimise bleeding and segregation. While waiting with load the engine shall be switched off. Transport of containers containing high-slump concrete in such ways that vibrations occur, will not be allowed.

4.05.03.2 *Transport by agitators and truck-mixers*

Mixing during transport of concrete, which has been completely mixed at the mixing plant, shall be at the rotating speed specified by the manufacturer of the agitating equipment.

4.05.03.3 *Pumping*

Pumping of concrete may be allowed where the transport method itself does not add requirements to the fresh concrete that are inconsistent with the specific requirements of the concrete. The consent of the Engineer shall be obtained before pumping is considered.

The pump itself and all its accessories shall be so designed and arranged that the specified concrete mix can be transported and placed in the formwork without segregation, and the pipeline and fittings shall be designed to withstand the working pressure. Aluminium pipes shall not be used in pipelines for pumping of concrete.

When it is necessary to lay the pipeline for pumping down-slope a pressure reducer shall be placed at the discharge end of the line to provide a choking effect producing a continuous flow of concrete. The pressure pipeline shall be laid with as few bends as possible. When changes in direction are necessary they should be made with bends of 45 degrees or less. If greater bends are necessary they shall be long radius bends.

Lubrication of the pipeline with oil or other concrete contamination materials is not allowed. If the pipelines are lubricated with a mix of cement and water or with mortar, concrete shall not be placed in the forms until the concrete is no longer contaminated with the lubricant.

Issued for Tender

On completion of pumping, the pipeline and equipment shall be thoroughly cleaned with water. Cleaning water shall be discharged outside the forms.

Duplicate pumping equipment, spare parts and extra pipes shall be provided to prevent delay in case of breakdown of equipment.

Transport by pumping may introduce additional requirements on the concrete mix design, as mentioned in 4.03. All changes in mix design to achieve pumpable concrete shall be to the satisfaction of the Engineer.

4.05.04 Preparation of surfaces to receive concrete

Immediately before concrete is placed on or against a rock surface, the rock shall be given a final cleaning with water and compressed air.

All water and contamination caused by this cleaning has to be removed before the concrete is placed.

Fissures and seams in the rock shall be cleaned out to a depth approved by the Engineer and if necessary packed with cement mortar of an approved mix before the main casting starts.

Inside the formwork all debris and any mortar splashed on the reinforcement and surfaces of the forms shall be removed.

Construction joints and previously cast concrete surfaces shall be prepared as described in 5.03. Wooden forms shall be wetted to prevent excessive absorption of water and prevent leakage of mortar from the fresh concrete, ref. 5.02.05. The concreting shall commence by placing 30 - 100 mm of mortar on the bottom surface

4.05.05 Placing of Concrete

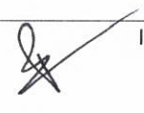
4.05.05.1 *General*

Temperature

High initial concrete temperatures can have undesirable effects including increased water demand; reduced ultimate strength due to high temperature during curing; increased rate of slump loss and reduction in initial setting time; increased tendency for plastic cracking; increased tendency for drying shrinkage and thermal cracking; and decreased durability due to a more extensive micro-cracking and reduced strength.

For this reason an upper temperature limit shall apply for all concrete unless exceptions are specified or approved by the Engineer. For structural concrete the initial temperature as cast shall not exceed 30° C. Concrete placed in contact with rock or "cold", hardened concrete shall not have an initial temperature as cast exceeding 27° C. The same limits apply to concrete placed by pumping. The concrete temperature during curing shall be kept as low as possible. The Contractor shall record the temperature during placing and show the records to the Engineer on request. The records shall be submitted to the Engineer within 24 hours after completion.

Interruption in concrete casting



Issued for Tender

Once commenced, concreting of any unit or section of the construction shall be carried out in one continuous operation, between pre-arranged construction sections or construction joints at a rate which will give the specified rise of the fresh concrete in the formwork without "cold" joints. The Contractor shall have readily available suitable prefabricated shuttering as stop ends to form emergency vertical construction joints in case of a break down in the production line. In the event of such an interruption the concrete already placed shall be properly finished up to the stop end and to a horizontal or inclined surface to the satisfaction of the Engineer. The formwork and the concrete surface shall be treated in the same way as any other casting joint, i.e. split laths, curing etc.

Concrete shall be placed carefully within the shuttering so as not to displace the shuttering or reinforcement.

Placing Rates

The rate of placing shall in any case not exceed 0.5m/h. For embedding and placing in narrow recesses the limit is 0.2m/h. The minimum raising rate of concreting is 0.15 m/h.

The rate of placing shall not exceed the design value of the formwork construction.

Placing in formwork

The concrete shall be placed as close as practicable to its final position to avoid rehandling, in horizontal layers, not exceeding the thickness to be agreed by the Engineer. No layer of concrete shall be placed to feather edge, and no layer of concrete shall have a thickness less than four times the maximum aggregate size. The layer thickness shall not exceed 50 cm. These layers shall be deposited from one face to the other until the full height of the lift is reached. Each layer shall be deposited on the previous one before the latter has taken its initial set, and the exposed area of fresh concrete shall be maintained to the practical minimum. To accomplish this, a new layer may have to be started before the previous layer is completed.

Casting of slabs

Thin slabs and shallow beams may be concreted to the full height in one operation. The concrete shall not be placed in excessive heights that may cause segregation of the aggregate at the working edge, nor shall the concrete be allowed to flow in the slope of fresh concrete.

Dropping of concrete

Concrete shall not be dropped through a height exceeding 1.5 m. For lowering concrete through heights in excess of 1.5 m special methods shall be used such as chutes, tremies, bottom dumping hoppers, or bagged placing, and then only with the consent of the Engineer. All containers, troughs and chutes and apparatus through which concrete is passed shall be kept clean and entirely free from

XX

Issued for Tender

hardened concrete or cement and free from contamination by extraneous material, and where there is an interruption of concreting exceeding 20 minutes, these shall be cleaned completely.

Early hardening

Placing of concrete in the forms shall be completed before loss of workability occurs. Under no circumstances shall concrete, which has partially hardened be deposited in the work, nor shall any concrete be retempered by the addition of water or other materials.

Revibration

The rate of placing shall be adjusted in accordance with the bleeding tendencies and the setting time of the concrete to avoid excessive bleeding water under coarse aggregate particles, reinforcement, ducts, embedded items etc. And

Cracks formed during the setting of concrete. Revibration shall generally be used to avoid cracks during setting.

Cracks due to setting

When during concreting against rock the concrete reaches a ledge in an otherwise steeply inclined or nearly vertical surface, the concreting shall be suspended for about one hour in order to prevent the formation of cracks during the setting of the superimposed concrete. For the same reason the minimum time for setting of concrete in columns and walls before the pouring of adjoining beams and slabs shall be about one hour. Revibration shall be applied after the stop.

Protection against drying

Fresh concrete shall generally be protected against damage and injury from sunshine and rainfall. Remedies for immediate protection of the fresh concrete, in particular uncompacted concrete, against rainfall shall be available at the casting site. If a concrete layer is not covered by new fresh concrete within 30 minutes, it shall be protected against direct sunshine.

Flowing water

The Contractor shall deal with all water encountered during concreting operations in such a manner that the water is prevented from flowing over or exerting pressure against the concrete, until such time after depositing as approved by the Engineer.

Separation

Water and slurry shall be removed from the concrete surface during concreting.

Issued for Tender

Pumping of concrete

Concrete in tunnel linings and in certain other sections of the Works may be placed by pumping. The pumping pressure shall be sufficient to fill the form and the cavities completely.

After the concrete in the tunnel has been built up over the arch at the start of placing, the end of the discharge line shall be kept well buried in the concrete during placing of the arch and sidewalls to ensure complete filling. The final section of the discharge line shall be marked so as to indicate the depth of burial at any time. Special care shall be taken to force concrete into all irregularities in the rock surfaces and to completely fill the tunnel arch. Placing equipment shall be operated by experienced operators only.

Concrete for filling rock overbreak

Concrete for filling the void resulting from overbreak outside the sections shown on the Drawings, (dental concrete), shall be of the same quality as the concrete in the adjacent structures, unless otherwise decided by the Engineer. Such concrete filling shall be placed during the progress of the normal concreting work or, in the event of excessive overbreak, as a separate operation before the ordinary concreting.

4.05.05.2 Placing of concrete in foundations

Before placing concrete in foundations, the bottom shall be thoroughly rammed and cleaned up to a neat plane, or such profile as is shown on the Drawings. No steps or batters will be permitted unless shown on the Drawings or consented to by the Engineer.

Where shown on the Drawings or ordered by the Engineer that the sides of the concrete shall be cast against the existing ground without using shuttering the faces of the earth shall be trimmed neat and true to line. Where such a hole is over-excavated due to the Contractor's method of working, the void shall be filled with concrete of the same class as specified for the foundation, at the Contractor's expense.

Where pumping from the foundation is necessary, sumps and drains shall be provided outside of the area to be concreted. Where in the opinion of the Engineer, the bottom of the excavation has become unsuitable for bearing due to the Contractor's method of working, the soft material shall be excavated to such level as the Engineer may direct, and replaced with concrete at the Contractor's expense.

No concrete shall be placed in the foundation until the excavation has been approved by the Engineer.

4.05.05.3 Placing concrete backing to masonry or brickwork

Mass concrete backing to masonry or brick facing shall be mixed slightly wetter than that mixed for placing against timber forms. Before any concrete is placed, the mortar joints in the facework shall have hardened thoroughly, and the back of the facing shall be carefully tamped round any ties or bond-stones and worked into any cavities.

The lift of the concrete shall be limited to 0.6 m/h where the facing is nominally 115 mm thick brickwork and 0.75 m/h where the facing is nominally 150

Issued for Tender

mm stonework. Lifts for other thicknesses and material shall be as agreed by the Engineer.

4.05.05.4 *Embedding, undercasting, grouting*

Constructions to be embedded shall be cleaned and free from oil and grease. Embedding of steel constructions shall be executed to a limited rate of concreting see Clause 4.05.05.1.

For steel constructions embedded in a second cast concrete, expanding additives may be ordered by the Engineer.

Grouting behind embedded steel constructions may be ordered. Imperfect embedding shall be rectified by grouting. For grouting of plug areas at the steel/concrete contact - see

4.05.06 Compaction of concrete

All concrete shall be compacted thoroughly during and immediately after placing. No concrete shall be left uncompacted more than 30 minutes after being delivered to the form.

All concrete shall be compacted mechanically, except when agreed by the Engineer that small areas shall be otherwise compacted. The compaction equipment shall be suitable high-frequency vibrator of a type to the satisfaction of the Engineer.

Mould vibrators shall be used for the production of small precast units only, except in tunnel linings where other compaction methods are difficult to apply. Where used, mould vibrators shall be placed in such positions and in such numbers to ensure uniform compaction without separation of aggregates or movement of the mix water. Vibrators shall not be attached to the reinforcement, and care shall be taken to avoid contact with it.

Vibrating screeds shall be used for carriageway and footpath construction, 100 mm or less thick. For thickness in excess of 100 mm an immersion or plate type vibrator shall be used to compact the lower layers. Where a plate vibrator is used, the thickness of each concrete lift shall be limited to 100 mm.

