



Government of Nepal
Ministry of Infrastructure Development
Department of Roads
Project Directorate (ADB)
Bishalnagar Kathmandu

INVITATION FOR BIDS
Date of Publication: 17th August, 2026

Loan and Title:	Loan No: 3722- NEP; SASEC Highway Improvement Project (SHIP)
Contract No. and Title:	SHIP/OCB/BLDPDADB/02; Construction of Project Directorate Building with necessary accessories (Completion of Remaining Works)
Deadline for Submission of Bids:	16 September, 2026, 12:00 (Local Time)

- The Government of Nepal has received financing from the Asian Development Bank (ADB) toward the cost of SASEC Highway Improvement Project (SHIP). Part of this financing will be used for payments under the Contract named above. Bidding is open to Bidders from eligible source countries of ADB
- The Department of Roads, Project Directorate (ADB) ("the Employer") invites sealed bids from eligible Bidders for the construction and completion of Construction of Project Directorate (ADB) with necessary accessories. ("the Works").
- Open competitive bidding will be conducted in accordance with ADB's Single Stage Two Envelope Procedure and is open to all Bidders from eligible countries as described in the Bidding Document.
- A pre-bid meeting will be conducted on **31 August, 2026 at 15:00 (Local Time)** at the Department of Roads, Project Directorate (ADB), Bishalnagar, Kathmandu.
- Only eligible Bidders with the following qualifications defined in the Bidding Document may participate in this bidding:

AACT (NRs.)	Financial Resources (NRs.)	Construction Experience	Bid Security (NRs.)
329.00 million	65.00 million	Construction of Frame Structure Building with Necessary accessories with at least total floor area 40,000 Sq.ft with contract value of NRs.175 million.	4.95 million

- To obtain further information and inspect the bidding documents, Bidders should contact:

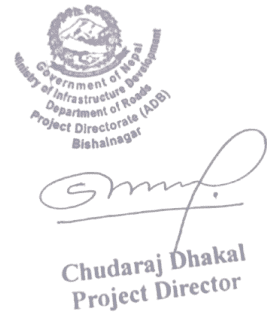
Attention: Project Director
Department of Roads, Project Directorate (ADB)
Bishalnagar, Kathmandu
Phone No: +977-01-4537492, 4537493, 4514239, Fax No: +977-01-4537488
Email: pdadb@dor.gov.np

- To purchase the Bidding Document in English, eligible Bidders should write to address above requesting the bidding documents for **SHIP/OCB/BLDPDADB/02; Construction of Project Directorate Building with Necessary Accessories** and deposit nonrefundable fee of Nepalese Rupees Twenty Thousand Only (NRs. 20,000.00) in the following Revenue Account on or before **15 September, 2026, 17:00 Hours (Local Time)**

Name of Bank	Name of the office	Revenue Account No	Office Code	Revenue Heading No.	Cost of Bidding Document
Rastriya Banijya Bank, Thamel Branch	Department of Roads, Project Directorate (ADB)	1000100200010000	337013518	14229	NRs. 20,000

- Deliver your bid to *Department of Roads, Project Directorate (ADB), Bishalnagar, Kathmandu* on or before **16 September, 2026; 12:00 PM (Local Time)** and together with a Bid Security as described in the Bidding Document.
- Technical Bids will be opened on **16 September, 2026, 13:00 (Local Time)** in the presence of Bidders' representatives who choose to attend.

Government of Nepal
Ministry of Infrastructure Development
Department of Roads
Project Directorate (ADB)
Bishalnagar
Kathmandu, Nepal



SASEC Highway Improvement Project (SHIP)
(ADB Loan No:3722)

**Construction of Project Directorate Office Building with necessary
accessories (Completion of Remaining Works) at Bishalnagar,
Kathmandu**

Contract No: SHIP/OCB/BLDPDADB/02

Bidding Document

Part I Bidding Procedures

Section 1	Instruction to Bidders
Section 2	Bid Data Sheet
Section 3	Evaluation and Qualification Criteria
Section 4	Bidding Forms including Bills of Quantities
Section 5	Eligible Countries

August, 2026

Preface



This Bidding Document for the Procurement of Works (Single Stage – Two Envelope) has been prepared by the Government of Nepal, Ministry of Infrastructure Development, Department of Roads, Project Directorate (ADB) and is based on the Standard Bidding Document for the Procurement of Works (SBD Works) issued by the Asian Development Bank


Chudaraj Dhakal
Project Director

ADB's SBD Works has the structure and the provisions of the Master Procurement Document entitled "Bidding Documents for the Procurement of Works", prepared by multilateral development banks and other public international financial institutions, except where ADB-specific considerations have required a change.

FOR WEBSITE

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PART III CONDITIONS OF CONTRACT AND CONTRACT FORMS

Section 7 - General Conditions of Contract (GCC) -----

This Section contains the general clauses that govern the Contract. These General Conditions shall be the Conditions of Contract for Construction, Multilateral Development Bank Harmonized Edition, prepared by the Fédération Internationale des Ingénieurs-Conseil (FIDIC 2010 MDB version). These Conditions are subject to the variations and additions set out in Section 8 (Particular Conditions of Contract).