The number of vibrators in use on each pour shall collectively be capable of achieving the specified compaction at a rate of at least 20 per cent in excess of the average placing rate. In addition, standby vibrators of a similar size shall be available for immediate use at each concreting place. The numbers of such standby vibrators shall not be less than one quarter of the number actually in use as specified above.

Where air vibrators are used, the Contractor shall ensure that the air pressure at the pour shall not fall below the operating pressure recommended by the manufacturers of the vibrators. Where electrical vibrators are used the Contractor shall likewise ensure that the voltage does not fall below that required for correct operation.

Only workers skilled and experienced in the use of vibrators shall be employed on this type of work.

Issued for Tender

Immersion vibrators shall be inserted sufficiently deep to penetrate through the layer of concrete being placed and re-vibrate the upper portion of the concrete layer underneath.

Vibration shall be continued at each point until the concrete ceases to contract, a thin layer of mortar has appeared on the surface and air bubbles have ceased to appear. The period of vibration necessary shall be carefully determined by trial in the presence of the Engineer. Vibration shall be limited to the time necessary to produce complete consolidation and shall not result in segregation.

Immersion vibrators shall be inserted vertically to penetrate into the layer underneath at regular intervals which shall not exceed the distance from the element over which vibration is visibly effective, and in any case shall not exceed 0.60 m. Vibrators shall not be used to move concrete laterally and shall be withdrawn slowly to prevent the formation of voids.

For thin walls or inaccessible portions of the forms the concrete shall be assisted into place by tapping or hammering the formwork opposite the freshly deposited concrete. The concrete shall be thoroughly worked around the reinforcement, embedded fixtures and into corners of the formwork.

4.05.07 Time between casting of adjacent sections

The time between the castings of adjacent sections (Table 4.3) shall be as indicated on the Drawings. In order to avoid as far as practicable fissuring of concrete at connections of concrete sections, the following intervals between concreting of adjacent blocks will normally be required for different thicknesses of the concrete structures, if grout or concrete filled joint are not designed:

Table 4.3 Time between adjacent casting

Thickness of structure	Minimum Time interval
<0.3 m	No limitation
0.3 m	5 days
1 m	10 days
2 m	15 days
3 m or more	20 days

4.06 **Curing of concrete**

4.06.01 General

The Contractor shall present his plans for curing for consent well before concreting begins.

All concrete surfaces shall, when not protected by steel forms, either

- be kept constantly wet by application of water, or
- be protected against excessive loss of water by use of sealing materials.

Issued for Tender

When wooden forms are left in place during the curing period they shall be kept sufficiently damp at all times to prevent drying of the concrete.

The curing medium and method, or the combination of mediums and methods used, shall be approved by the Engineer. These will be media containing wax in water emulsions for most surfaces and special media for surfaces to be painted. All galleries, conduits and other formed openings through the concrete shall be closed during the entire curing period.

Membrane curing shall be the ordinary way of curing. The Contractor shall apply moist curing conforming to the Specifications in lieu of membrane curing.

4.06.02 Curing time

All concrete shall be cured for a period of time corresponding to the cementing material used in the concrete:

Moderate Heat Portland cement: 14 days

Low Heat Portland cement or blends containing pozzolanas, natural cement or slag cement: 21 days

For construction joints, curing should be continued until resumption of concrete placement or until the required curing period is completed.

Horizontal construction joints may, however, be allowed to dry the twelve hours immediately prior to the placing of the following lift.

4.06.03 Curing materials

4.06.03.1 Curing water

Curing water shall be reasonably clean, not chilled. If the water stains or discolours concrete surfaces, they shall be cleaned. Dust and suspended matter in curing water shall be removed from construction joints before concreting is restarted.

The Contractor has the option of using nonstaining water or of cleaning the surfaces after completion of moist curing.

4.06.03.2 Curing compound

Curing compounds shall conform to ASTM C309-89, "Standard Specification for Liquid Membrane-forming Compounds for Curing Concrete".

The curing compounds shall be white pigmented unless the concrete surface is permanently shaded from direct rays of the sun, in which case non-pigmented may be used. In cases where white-pigmented compounds are objectionable on aesthetic grounds, the Engineer may order use of a non-pigmented compound.

When used in closed or badly ventilated rooms, the curing compound shall not be inflammable.

XX

Issued for Tender

4.06.04 Membrane curing

Before any curing compound is used, the Contractor shall submit to the Engineer the manufacturer's data sheet and other relevant information, for the Engineer's approval.

Any use of curing compound shall be in accordance with the manufacturer's recommendations for use, unless otherwise instructed by the Engineer.

All concrete surfaces on which the curing compound has been applied shall be adequately protected for the duration of the entire curing period from pedestrian and vehicular traffic and from any other cause which will disrupt the continuity of the curing membrane.

4.06.05 Moist curing

Moist curing may be maintained by keeping the concrete surfaces continuously wet for the duration of the entire curing period by spray-pipe or fog systems, by ponding, or by covering with damp earth, saturated sand, or non-staining burlap or cotton mats maintained in a damp condition in contact with the concrete.

Curing by plastic sheet may be used provided there is sufficient supply of water under the sheet, the sheet is kept properly in place, and the sheet is strong enough to withstand all traffic and other loads that may disrupt the sheet during the curing period.

At least once each shift an inspection shall be made of all areas subject to moist curing. The surface moisture condition shall be noted and recorded. Special attention should be given to surfaces which will be exposed to wear or weathering. When a daily inspection report lists an area of inadequate curing, the required curing period for that area shall be extended by one day.

4.07 **Testing of concrete**

Concrete shall be tested by the Contractor as described herein and ordered by the Engineer.

All test results shall be reported in writing to the Engineer within 48 hours of the test being completed.

4.07.01 Test methods

Unless otherwise ordered or permitted by the Engineer, concrete tests shall be performed according to the methods stated below. Tests not described here shall be performed according to the relevant British Standard or ASTM if no relevant BS exists, to the satisfaction of the Engineer.

Before fresh concrete properties are tested on mass concrete with nominal maximum aggregate size of 64 mm, aggregate particles greater than 32 mm shall be removed by pulling out the particles with sticking mortar.

Issued for Tender

4.07.02 Fresh concrete

4.07.02.1 *Sampling of concrete*

Sampling of fresh concrete shall be undertaken in accordance with BS1881: Part 101:1983

4.07.02.2 *Workability*

Workability tests shall be carried out by:

The "Slump test" in accordance with BS1881: Part 102: 1983 (Concrete with slump exceeding 20 mm).

For zero slump concrete the test is in accordance with BS1881: part 104: 1983. Measuring of Vebe time.

The Contractor is free to propose other test methods.

4.07.02.3 *Bleeding*

Bleeding tests shall be carried out in accordance with ASTM Designation C232.

4.07.02.4 *Air content of fresh concrete*

The air content shall be tested either by:

- a) The pressure method in accordance with either BS1881: Part 106 1983 or ASTM Designation C231, or
- b) The gravimetric method in accordance with ASTM Designation C138, or
- c) The volumetric method in accordance with ASTM Designation C173.

4.07.02.5 *Unit weight of fresh concrete*

The weight per. cubic meter of fresh concrete shall be determined in accordance with BS1881: Part 107: 1983.

As deviations from the normal unit weight usually are a sign of deviations in strength, emphasis shall be put on the unit weight test. Any significant deviations shall immediately be investigated as to the cause and the possible consequences with regard to strength and durability of the concrete.

4.07.03 Hardened concrete

4.07.03.1 *Compressive strength of test cubes*

Test specimens shall be made and cured in accordance with BS1881: Part 111: 1983. The testing of strength shall be done in accordance with BS1881: Part 116:1983.

Issued for Tender

Concrete shall be tested by cubes 15x15x15 cm. The concrete shall not be screened before the specimens are made but aggregates >32 mm shall be pulled out together with adhering mortar.

Test specimens shall be moulded in steel forms, and compacted with a vibration table. Internal vibration shall not be used. Compaction by hand shall be done solely with the consent of the Engineer.

Identification of the specimens shall be written by water-resistant ink, not by engraving on the surface.

After de-moulding the specimens shall be stored in accordance with BS1881. The specimens must not be subject to any kind of shock or drying out.

When 15x15x15 cm cube moulds are used, compressive strength shall be tested at 7, 28 and 90 days, three specimens at each age.

The cubes shall be tested at right angles to the direction of concreting.

4.07.03.2 Compressive strength of drilled cores

Cores shall be drilled, prepared and tested in accordance with BS1881: Part 110:1983.

The diameter of the cores shall be as directed by the Engineer. Cores from concrete with nominal maximum aggregate size of 64 mm shall normally have a diameter of 200 mm. Cores from structural concrete with nominal maximum aggregate size of 38 mm or less may normally have a diameter of 100 mm.

Drilled cores shall be examined for compaction and strength as directed by the Engineer early in the construction period, and in connection with the trial mixes and the test castings, to establish the correlation between test cube strength and the in situ strength and for check of the compaction procedure. Later on in the construction period cores shall be drilled, examined and tested as deemed necessary by the Engineer, on basis of test cube results and actual workmanship.

4.07.03.3 Splitting tensile strength

The splitting tensile strength shall be tested in accordance with BS1881: Part 117:1983. (Test for Indirect Tensile Strength of Cylinders).

4.07.03.4 Unit weight of hardened concrete

The unit weight shall be tested in accordance with BS1881: Part 114: 1983. (Determination of the Saturated and Dry Densities of Concrete Specimens by the Water Displacement Method).

The saturated density shall always be tested just before any specimen is subject to the compressive strength test.

4.07.03.5 Modulus of elasticity

The modulus of elasticity shall be tested in accordance with BS1881: Part 121: 1983. (Test for the Static Modulus of Elasticity by means of an Extensometer).

4.07.03.6 Permeability

The permeability / intrusion of water under pressure shall be tested on concrete slabs 400x400x200 mm at the age of 28 days. Aggregate larger than 38 mm shall be removed from the fresh concrete.

The sides of the specimen shall receive a water-tight surface sealing, and the one-sided water pressure shall be 20 m. The pressure shall be increased step-wise during the first 3 days of test, and maintained at the maximum pressure for 11 days. Distilled water only shall be used.

Compaction and storage of the test slabs shall be as for test cubes. The side which shall be subject to water pressure shall be pick-hammered by hand to remove the cement skin before the test is started.

After the test is finished the specimen shall be cut in two halves and the depth of penetration measured. The specimen is considered impermeable if the penetration of water does not exceed half the slab thickness, i.e. 100 mm.

4.07.04 Concrete testing programme for proportioning and production of concrete

The Contractor shall complete a testing program before the normal concrete production is to start. The test program shall be submitted 10 weeks after the issue of the Letter to Commence.

The testing programme shall be implemented as soon as practically possible.

The tests shall be carried out with the available aggregate resources, the cement and pozzolanas that shall be used in the normal production and with the normal production equipment.

The same tests as described for the construction period shall be undertaken. The tests shall include filling and compaction of concrete in full scale.

Tests shall be done with various proportioning of each standard mix.

All test data and related information shall be recorded, and the log shall at all times be made available for the Engineer.

At completion of the test programme, the log and results with conclusions shall be presented for the approval of the Engineer. Final test results shall be submitted to the Engineer 4 weeks ahead of any construction Works.

4.07.05 Concrete tests during the construction period

4.07.05.1 *General*

The fresh concrete properties shall, in addition to what is shown below, be tested at the start of each casting period.

Fresh concrete properties shall always be measured in connection with casting of specimens for tests on hardened concrete.

4.07.05.2 *Testing program for structural concrete*

Issued for Tender

At least one sample shall be taken on each day that concrete of that type and grade is used. The rate of sampling shall, however, not be less than that specified in BS 1881.

The test shall include:

- Temperature of fresh concrete.
- Consistency.
- Unit weight of fresh concrete.
- Air content (where air-entraining admixture is used).
- Compressive strength and unit weight of hardened concrete.

The temperature shall be tested once per 25 m³ of concrete.

4.07.06 Submittal of test results.

The Contractor shall each month submit to the Engineer all test results, and include deviations and corrective measures.

The format of this submittal shall be subject to the Engineers approval.

4.08 **Repair of blemishes**

All surface blemishes exceeding 15 mm in any dimension shall be cleaned for laitance, and filled with dry mortar of mix proportions cement: sand= 1:2 as soon as the formwork is removed.

XX





Issued for Tender

Repair at a later point in time shall be done with Epoxy-mortar. In all cases repairs to concrete shall only be carried out with the prior written approval of the Engineer.

4.09 MEASUREMENT

(1) Concrete

Concrete laid in place as specified in the Drawing or directed by the Engineer shall be measured in cubic metre separately for each class. No deduction shall be made in the measurement for:

- (a) Bolt holes, pockets, box outs and cast in components provided that the volume of each is less than 0.15 cubic metres;
- (b) mortar beds, fillets, drips, rebates, recesses, grooves, chamfers and the like of 100 mm total width or less;
- (c) Reinforcement

(2) Admixtures, Workability and Hardening Agents and Curing Compounds

Unless stated otherwise, rate of concrete shall be deemed to include admixture, workability, hardening agent and curing compounds.

4.10 PAYMENT

Every class of concrete shall be paid as per respective contract unit rate. In addition to those specified in Clause 4.01 the respective rate shall also include the cost of:

- (a) All materials including admixture and workability agent, curing agent, labour, Tools, Plants and equipment required for mixing, transporting and placing in position, vibrating and compacting, finishing and curing including all incidental expenses.
- (b) Unless mentioned separately as an item in contract sampling and testing, quality assurance and supervision

Issued for Tender

SECTION VI
WORK'S REQUIREMENTS
SPECIFICATION
5-CONCRETE ANCILLARIES

Table of Contents

5	CONCRETE ANCILLARIES	1
5.01	Scope works	1
5.02	Formwork	1
5.03	Steel reinforcement	4
5.04	Tolerances and surface finishes	7
5.05	Embedding of items	11
5.06	Measurement	11
5.07	Payment	12

XX





05 CONCRETE ANCILLARIES.

5.01 Scope works

The portion of Work specified by this Specification Section shall consist of supplying all labour, plant and material, and doing everything necessary to complete the ancillary concrete works. This clause includes formwork, construction joints, steel reinforcement, tolerances and surface finishes and embedding of items.

Specifications for hard stone lining, boulder lining in concrete are given in Specification 4 Concrete.

5.02 Formwork

5.02.01 General

Upon request, the Contractor shall submit to the Engineer complete calculations and drawings showing the type and design of formwork, or special parts thereof. For more accurate, complicated formwork and formwork exposed to large loads the above said shall be a routine without a special request.

Forms shall conform to the dimensions and contours of the concrete as shown on the Drawings, and be of a type, size, shape, quality and strength which will produce true, smooth lines in accordance with the Drawings and the tolerance limits given in 5.05.

Formwork, which in the opinion of the Engineer, will not allow the specified surface finish or tolerances to be attained, shall not be used.

5.02.02 Formwork materials

Forms may be of plywood, steel sheet, wooden boards or other approved materials. The materials shall have strength, plainness and surface texture needed to achieve the specified concrete surface finish required. The materials shall be clean, sharp-edged, undamaged and of even thickness. If the wooden boards are planed, they shall be placed so that the concrete is cast against the unplanned surface. Forms may be made of prefabricated elements. Visible concrete surfaces shall be formed by either only new materials or only used materials. Unless otherwise permitted or ordered by the Engineer, all surfaces on the same structural element shall be formed by one type of formwork material.

All materials, which have been used as formwork, shall be thoroughly cleaned before being re-used, and forms, which have been used repeatedly and are no longer accepted by the Engineer for further use, shall be discarded or satisfactorily repaired.

The Contractor shall determine in agreement with the Engineer the most suitable materials to be used to produce the required finishes and shapes.

5.02.03 Formwork internal ties

Bolts and rods for internal ties shall be of approved types.

Bolts positioned in plastic pipes and thus leaving through-going holes may be used for structural elements not exposed to water. Ties, which are embedded in concrete, shall be so arranged that when the forms are removed, no metal shall be within 25 mm of any surface. If wire ties and steel bands are approved for use, the outer 25mm shall be removed and the wound made good. Holes in concrete faces from screw-out tie-bolts and from embedded ties shall be cleaned and dry-packed with mortar of the same or superior strength as the concrete, and with colour as near to the colour of the concrete as possible.

If possible, bolts and rods through concrete walls, which will be exposed to water pressure, shall be avoided. If used, they shall be provided with continuously welded washers, 100 x 100 x 5 mm, arranged in such a way that they will prevent leakage along the bolts and rods.

Formwork supports may be bolted to previously cast concrete, provided the type of bolt is to the satisfaction of the Engineer and that sufficient concrete strength has been attained.

5.02.04 Formwork construction

The formwork shall be sufficiently scaled to prevent damage to the fresh concrete by leakage or washing out of cement mortar during placing and compaction of the concrete. It shall also be constructed in such a manner as to prevent intrusion of damaging amounts of water or exposure to chemical or mechanical action before the concrete has attained sufficient strength. All formwork and formwork joints shall be with close fittings. Suitable devices shall be provided to hold adjacent edges together in accurate alignment. Where reinforcement passes through the formwork, care shall be taken to ensure a close fitting joint against the steel bars. Formwork shall be properly tightened against cast concrete to prevent leakage of cement mortar onto neighbouring concrete surfaces.

The formwork and its supports shall be constructed with sufficient strength to support all loads it is subjected to, such as dead load, utility loads, wind, construction loads and fresh concrete, without deflecting beyond the tolerances specified for the concrete surface concerned, or causing the concrete to crack.

Supports and scaffolding shall where necessary be constructed with geometrical adjustment devices, and in such ways that the static mode of action is clear and the deformations may be calculated. If adequate foundation for props cannot be provided, free span scaffolding shall be provided. Formwork for horizontal members, such as slabs and beams, shall be constructed with adequate overheight. Care shall be taken to prevent uneven deformations due to the location of casting joints and deformation of the supports.

Formwork joints shall be either horizontal or vertical, and shall either be continuous or form a regular pattern on the concrete surface.

Unless otherwise directed by the Engineer or on the Drawings, all formwork shall be provided with 25 mm angle fillets to external corners.

Where the formwork forms overhangs, holes/pipes or other means of evacuating air shall be provided for.

Surfaces sloping between 15 per cent and 20 per cent to the horizontal shall be formed with the aid of a suitable screed board to hold the concrete in place during vibration. Surfaces sloping at more than 20 percent shall generally be shuttered, but in certain cases, the Engineer may consent to the use of a sliding type of screed board where the configuration of the surface and the presence of suitable reinforcement close to the surface permit the required finish to be attained in this way.

Forms may be omitted for foundation concrete if in the opinion of the Engineer the sides of the excavation are sufficiently firm to permit the concrete to be thoroughly compacted without causing the adjacent earth or rock to yield. When such forms are omitted, the actual dimensions of the excavation shall be slightly greater than the dimensions shown on the Drawings for the foundations so that the design requirements are ensured.

All forms shall be constructed in such a way that they can be easily removed after the required period of concrete curing, without hammering or using pry bars against the concrete.

5.02.05 Oiling and wetting of formwork

The inside of steel or wooden forms shall normally be coated with non-staining mineral oil or, if the Engineer so consents, with other materials which shall be applied before the reinforcement is placed. Care should be taken that the oil or other approved material is not allowed to come into contact with the foundation, the reinforcement, or other surfaces where the oil may adversely affect the bond strength against the concrete.

Wooden forms for low concrete heights when not coated as specified above, and if approved by the Engineer, shall be thoroughly wetted well ahead of the deposition of the concrete.

5.02.06 Temporary Openings in Formwork.

Temporary openings (trapdoors) shall be provided at the base of column and wall formwork and at other points where necessary to facilitate cleaning and inspections immediately before depositing the concrete. Formwork for walls or other thin sections of considerable height shall be provided with openings or other devices where directed by the Engineer to facilitate the placing and consolidation of the concrete.

5.02.07 Removal of formwork.

In general and unless otherwise directed all formwork shall be removed from the concrete surfaces.

Formwork and shoring shall not be removed until the concrete has attained sufficient strength to withstand safely any stresses to which the structure may be exposed to. The Engineer shall determine the earliest time for removal of shoring and use of props for reduction of creep deformations. The Contractor shall ascertain that the necessary concrete strength is attained before commencing the removal. A small portion of formwork shall be removed first to verify that the concrete has hardened sufficiently before the whole area of formwork is removed.

The formwork shall be removed carefully without shock or disturbance and in such a manner that the concrete is not harmed.

The Contractor shall be responsible for and shall make good at his own cost all injury and damage arising from premature removal of formwork and/or shoring.

If on removal of the formwork honeycombing or other defects are observed in the concrete the Contractor shall immediately notify the Engineer and shall after his inspection thereof remedy these defects as soon as possible to the satisfaction of the Engineer.

5.03 Steel Reinforcement

5.03.01 Materials

The steel reinforcement shall be hot rolled deformed / ribbed bars conforming to the requirements of British Standard 4449:1988, grade of steel "High Yield". The specific number, type and location of ridges of the deformed bars shall be consented to by the Engineer.

5.03.02 Testing

For each consignment of steel reinforcement, the Contractor shall obtain and file a certificate of conformity, which shall be available to the Engineer upon request. The certificate in question shall confirm compliance with the contract requirements.

5.03.03 Storage and transport

Reinforcement steel shall be stored and transported in such a manner as to avoid contact with the ground. If the steel deteriorates seriously due to rust and scale during transport and storage, it may be rejected by the Engineer. Bars of different sizes and qualities shall be stored separately and tagged with the manufacturer's identification number.

5.03.04 Cutting, bending and straightening

Reinforcement shall be formed to the dimensions indicated on the Drawings and in the bar-bending schedules. In case of over-excavation not shown on the Drawings, the number and lengths of the bars shall, unless otherwise directed by the Engineer, be increased so that the reinforcement shall with unchanged spacing as indicated on the Drawings continue to the actual contour of the excavation. Reinforcement against a rock surface shown on the Drawings shall be modified so that the bars follow the actual contours of the excavation as approved by the Engineer.

Reinforcement shall be cut and/or bent in accordance with BS4466. Bends in reinforcement shall have a substantially constant curvature. Where it is necessary to bend reinforcement projecting from concrete, care should be taken to ensure that the radius of bend is not less than specified in BS4466. Hot bending of reinforcement or other heat treatment will be permitted only when approved by the Engineer.

Where it is necessary to reshape steel previously bent, this should only be done with the Engineer's consent and each bar should be inspected for signs of fracture. Bars with kinks or bends, which are not shown on the Drawings or in the bar-bending schedules, shall be rejected.

The permissible deviations from correct length of cutting are ± 20 mm for L less or equal to 6 m, ± 30 mm for L greater than 6 m, where L is the basic length of the rod. The tolerances of bending are ± 10 mm for L less or equal to 0,5 m, ± 15 mm for L between 0,5 m and 1,5 m, and ± 20 mm for L greater or equal to 1.5 m, where L is the length.

5.03.05 Fixing of steel reinforcement

Before being positioned steel reinforcement shall be cleaned and free from loose rust, loose mill scale, dirt, oil, grease, paint, retarders, curing compounds or any other substance which can be shown to affect adversely the steel or concrete chemically, or reduce the bond. After being placed, it shall be maintained in a clean condition until completely embedded in concrete.

Steel reinforcement shall be positioned in accordance with the detailed construction Drawings and secured against displacement outside the specified limits by using annealed iron-wire ties, suitable clips, concrete or steel supports, spacers or steel hangers. The reinforcement shall be firmly fixed in position so that it is not displaced during concreting or when workmen walk or climb on it.

The tolerances for placing of reinforcement in the form are:

- Cover: Not more than 5 mm closer to surface than that specified
- Vertical distance dependant upon the total height/depth (h) of structure:
 - $h < 0.50$ m; 10 mm
 - $0.50 \text{ m} < h < 1.50$ m; 15 mm
 - $h > 1.50$ m; 20 mm
- Distance between consecutive parallel bars where L is the basic distance between reinforcement bars:
 - $L < 0.05$ m ± 5 mm
 - $0.05 \text{ m} < L < 0.20$ m ± 10 mm
 - $0.20 \text{ m} < L < 0.40$ m ± 20 mm
 - $L > 0.40$ m ± 30 mm
- Allowable deviation in location of reinforcement bars measured horizontally or vertically depends upon total vertical dimension and horizontal dimension of the structure. The tolerated deviation is the same both horizontally and vertically and thus the structure dimension is only called L in the table below.
 - $L < 0.25$ m ± 10 mm
 - $0.25 \text{ m} < L < 0.50$ m ± 15 mm
 - $0.50 \text{ m} < L < 1.50$ m ± 20 mm
 - $L > 1.50$ m ± 30 mm

Spacer blocks shall be made from concrete of the same grade as the structures they are designed for.

Where bars protrude more than 3 m beyond or above construction joints the bars shall be suitably secured to hold them in the required position. Bars protruding vertically out of concrete sections shall be covered / secured by wooden plates/boxes to prevent potential serious stumbling or falling accidents.

The ends of all tying wires shall be turned into the body of the concrete and not allowed to project towards the surface.

The position of reinforcement shall be checked before and during concreting, particular attention being paid to the position of top reinforcement in cantilever sections. During concreting a competent steel fixer shall be in attendance to adjust and correct the positioning of the reinforcement immediate prior to the placing of the concrete.

Except at splices, the clear distance between parallel deformed bars in the same layer shall not be less than 30 mm or twice the diameter of the bar, whatever is greatest, unless otherwise stated on the Drawings. With two or more reinforcement layers, the clear distance between the layers shall not be less than 20 mm or 1.5 times the diameter of the bars, whatever is greatest, unless otherwise stated on the Drawings.

5.03.06 Concrete cover

At surfaces subjected to rapid flow of water, and at surfaces and footings in which concrete is deposited directly against the ground, steel reinforcement shall have a nominal cover of 75 mm. At other surfaces of concrete exposed to water or severe weathering conditions, or situated below ground level, the nominal cover shall be 50 mm, unless otherwise specified on the Drawings. In other cases the nominal cover shall be 25 mm unless otherwise specified on the Drawings.

5.03.07 Splicing

Splicing of deformed / ribbed bars shall be carried out in such a manner that the bars overlap for a length of at least 50 times the bar diameter.

When it is necessary to splice reinforcement at points other than those shown on the Drawings the position of splices shall be determined by the Engineer. Splices shall not be made at points of maximum stress and splices in adjacent bars shall be staggered.

5.03.08 Welding

Welding on site may be undertaken on the consent of the Engineer provided that the types of steel have the required welding properties, confirmed by the manufacturer in writing. All welding is to be carried out by skilled personnel only.

5.03.09 Steel fibre reinforcement

To achieve greater toughness of the concrete where abrasive conditions occur steel fibre reinforcement shall be added to the concrete when specified by the Engineer. Steel fibres shall be hooked fibres (Dramix, or similar) or enlarged end fibres (EE, or similar), length minimum 30 mm. The length/diameter ratio shall be minimum 60. Steel fibre proportioning will depend on type of fibre, but shall

comply with proven figures for optimal proportioning for the actual type of steel fibres. Minimum amount of fibres added is 60 kg/m^3 of concrete with fibre length 30 - 39 mm and 40 kg/m^3 with fibre length 40 mm and above.

5.04 Tolerances and Surface Finishes

5.04.01 General

Tolerances are defined as the limitations within which structures shall be constructed in space in relation to their positions as shown on the Drawings. Tolerances mentioned in this section include those for setting out and in situ performance as well as production and erection procedures in the case of precast structures. Tolerances concern the structures before removal of supporting shores. Deflections and designed cambers are not taken into account here and in general tolerances do not refer to time and temperature dependent variations.

The Contractor shall maintain control points and bench marks during the whole construction period up to the completion in order to execute effective control of measurements and dimensions.

Surface finishes are defined as the limitations within which all points on a surface shall fall in relation to the general or average position of the surface. Surface finishes include limitations on abrupt irregularities, gradual irregularities, and texture. No point on a surface shall lie outside the band of tolerances.

The tolerances and finishes specified shall be achieved without any after-treatment of surfaces, other than removal of irregularities as specified.

Plastering of defective concrete as a means of making good will not be permitted, unless allowed by the Engineer.

Where tolerances or surface finishes shown on the Drawings differ from those given here in the specifications, those shown on the Drawings shall rule.

5.04.02 Tolerances

The tolerances for individual cast structural elements and for placement of structural elements within a structural unit are:

- a) Position on plan.(Distance to the closest reference line) $\pm 15 \text{ mm}$
- b) Verticality (where h is the basic height of the structure section)

$$h < 1.0 \text{ m: } \pm 8 \text{ mm}$$

$$1.0 < h < 3.0 \text{ m: } \pm 15 \text{ mm}$$

$$h > 3.0 \text{ m: } \pm (15 \text{ mm} + 0.002 h)$$

- c) Cross and linear dimensions

$$L < 0.25 \text{ m: } \pm 5 \text{ mm}$$

$$0.25 < L < 0.5 \text{ m: } \pm 10 \text{ mm}$$

$$L > 0.5 \text{ m: } \pm (10 \text{ mm} + 0.003L)$$

Precast units are to be set by eye to straight lines or smooth continuous curves as shown on the Drawings when viewed over a length of at least 15 m along the most prominent face or edge. No waved or abrupt changes of curvature will be accepted. The units shall then be finally grouted into position and the Contractor shall take all necessary precautions to ensure that the units are not displaced before the grout has set.

5.04.03 Finishes

Abrupt irregularities are steps in the surfaces caused by displaced or misplaced formwork or defects in the formwork surface and poor workmanship on free surfaces. Where required, all abrupt irregularities exceeding the specified limits shall be removed by hand-grinding to the satisfaction of the Engineer.

Gradual irregularities shall be tested by measurement at the centre of a straight or appropriately curved template 3 m long. No point on the surface shall lie further away from the template when laid in the appropriate position on the surface of the concrete than the distances given in the table entitled "Surface Finishes".

Surfaces which will be exposed to the weather and which would normally be level shall, unless otherwise directed, be sloped 2 per cent for drainage.

All stains and encrustation on exposed concrete surfaces shall be removed using a method to the satisfaction of the Engineer.

5.04.04 Classes of finish

5.04.04.1 Shuttered Surfaces

Class F1. This finish is for surfaces against which backfill or further concrete will be placed. Shuttering shall consist of suitable material which will prevent the loss of grout when the concrete is vibrated.

Class F2. This finish shall be the normal finish for surfaces which are permanently exposed to view, but where the highest standard of finish is not required. Shuttering to provide a Class F2 finish shall be faced with planed and close-jointed, thickness-planed boards with square edges arranged in a uniform pattern. Alternatively plywood or metal panels may be used if they are free from defects likely to detract from the general appearance of the finished surface. Joints between boards and panels shall be horizontal and vertical unless otherwise directed.

The finish shall be such as to require no general filling of surface pitting, but fins and surface discolouration and other minor defects shall be remedied by methods approved by the Engineer.

Class F3. This finish is for surfaces prominently exposed to view where good appearance and alignment are of special importance, and hydraulic surfaces subject to the passage of fast flowing water. To achieve this finish, normal wrought or standard steel panels may have to be faced with plywood or equivalent material in large sheets. The sheets shall be arranged in an approved uniform pattern. Wherever possible the joints between sheets shall be arranged to coincide with architectural features like sills, window heads, or changes in direction of the surface. All joints between panels shall be vertical and horizontal unless otherwise

directed. Suitable joints shall be provided between sheets to maintain accurate alignment in the plane of the sheets.

For warped surfaces the facing shall be built up of laminated splices cut to make a tight surface which shall then be dressed and sanded to the required curvature.

Class F4. This finish is similar to that required for Class F3, but is for surfaces exposed to water flowing at particularly high velocities, where first class alignment and a dense surface free from air holes and other defects is required.

5.04.04.2 Unshuttered Surfaces

Class U1, wood floated finish. This is for surfaces of beds and slabs to receive mastic pavings or block or tile pavings bedded in mastic, and for exposed surfaces of pavings, slabs, tops of walls etc., where a hard smooth steel-trowelled surface is not required. Floating shall be done only after concrete has hardened sufficiently, and may be by hand or machine. Care shall be taken that the concrete is worked no more than is necessary to produce a uniform non-slip surface free from float marks.

Joints and edges shall be tooled, and entrance slabs and steps screeded as directed.

Class U2, floated and broomed finish. When the surface has been floated according to class U1 and the concrete has started to harden, brooming shall be carried out in the direction transverse to the direction of the traffic. The brooming shall leave traces 1-2 mm deep.

Class U3, steel-trowelled finish. This is a hard smooth finish for surfaces of concrete pavings, tops of walls, copings and other surfaces exposed to weathering, surfaces of beds and slabs to receive thin flexible sheet and tile pavings bedded in adhesive, and seatings for bearing plates and the like where the metal is in direct contact with the concrete. Trowelling shall not commence until the moisture film has disappeared and the concrete has hardened sufficiently to prevent excess laitance from being worked to the surface. The surface shall be trowelled under firm pressure to flatten the sandy texture of the floated surface and produce a dense uniform surface free from trowel marks.

Class U4. This surface exposed for water with high velocity, is similar to Class U3 except that the tolerances are smaller. Special care shall be taken to avoid excess of fine material or moisture being brought to the surface during the screeding and finishing operations.

5.04.04.2.1 Surface Finishes.

Class of surface	Irregularities Gradual [mm]	Abrupt [mm]
<u>Shuttered surfaces of in situ concrete</u>		
Class F1	25	10
Class F2	15	3
Class F3	6	3
Class F4	6	0

Class of surface	Irregularities Gradual [mm]	Abrupt [mm]
------------------	-----------------------------------	----------------

Unshuttered surfaces of in situ concrete

Class U1	10	3
Class U2	10	3
Class U3	10	0
Class U4	6	0

Shuttered and unshuttered surfaces of precast units

Class P1	1 in 1000	0
Class P2	1 in 1000	0

5.04.04.3 Embedding of steel structures, gates, penstocks, etc.

The tolerances for cast and hardened concrete constructions forming a gate course, or an opening for gate guides or for other prefabricated elements (of steel, metal, glasses, plastic) to be embedded are:

- Position horizontally in relation to the centreline through the gate course or the opening: ± 10 mm.
- Vertically: ± 10 mm
- One plane (vertical, inclined or horizontal) must not deviate more from a straight plane in any direction than:

On length less than 2.5 m	:	5 mm
On length 2.5 m to 7.5 m	:	2 %
On length over 7.5 m	:	15 mm

All other construction specifications are to be maintained.

5.04.04.4 Finishing of hardened surface with a separate screed

The concrete surfaces to be finished by a separate concrete screed or reinforced layer shall be struck off by wooden board 40 to 100 mm lower than the surface shown on Drawings. The surface shall when possible be cleaned with an air-water jet so as to ensure bond for the surface screed. Before the application of the concrete screed the hardened concrete shall be saturated with water for three days, but it shall be left to dry for a few hours before the work commences. No free water shall be present when applying the top screed.

Immediately before the application of the top screed, concrete glue acceptable to the Engineer shall be applied.

The aggregates for the screed shall be well graded and shall have a maximum stone size of 10 - 16 mm. The mix shall be 1 part cement to 4 parts aggregate and the concrete shall have a very stiff consistency. It shall be spread in one layer 45 to 100 mm thick and screeded to about 15 mm above the final surface. The

concrete shall then be compacted by vibrating shovels, screeded to its final level, floated and smoothened all as described for Class U3.

During the application of the top screed and during the curing period, the surface shall be protected against temperature changes.

5.05 Embedding of Items

Where shown on the Drawings or as otherwise directed, the Contractor shall supply, fix and embed in the concrete and grout in such steel items as steel lining, pipes, edge-protecting angles, steel grooves, anchors for steel structures, etc.

Before placing of the concrete, the steel items to be embedded shall be thoroughly cleaned for oil, rust and other foreign matter. The items shall be properly fixed to avoid any displacement during concreting.

Where directed by the Engineer, rapid hardening cement shall be used and non-shrink ingredients of approved type shall be added to the concrete and grout. Forms shall be built where necessary. Care shall be taken to ensure that the concrete and grout fill the whole space under and around the steel items. Where required the grout shall be inserted under pressure. Dry packing shall be used where directed. The casting velocity at embedding is limited to 0.2 m/h.

5.06 MEASUREMENT

a) Reinforcement

All types of reinforcement shall be measured in length including hooks, if any, separately for different diameters as actually used in works or as directed by the Engineer, excluding overlaps. From the length so measured, the weight of reinforcement shall be calculated in ton on the basis of IS: 1732.

Wastage, overlaps, couplings, welded joints, spacer bars, chairs, stays, hangers and annealed steel wire or other method for binding and placing shall not be measured and cost of these items shall be deemed to be included in the rates for reinforcement. An average weight of at least 5 samples each one metre length shall be determined by the laboratory approved by the Engineer. The weight of each type of the reinforcement shall be determined by multiplying average weight of the respective reinforcement by its length.

b) Formworks

Where it is specifically stipulated in the Contract that the formwork shall be paid for separately, measurement of formwork shall be taken in square metres of the surface area of concrete which is in contact with formwork.

5.07 PAYMENT

1) Reinforcement

The reinforcement shall be paid at contract unit rate.

2) Formworks

In case of formwork and other false work specifically provided as a separate item, it shall be paid as per the contract unit rate.

[Handwritten signature]

[Handwritten signature]

[Handwritten signature]

SECTION VI
WORK'S REQUIREMENTS
SPECIFICATION
6-MASONRY FOR STRUCTURES

Table of Contents

6	MASONRY FOR STRUCTURES	1
6.01	Scope	1
6.02	Materials	2
6.03	Construction	2
6.04	Random Rubble Coursed or Uncoursed	4
6.05	Test and Standard Acceptance	4
6.06	Measurement	4
6.07	Payment	4

XX

6 Masonry for Structures

6.01 Scope

This Section covers the furnishing of materials and construction of different types of stone masonry works in accordance with the Drawing and this Specifications or as directed by the Engineer.

6.02 Materials

6.02.01 Stone

The stones to be used shall be durable and angular in shape. If boulders are used, they shall be broken into angular pieces. The stones shall be sound, hard and free from iron bands, spots, sand holes, flaws, shakes, cracks or other defects. The stone shall not absorb water more than 5 per cent. The specific gravity of the stone shall not be less than 2.50. Except otherwise described in the contract, the length of any stone shall not exceed three times its height. The breadth of the stone on the bed shall not be less than 150 mm nor greater than $\frac{3}{4}$ the thickness of the wall. At least 85% of the stones used in masonry, except those used for chinking as chips or spalls of stones shall have individual volumes of more than 0.01 m³. The chips or spalls used including voids in the dry stone masonry shall not be more than 20% of the stone masonry by volume. In case of mortared masonry, the total volume of mortar and spalls taken together shall not be more than 30% of the mortared masonry. Representative samples of the stones intended for use in the works shall be submitted to the Engineer for prior approval. Further representative samples shall be submitted for approval whenever there is a change in the type or strength of the rock that the Contractor intends to use in masonry work.

6.02.02 Mortar

Sand

Sand shall comply with IS: 216., It shall consist of natural sand, crushed stone sand, crushed gravel sand or a combination of any of them. It shall be hard, durable, clean and free from deleterious & organic matters. It shall not contain clay, silt and fine dust more than 5 % by weight. The particle size grading of sand shall be within the limits as specified in Table 2.02.

Table 2.02: Grading envelope for sand for Masonry work

Sieve size (mm)	Percentage passing by weight
4.75	100
2.36	90- 100
1.18	70-100
0.6	40-100
0.3	5-70
0.15	0-15

Cement

Cement shall be ordinary Portland cement and shall comply with Clause 614.

Mortar shall comply with IS 2250-1981; Code of Practice for preparation and use of masonry mortar. The mortar used in work shall have the strength not less than 5 N/mm² or 7.5 N/mm² at 28 days as specified.

However, if provided in the Contract, cement and sand may also be mixed in specified proportions. Cement shall be proportioned only by weight, by taking its unit weight as 1.44 ton per cubic metre and sand shall be proportioned by volume after making due allowance for bulking.

The mixing shall be done in a mechanical mixer unless hand-mixing is permitted by the Engineer. If hand-mixing is allowed, the operation shall be carried out on a clear watertight platform. In the required proportion cement and sand shall be first mixed dry to obtain a uniform colour. Then required quantity of water shall be added and the mortar shall be mixed to produce workable consistency. The mortar shall be mixed for at least three minutes after addition of water in the case of mechanical mixing. In the case of hand mixing, the mortar shall be hoed back and forth for about 10 minutes after addition of water in order to obtain uniform consistency.

Only that quantity of mortar shall be mixed at a time which can be used completely before it becomes unworkable. Any mortar that has become unworkable due to loss of water before elapsing the initial setting time of cement, shall be rewet to make it workable and shall be used in the works. On no account mortar shall be used after elapsing the initial setting time of cement.

6.03 Construction

The method of construction described herein shall hold in all Clauses of this Section, wherever applicable.

6.03.01 General

Construction shall be carried out in accordance with I.S. 1597-1992, Code of Practice for construction of stone masonry, Part 1 Rubble stone masonry or Part 2 Ashlar Masonry as appropriate. All stratified stone possessing bedding planes shall be laid with its natural bed as nearly as possible at right angles to the direction of load. In the case of arch rings, the natural bed shall be radial. Face work groins shall be built to a height not exceeding one meter in advance of the main body of the work and adjacent walling stepped down on either side. Masonry face work between the groins shall then be built to a height not exceeding 500 mm above the backing which shall then be brought up level with the completed face work. At no time shall the backing be built up higher than the face work.

Except for dry rubble walling, all joints (gaps) shall be sufficiently thick to prevent stone to stone contact and the gaps shall be completely filled with mortar. Stones shall be clean and sufficiently wetted before laying to prevent absorption of water from mortar.

Placing loose mortar on the course and pouring water upon it to fill the gaps in stones shall not be allowed. Mortar shall be fluid, mixed thoroughly and then poured in the joints. No dry or hollow space shall be left anywhere in the masonry and each

stone shall have all its faces completely covered with mortar of the thickness as specified for joints.

The bed which is to receive the stone shall be cleaned, wetted and covered with a layer of fresh mortar. All stones shall be laid full in mortar both in bed and vertical joints and settled carefully in place with a wooden mallet immediately after placement and solidly embedded in mortar before it has set. Clean and wet chips and spalls shall be wedged into the mortar joints and bed whenever necessary to avoid thick joints or bed of mortar. When the foundation masonry is laid directly on rock, the bedding face of the stones of the first course shall be dressed to fit into rock snugly when pressed down in the mortar bedding over the rock. For masonry works over rock, a levelling course of M15/40 or M15/20 concrete 100mm thickness shall be laid over rock and then stone masonry work shall be laid without foundation concrete block.

In case, any stone already set in mortar is disturbed or the joints broken, it shall be taken out without disturbing the adjoining stones and joints. Dry mortar and stones thoroughly cleaned from the joints and the stones shall be reset in fresh mortar. Sliding one stone on top of another which is freshly laid, shall not be allowed.

Shaping and dressing of stone shall be done before it is laid in the work. Dressing and hammering of the laid stones which will loosen the masonry, shall not be allowed.

Building up face wall tied with occasional through stones and filling up the middle with stones spalls and chips or dry packing shall not be allowed. Vertical joints shall be staggered. Distance between the nearer vertical joints of upper layer and lower layer in coursed rubble masonry shall not be less than half the height of the course.

Masonry in a structure between two expansion joints shall be carried up nearly at one uniform level throughout but when breaks are unavoidable the masonry shall be raked in sufficiently long steps to facilitate jointing of old and new work. The stepping of raking shall not be more than 45 degrees with the horizontal. Masonry shall not be laid when the air temperature in the shade is less than 3°C. Newly laid masonry shall be protected from the harmful effects of weather.

6.03.02 Concreting Capping

Where masonry structures are to receive a concrete capping. The joints to the upper surface of the masonry shall be raked out to a depth of 10 mm prior to placing of the concrete to the capping. The concrete for capping shall be as per the Drawing or as directed by Engineer and shall conform to Section 4.

6.03.03 Pointing

Where external faces of the mortared masonry work will be backfilled or otherwise permanently covered up, the mortared joint shall be finished flush to the faces of the adjacent stonework.

Where mortared masonry faces will remain exposed, the mortar joints shall be pointed to a consistent style as shown on the Drawing. Pointing shall be carried out using mortar 1:3 by volume of cement and sand or as shown on the Drawing. The mortar shall be filled and pressed into the raked out joints before giving the

required finish. The pointing, if not otherwise mentioned shall be ruled type for which it shall, while masonry work is still green, be ruled along the center with half round tools of such width as may be specified by the engineer. The excess mortar shall then, be taken off from the edges of the lines and shall not be unnecessarily plastered over the exposed stone works. The thickness of the joints shall not be less than 3mm for Ashlar masonry.

However, the maximum thickness of joints in different works shall be as follows:

Random Rubble: 20 mm

Coursed Rubble: 15 mm

Ashlar masonry: 5 mm

6.04 Random Rubble-Coursed or Uncoursed

All stones shall be carefully set with a bond stone provided at the rate of at least one to every 0.9 m² of exposed face. Bond stones shall measure not less than 150 mm x 150 mm on the exposed face and not less than 450 mm in length or the full thickness of the wall, whichever is the less.

6.05 Test and Standard of Acceptance

Before laying any mortar, the Contractor shall make three sets of mortar test cubes from each source of sand to demonstrate the compliance of the mix to the specified strength. Each set shall comprise two cubes, one to be tested at 7 days and the other to be tested at 28 days. During construction, the Contractor shall make and test mortar cubes at the rate of three cubes for every 10m³ of masonry to assess the strength subject to a minimum of 3 cubes samples for a day's work. Testing of cubes shall be in accordance with IS: 2250. The stones shall be tested for the water absorption as per IS: 1124 and it shall not be more than 5 percent. The stones shall also be tested for Specification gravity and it shall not be less than 2.65. Sand shall be tested as per Clause 613 or as directed by the Engineer. At least 3 set of tests for stone and sand shall be conducted for every source.

6.06 Measurement

Stone masonry shall be measured in cubic metres. The pointing shall be measured in sq. m.

6.07 Payment

The stone masonry and the pointing shall be paid at the respective contract unit prices which shall be the full and the final compensation to the Contractor.

SECTION VI
WORKS REQUIREMENTS
SPECIFICATION
7- PROTECTION WORKS

Table of Contents

7	PROTECTION WORKS	1
7.01	Gabions	Error! Bookmark not defined.
7.02	Geotextiles	4
7.03	Measurement	5
7.04	Payment	5

07 PROTECTION WORKS

07.01 Gabions

07.01.01 Scope

This Specification covers the construction of gabion walls and aprons for constructing retaining walls, lining channels, revetments and other anti-erosion structures.

Gabions shall be flexible galvanised steel-wire wiremesh cages packed with rock.

07.01.02 Materials

(a) Rock

Rocks used as filling for cages shall be clean, hard, unweathered boulders or rock fragments. No rock fragment shall exceed the maximum size given in Table 7.1, and at least 85% of the rocks shall be of a size equal to or above the average least dimension size in Table 7.1.

Table 7.1 Rock sizes

Depth of cage (m)	Rock size according to the largest dimension of rock	
	Average least dimension mm	Maximum mm
0.2	125	150
0.3	125	200
0.5	125	250
1.0	125	250

(b) Wire

All wire for making the gabions and for tying during the construction of the gabions shall comply with the requirements of BS 183 or equivalent for mild steel wire.

(c) PVC coated wire

The gabions of PVC coated mesh shall be of an acknowledged make which shall be subject to approval by the Engineer.

(d) Galvanising

All wire used in the making of gabions shall be galvanised in accordance with the provisions of BS 183: 1972 or equivalent for Class A heavy galvanised mild steel wire.

(e) Wire mesh

Wire mesh shall comply with the requirements of BS 7372 or equivalent.

07.01.03 Constructing gabion cages

(a) General

Gabion cages shall be made from wire mesh of the size, type, and selvedge as specified below. The cages shall be subdivided into cells by wire mesh diaphragms and will be of two types.

(i) Boxes which are generally used for the construction of gabion walls. These boxes are subdivided into cells by diaphragms spaced at 1.0 m intervals. No diaphragms are required for a box of which the length does not exceed 1.5 m.

(ii) Mattresses which are generally used as single-layer aprons only in revetments, channel linings, etc and in which the maximum width shall be subdivided by diaphragms into cells with a width of 600 mm or 1.0 m as specified in the Bill of Quantities.

The standard sizes of boxes and mattresses are as follows:

(1) Boxes:

- | | |
|---------------------|---------------------|
| - Length | 1, 2, 3 and 4m |
| - Width | 1.0m |
| - Depth | 0.3m, 0.5m and 1.0m |
| - Diaphragm spacing | 1.0 m |

(2) Mattresses:

- | | |
|-------------|------------------------------|
| - Length | 6 m |
| - Width | 2 m |
| - Depth | 0.2m, 0.3m and 0.5m |
| - Diaphragm | 600 mm or 1.0 m as specified |

Other gabions may be supplied, provided that the Engineer's prior permission has been obtained.

(b) Selvedges

The cut edges of all mesh used in the construction of gabions, except the bottom edges of diaphragms and end panels, shall be selvedged with wire with a diameter as specified in BS 183 or equivalent.

Where the selvedge is not woven integrally with the mesh but has to be tied to the cut ends of the mesh, it shall be attached by tying the cut ends of the mesh to the selvedge, so that a force of not less than 8.5 kN applied in the same plane as the mesh at a point on the selvedge of a mesh sample of 1.0 m in length will be required to separate it from the mesh.

(c) Diaphragms and end panels

The diaphragms and end panels shall be selvedged on the top and vertical sides only. The end panels shall be attached by the cut ends of the mesh wires at the



bottom of the panel being twisted around the selvedge on the base of the gabion. Similarly, the diaphragms shall be attached by the cut ends of the mesh being twisted to the twisted joints of the mesh in the base of the gabion. In each case the force required to separate the panels from the base shall be not less than 6 kN/m.

(d) Binding and connecting wire

Sufficient binding and connecting wire for all the tying to be done during construction of the gabions as specified below shall be supplied with the gabion cages. The diameter of the wire shall be 2.2 mm.

(e) Tolerances

The tolerance on the specified diameter of all wire shall be $\pm 2.5\%$. The length of the cages shall be subject to a tolerance of $\pm 10\%$, the width of the cages shall be subject to a tolerance of $\pm 5\%$, and the depth of the cages shall be subject to a tolerance of $\pm 5\%$.

07.01.04 Constructing gabions

(a) Preparing the foundation and surface

The surface on which the gabion cages are to be laid prior to being filled with rock shall be levelled to the depth shown on the Drawings or as directed by the Engineer so as to present an even surface. If necessary, cavities between rock protrusions shall be filled with material similar to that specified above (Materials). Where required, a foundation trench along the toe of the revetment or wall shall be excavated to the dimensions shown on the Drawings or indicated by the Engineer.

(b) Geotextile filter fabric

One layer of Geotextile filter fabric shall be placed where indicated on the Drawings or ordered by the Engineer. The material shall be placed in accordance with the instructions in strips with a minimum overlap of 300 mm at the joints, and shall be properly fastened to prevent any movement or slipping while the gabions are being placed.

(c) Assembly

The methods of constructing, stretching, placing in position, wiring and filling the gabions with rock shall generally be in accordance with the manufacturer's instructions which have been approved by the Engineer, but nevertheless sufficient connecting wires shall be tensioned between the vertical sides of all the outer visible cells to prevent the deformation of boxes as they are being filled with stone.

It is essential that the corners of gabion cages be securely wired together to provide a uniform surface and ensure that the surface does not resemble a series of block or panels.

The layout and the tolerances for the layout of the boxes shall be as shown on the Drawings or as instructed by the Engineer.

(d) Rock filling

(i) Boxes in retaining walls

Particular care shall be taken in packing the visible faces of gabion boxes, where only selected stone of the specified size shall be used so as to obtain an even faced finish. The boxes shall be filled in layers to prevent deformation and bulging. Boxes shall be filled to just below the level of the wire braces, after which the braces shall be twisted to provide tension. Care must be taken to ensure that consecutive layers of cages are filled evenly to a level surface ready to receive the next course.

(ii) Mattresses used in revetments and aprons

The 0.2 m, 0.3 m and 0.5 m gabions forming aprons and revetments shall be filled by random stones being packed in the first layer and selected stones being used for the top layer so as to resemble normal stone pitching.

07.02 Geotextiles

Geotextiles, where specified, shall meet the requirements given in Table 7.2. The fabric shall not be exposed to direct sunlight for prolonged periods and shall be protected from mechanical damage during installation and construction.

Table 7.2: Requirements for geotextiles

Aggregate placed adjacent to the geotextile		Geotextile, weight per area of the geotextile material (g/m ²)	
Aggregate type	Maximum particle size, d_{max}	Placed on dry, firm subsoil 1)	Placed on soft, wet subsoil 2)
Gravel, sand or graded crushed material	Maximum 50 mm	Minimum 140	Minimum 200
Sorted crushed rock	Maximum 200	Minimum 200	Minimum 320
Dump rock (DR), unsorted	-	Minimum 320	Special reinforcement shall be considered
Dry subsoil refers to moisture contents below OMC of BS1377 (2 kg rammer) test 1.9.			
Soft, wet subsoil is silty or clayey materials in waterlogged areas or as defined by the Engineer			



07.03 Measurement

Gabion wire mesh and mattresses shall be measured in cubic metre and Geotextile in square metre.

07.04 Payment

Gabion boxes, gabion mattresses and geotextiles shall be paid as per Contract unit rate of the respective item.

XX

SECTION VI
WORK'S REQUIREMENTS
SPECIFICATION

**8-PIPE DRAINS, PIPE CULVERTS AND CONCRETE
CHANNELS**

Table of Contents

8	PIPE DRAINS, PIPE CULVERTS AND CONCRETE CHANNELS.....	1
8.01	Pipe Drains And Pipe Culverts	1
8.02	Concrete Channelling	6
8.03	Completion Of Drainage Works	8







8. PIPE DRAINS, PIPE CULVERTS AND CONCRETE CHANNELS

8.01 PIPE DRAINS AND PIPE CULVERTS

(1) Scope

This Clause covers the works for the construction of pipe drains and culverts with or without prefabricated reinforced cement concrete pipes and/or high-density polythene pipes (HDP Pipes).

(2) Materials

(a) Reinforced Concrete Pipes

Reinforced concrete pipes shall comply with the requirements of NS: 80 /IS: 458. Reinforced concrete pipes either spun or vibrated cast shall be such that the maximum tensile stress in the circumferential steel due to specified hydrostatic test pressure does not exceed the limit of 125 N/mm² in the case of mild steel rods, 140 N/mm² in the case of hard-drawn steel wires and high strength deformed steel bars and wires.

The barrel thickness shall be such that under the specified hydrostatic test pressure, the maximum tensile stress in concrete, when considered as effective to take stress along with the tensile reinforcement. Shall not exceed 2 N/mm² for pressure pipes and 1.5 N/mm² for non-pressure pipes but the barrel wall thickness shall be not less than those given in Table 8.01 for pipes manufactured by spun process. For pipes manufactured by vibrated casting process, the barrel wall thickness shall be as given in Tables

Table 8.01 (2): Design and Strength requirements of Concrete Pipes of class NP3 Reinforced Concrete, medium duty, Non- Pressure Pipes.

Internal diameter of pipes mm	Barrel Wall thickness mm	Reinforcements			Strength, Test requirement for Three edge Bearing Test	
		Longitudinal, mild steel or hard drawn steel		Spiral, Hard drawn steel Kg/ Lin metre	Load to produce 0.25 mm Crack KN/ Lin metre	Ultimate Load KN/ Lin metre
		Minimum number	Kg/ Linear metre			
(1)	(2)	(3)	(4)	(5)	(6)	(7)
300	40	8	0.78	1.8	15.5	23.25
450	75	8	0.78	3.79	21.56	32.34
600	85	8 or 6+6	1.18	7.01	28.74	43.11
900	900	6+6	2.66	18.30	43.11	64.67

1000	115	6+6	2.66	21.52	47.90	71.85
1200	120	8+8	3.55	33.57	57.48	86.22

Table 8.01 (2): Design and Strength Test requirements of Concrete Pipes of class NP3- Reinforced concrete, medium duty, non-pressure made by vibrated Casting process.

Internal diameter of pipes mm	Barrel Wall thickness mm	Reinforcements			Strength, Test requirement for Three edge Bearing Test	
		Longitudinal, mild steel or hard drawn steel		Spiral, Hard drawn steel Kg/ Lin metre	Load to produce 0.25 mm Crack KN/ Lin metre	Ultimate Load KN/ Lin metre
		Minimum number	Kg/ Linear metre			
(1)	(2)	(3)	(4)	(5)	(6)	(7)
300	40	8	0.78	1.8	15.5	23.25
450	75	8	0.78	3.79	21.56	32.34
600	85	8 or 6+6	1.18	7.01	28.74	43.11
900	900	6+6	2.66	18.30	43.11	64.67
1000	115	6+6	2.66	21.52	47.90	71.85
1200	120	8+8	3.55	33.57	57.48	86.22

(a) HDP Pipes HDP pipes shall comply with the requirements of NS: 40.

3 Excavation for pipe

The foundation bed for the pipe culverts/drains shall be excavated in accordance with Section VI (3) true to the lines and levels shown on the Drawing or to such other lines and depths as the Engineer may direct. The pipes shall be placed in shallow excavation of the natural ground or in open trenches cut in existing embankments, taken down to the levels as shown on the Drawing. The additional width of the trench on either sides of the pipe shall be 150 mm or one-fourth of the diameter of the pipe whichever is more. Should the Contractor desire to use mechanical plant for excavating trenches or for laying pipes he shall submit his proposals for approval by the Engineer, but such approval shall not relieve the Contractor from his responsibilities in case of damage to pipes.

The pipe shall be placed where the ground for the foundation is reasonable firm. Where the bottom of the trench as excavated does not provide a suitably firm foundation for culvert, due to soft, mucky or other unsuitable material being encountered, the unsuitable material shall be excavated to such depth, width and length as directed by the Engineer. The excavation shall then be backfilled with gravel or other approved granular material which shall be properly shaped and thoroughly compacted up to the specified level.

(3) Timbering Pits and Trenches

The sides of trenches shall, where required, be adequately timbered and supported to the satisfaction of the Engineer. All such excavations shall be of sizes sufficient to enable the pipes and concrete to be laid accurately and the formwork withdrawn before refilling and ramming is carried out.

(4) Water in Excavation

Trenches shall be kept free from water until the pipes are installed and the joints have hardened. The Contractor shall, at his own expense, construct any sumps or temporary drains that the Engineer may consider necessary. The Contractor shall make good at his own expense, any damage caused by prolonged and excessive pumping, and shall take all precautions necessary for the safety of adjoining structures by shoring or otherwise, during the time the trenches are excavated or open.

(5) Laying and Jointing Pipes

Arrangement for handling lifting, loading, transporting, unloading, storage and lowering the pipes in bed shall be such that the pipes do not suffer any damage.

The pipes shall be laid true to line and level, commencing from the outfall. No pipes shall be laid until it has been approved by the Engineer. Pipes shall be laid such that each one is in contact with the bed throughout the length of barrel. The pipes shall be laid closely together against each other so as to obtain tight joints.

Where two or more pipes are to be laid adjacent to each other, they shall be separated by a distance equal to half the diameter of the pipe subject to a minimum of 450 mm.

Concrete pipe culverts shall be laid on granular bedding or concrete bedding or as shown on the Drawing.

The concrete pipes shall be jointed either by collar joint or flush joint. In case of 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 NS: 80/ IS: 458 caulking materials shall be slightly wet mix of cement and sand in the ratio of 1: 2 rammed with caulking irons. Before caulking, the collar shall be placed such that its center coincides with the joint and an even annular space is left between the collar and the pipe. In case of flush joint, the ends of the pipes shall be spaced to form a self-centering joint with a joining space of 13 mm side. 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 damped for at least four days. A properly fitted plug shall be well secured at the end of each pipe already laid and shall be removed only when next pipe is being laid or on completion of the culvert or drain. The trench shall be kept free from water until the joint are thoroughly set. Jointing of HDP pipes shall be done by heating as prescribed by the manufacturer.

(6) Cement Mortar for Jointing

Cement mortar for jointing pipes shall consist of one part by weight of Portland cement to two parts by weight of sand. Sand shall comply with Sub-clause 6.02 (2).

The materials shall be accurately gauged and mixed in an approved manner. Cement mortar shall be made in suitable small quantities only and when required, and any mortar which has begun to set or which has been mixed for a period of more than the initial setting time shall be rejected.

(7) Pipe to be left Clean on Completion

On completion, all pipe lines, drains etc., shall be flushed from end to end with water and left clean and free from obstructions.

(8) Pipes Bedding and Encasing

Pipes shall be laid on granular or concrete bedding or as shown on the Drawing.

(a) Granular Bedding

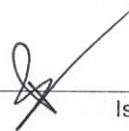
The pipes shall be laid on a layer of fine granular material, 100 mm thick, after the bottom of excavation has been shaped to conform to the lower part of the pipe as shown on the Drawing. The bedding material shall be well graded granular material passing 5.6 mm sieve and suitable compacted.

(b) Concrete Bedding

Where indicated on the Drawing, the pipes shall be laid on grade M 10/40 concrete confirming to Section VI (4) so that the bottom of the pipe rests on concrete of the specified thickness. The thickness of the concrete below the pipe and the height to which it extends upwards shall be as indicated on the Drawing.

(c) Concrete Encasing

Where shown on the Drawing, pipes shall be fully encased in concrete as shown on the Drawing. The grade of the concrete shall be as shown on the Drawing. In carrying out this work the Contractor shall take care to pack the concrete under and around the pipes to ensure even bedding and solidity in the concrete; in no instance shall the concrete be thrown directly on the pipes. The concrete shall be placed in such a way that all spaces around the pipe are completely filled with concrete. Concrete casing shall be cast in one continuous operation until completed. The upper surface of the concrete shall be struck off with a wooden screed and neatly finished off.



(9) Joining New Work to Old Work

Where partial demolition is required for extension to the existing structures, the contact face shall be cut to predetermined lines and levels. The loose and fragmented material shall be removed and projecting steel cleaned and bent as directed by the Engineer. Where no partial demolition but only extension is required, the contact area shall be roughened and cleaned of all dirt and loose particles.

(10) Refilling Trenches

Backfill for pipes and minor drainage structure shall be obtained from the material excavated in forming the excavation. In the event of there being insufficient excavated material or the culvert is laid close to or above existing ground level then selected backfill shall be obtained from borrow pits. All backfill whether from excavated material or borrow pits shall be suitable material as defined in Section VI (3) and shall have a CBR of at least 5% measured after 4 days soak on laboratory mix compacted to 93% MDD (Heavy Compaction), plasticity Index of less than 35%, maximum particle size of 40 mm and shall be compacted to a dry density of 93% MDD (Heavy Compaction)

For pipe culvert which have been placed and where no concrete haunch or surround is called for, selected fill of suitable material available from the excavation shall be place in layers not exceeding 150 mm of loose thickness. The material shall be uniformly mixed with water or dried out such that the moisture content at the time of compaction is between 95% and 100% of the Optimum Moisture Content. Then it shall be compacted thoroughly. Similar selected material shall then be laid in layers, not exceeding 150 mm of loose thickness, mixed, dried or watered as necessary and carefully compacted, and brought up uniformly on both sides of the pipe up to a height of not less than 300 mm over the crown. The remainder of the trench shall then be backfilled with suitable materials, placed in layers not exceeding 150 mm of loose thickness, mixed, watered or dried as necessary and carefully compacted. All backfilling material except the top 300 mm below formation level shall be compacted to a minimum dry density of 93% of MDD (Heavy Compaction). The top 300 mm below formation level shall be placed in layers not exceeding 150 mm of loose thickness, mixed, watered or dried as necessary and carefully compacted to at least 95% of MDD (Heavy Compaction).

For pipe culverts which have been constructed close to, above or where the culverts protrude above the existing ground the backfilling under the flanks and alongside and over the culverts shall be placed and compacted in layers not exceeding 150 mm to a density of at least the density required for the material in adjoining layers of fill. All existing ground under this backfill shall be compacted to 93% MDD (Heavy Compaction) to a depth of 150 mm.

Backfilling shall be carried out simultaneously and equally on both sides of the culvert to avoid unequal lateral forces. In all cases there shall be cover of at least 600 mm over the crown of the culvert before construction equipment is driven over it unless protective measures approved by the Engineer have been provided.



(11) Inlet and Outlet Structures and Catch pits

Catch pits, headwalls, wing walls, aprons and other ancillary works shall be constructed in accordance with the details shown on the Drawing. Masonry for these works shall conform to Section VI (6) as applicable. Concrete shall conform to Section VI (4) and aprons shall conform to Section VI (7).

(12) Opening to Traffic

No traffic shall be allowed to cross the pipeline unless the height of the filling is not than 600 mm above the top of the pipe line or is as shown on the Drawing.

(13) Tests and Standard of Acceptance

The Contractor shall submit manufacturer's test certificate for each lot of pipes supplied. The test result shall meet the requirements of the Specifications.

Backfilling/Refilling shall be tested in accordance with Section VI (3) and all the test result shall meet the criteria specified. Compaction shall be tested in each layer of backfill, gradation of granular bedding shall be tested at least once a day and the test results shall meet the specified criteria.

The pipe drains/culverts shall be constructed to the true lines and levels indicated on the Drawing or instructed by the Engineer.

8.02 CONCRETE CHANNELLING

(1) Scope

This Clause covers the works for the construction of concrete channeling for drainage.

(2) Material

Concrete channels may be pre-cast units or may cast in-situ. All concrete works and reinforcement shall be carried out in accordance with the requirements of Section VI (4).

The material on which concrete is to be bedded shall be granular bedding as provided in Clause 8.01.

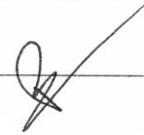
(3) Construction

(a) Excavation of Bedding

Trenches for channels shall be excavated to the required depth as shown on the Drawing. The bottom and side of the trench shall be neatly trimmed. All loose materials shall be thoroughly compacted. The bedding material shall then be laid on the bottom of the trench and it shall be thoroughly compacted and accurately shaped to the required line and level. No concrete shall be placed on un-compacted or disturbed material.

(b) Precast Concrete Channelling

Precast concrete channelling shall be laid with close joints with 1:2 cement sand mortar at the ends. The joints shall not exceed 10 mm in thickness and shall be



neatly pointed with a pointing trowel. Guide lines and straight edges shall be used to ensure that the exposed faces and edgings are set to true lines and levels. Care shall be taken to protect all precast units against chipping or breakage during handling and laying. Broken or chipped Sections shall not be used and shall be replaced with undamaged units.

(c) Cast in-situ Channels

Channels shall be cast in alternative Sections. The length of Sections shall be uniform throughout and shall be equal to 2 m, except where shorter Sections are necessary for closures or where otherwise shown on the Drawing.

Forms shall be accurately set to line, levels and elevation and shall be firmly held in position during the placing of the concrete. Stops at the ends of Sections shall be placed accurately so as to ensure that the joints are truly perpendicular to the surface of the concrete and right angles to the edge of the road. After concrete has been placed in the forms, it shall be tamped and spaded until the exposed surfaces are entirely covered with mortar. Exposed faces shall then be finished to smooth and even surfaces.

The forms of exposed concrete surfaces shall be removed after 24 hours after the concrete has been placed. Minor defects shall be repaired with a 1:2 cement sand mortar. Plastering shall not be permitted on exposed faces and all rejected portions shall be removed and replaced at the Contractor's expense. Exposed surfaces shall be finished while the concrete is still green, by wetting a soft brick or wooden block and rubbing the surfaces until they are smooth. When the concrete has smoothed by using water, it shall be rubbed with a thin paste of 1:1 cement sand mortar until a uniform colour is obtained. When completed the Sections shall be cured in accordance with the requirements of Section VI (4).

After the concrete in alternate Sections has been set, the intermediate Sections shall be cast and finished in accordance with all the requirements specified above. The exposed end surfaces of the alternate Sections cast first shall be painted with a coat of approved bituminous emulsion containing 60% of net bitumen by mass, and the emulsion shall be allowed to set and dry before the intermediate Sections are cast. Guide lines and straight edges shall be used to ensure that the exposed faces are formed to the true line, level and elevation.

(4) Tests and Standard of Acceptance

All concrete works shall be tested in accordance with Section VI (4) and the test results shall meet the specified criteria.

The concrete channeling works shall be constructed to the true lines and levels shown on the Drawing or instructed by the Engineer.







(5) Measurement

Unless stated otherwise, concrete channeling shall be measured in linear meter, Formworks and reinforcement shall not be measured separately.

Excavation and bedding shall be measured as provided under respective Sections of these Specifications.

(6) Payment

Concrete channeling shall be paid as per the contract unit rate which shall be the full and the final compensation to the Contractor.

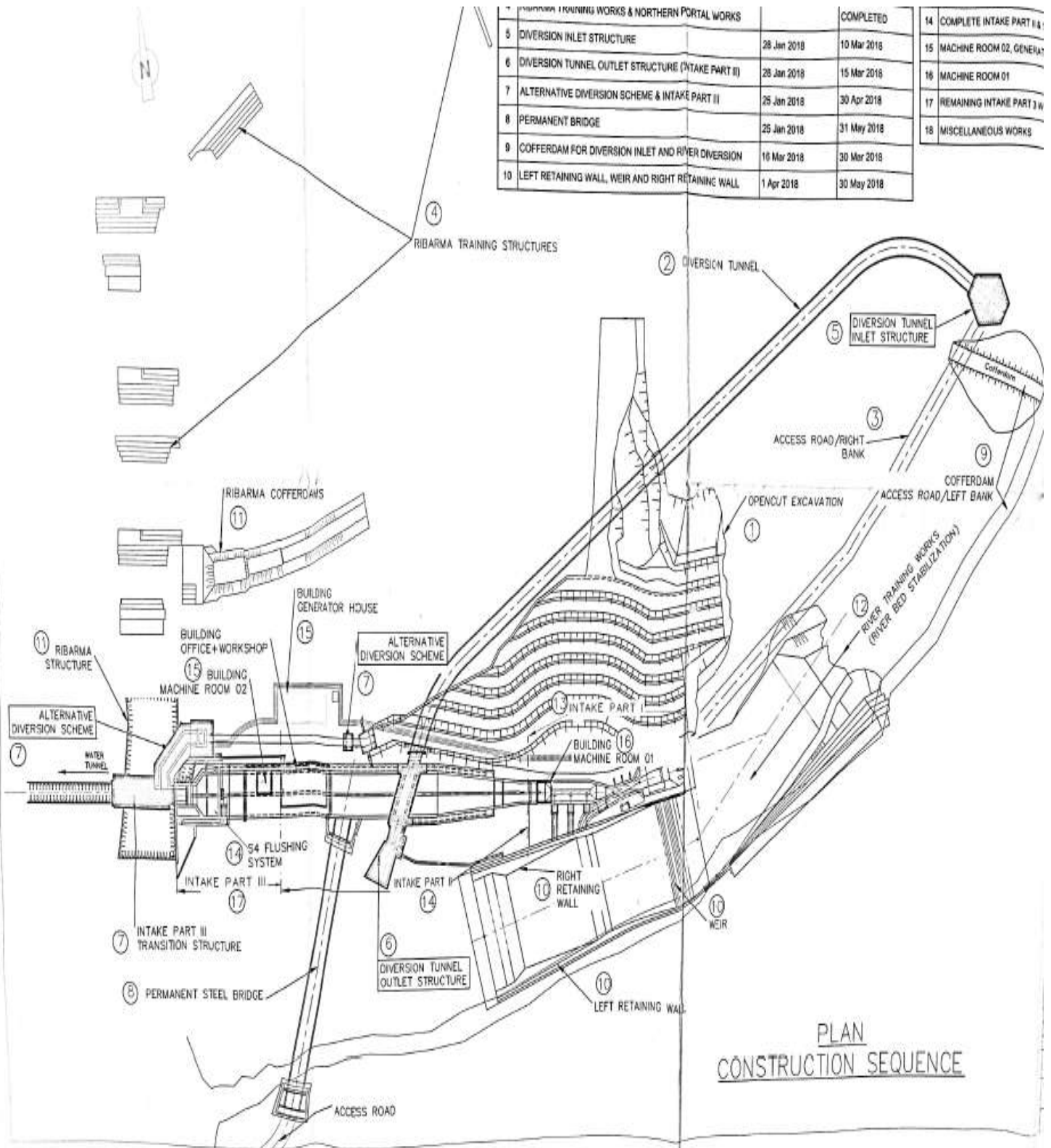
Excavation and bedding shall be paid as provided under respective Sections of these Specifications

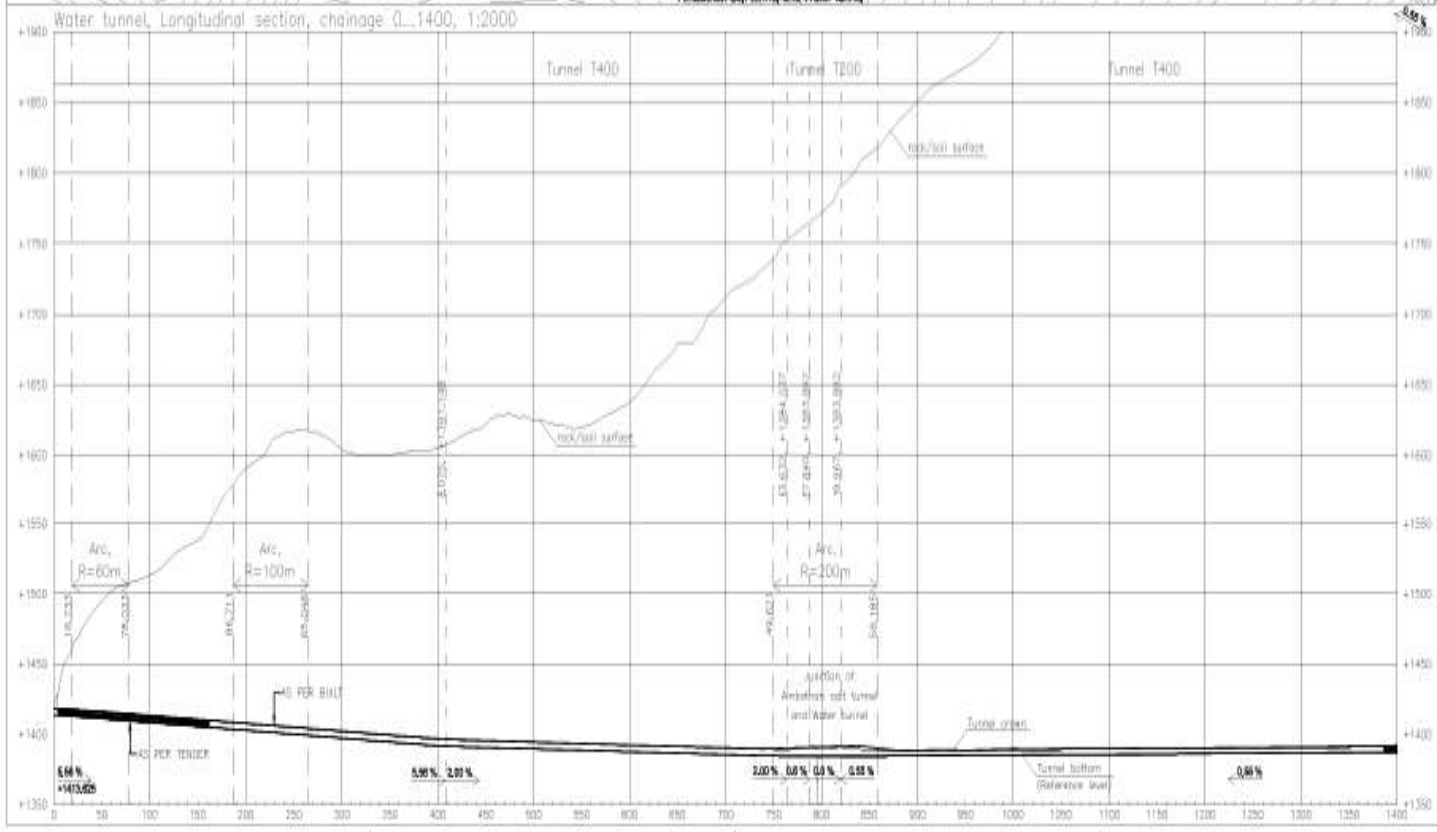
8.03 COMPLETION OF DRAINAGE WORKS

All culverts and/or other drainage works shall be completed well in advance of the construction of the base course, hard shoulders and/or surfacing of the carriageway.



Layout and Drawings





Tunnel Profile