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Project Director

Section 8 - Particular Conditions of Contract (PCC) -----

This Section contains provisions that are specific to each contract and that modify or supplement the GCC. Whenever there is a conflict, the provisions herein shall prevail over those in the GCC

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Section 9 - Contract Forms (COF) -----

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

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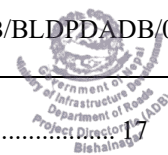
Chudaraj Dhakal
Project Director

Section 1 - Instructions to Bidders

(Single – Stage, Two-Envelope Bidding Procedure)

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Section 1 - Instructions to Bidders

A. General

1. Scope of Bid

1.1 In connection with the Invitation for Bids (IFB) 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 6 (Employer's Requirements). The name, identification, and number of contracts of the open competitive bidding (OCB) 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;
- (b) except where the context requires otherwise, words indicating the singular also include the plural and words indicating the plural also include the singular; and
- (c) "day" means calendar day.

2. Source of Funds

2.1 The Borrower or Recipient (hereinafter called "Borrower") indicated in the BDS has applied for or received financing (hereinafter called "funds") from the Asian Development Bank (hereinafter called "ADB") toward the cost of the project named in the BDS. The Borrower intends to apply a portion of the funds to eligible payments under the contract(s) for which this Bidding Document is issued.

2.2 Payments by the ADB will be made only at the request of the Borrower and upon approval by ADB in accordance with the terms and conditions of the Financing Agreement between the Borrower and ADB (hereinafter called "Financing Agreement"), and will be subject in all respects to the terms and conditions of that Financing Agreement. No party other than the Borrower shall derive any rights from the Financing Agreement or have any claim to the funds.

3. Fraud and Corruption

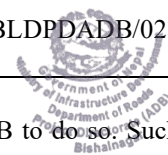
3.1 ADB's Anticorruption Policy requires Borrowers (including beneficiaries of ADB-financed activity), as well as Bidders, Suppliers, and Contractors under ADB-financed contracts, observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, ADB

(a) defines, for the purposes of this provision, the terms set forth below as follows:

- (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) "abuse" means theft, waste or improper use of assets related to ADB-related activity, either committed intentionally or through reckless disregard;
- (vi) "conflict of interest" means any situation in which a party has interests that could improperly influence that party's performance of official duties or responsibilities, contractual obligations, or compliance with applicable laws and regulations;
- (vii) "obstructive practice" means (a) deliberately destroying, falsifying, altering or concealing of evidence material to an ADB investigation, or deliberately making false statements to investigators, with the intent to impede an ADB investigation; (b) threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to a Bank investigation or from pursuing the investigation; or (c) deliberate acts intended to impede the exercise of ADB's contractual rights of audit or inspection or access to information; and
- (viii) "integrity violation" is any act which violates ADB's Anticorruption Policy, including (i) to (v) above and the following: abuse, conflict of interest, violations of ADB sanctions, retaliation against whistleblowers or witnesses, and other violations of ADB's Anticorruption Policy, including failure to adhere to the highest ethical standard
- (b) will reject a proposal for award if it determines that the Bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices or other integrity violations in competing for the Contract;
- (c) will cancel the portion of the financing allocated to a contract if it determines at any time that representatives of the Borrower or of a beneficiary of ADB-financing engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices or other integrity violations during the procurement or the execution of that contract, without the Borrower having taken timely and appropriate action satisfactory to ADB to remedy the situation;
- (d) will impose remedial actions on a firm or an individual, at any time, in accordance with ADB's Anticorruption Policy and Integrity Principles and Guidelines (both as amended from time to time), including declaring ineligible, either indefinitely or for a stated period of time, to participate¹ in ADB-financed, -administered, or -supported activities or to benefit from an ADB-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) will have the right to require that a provision be included in bidding documents and in contracts financed by ADB, requiring Bidders, suppliers and contractors to permit ADB or its representative to inspect their accounts and records and other documents relating to the bid submission and contract performance and to have them audited by auditors appointed by ADB.
- 3.2 All Bidders, consultants, contractors, suppliers, and other third parties engaged or involved in ADB-related activities have a duty to cooperate fully

¹ Whether as a Contractor, Subcontractor, Consultant, Manufacturer or Supplier, or Service Provider; or in any other capacity (different names are used depending on the particular Bidding Document).



Chudaraj Dhakal
Director

in any screening or investigation when requested by ADB to do so. Such cooperation includes, but is not limited to, the following:

- (a) being available to be interviewed and replying fully and truthfully to all questions asked;
- (b) providing ADB with any items requested that are within the party's control including, but not limited to, documents and other physical objects;
- (c) upon written request by ADB, authorizing other related entities to release directly to ADB such information that is specifically and materially related, directly or indirectly, to the said entities or issues which are the subject of the investigation;
- (d) cooperating with all reasonable requests to search or physically inspect their person and/or work areas, including files, electronic databases, and personal property used on ADB activities, or that utilizes ADB's ICT resources or systems (including mobile phones, personal electronic devices, and electronic storage devices such as external disk drives);
- (e) cooperating in any testing requested by ADB, including but not limited to, fingerprint identification, handwriting analysis, and physical examination and analysis; and
- (f) preserving and protecting confidentiality of all information discussed with, and as required by, ADB.

3.3 All Bidders, consultants, contractors and suppliers shall ensure that, in its contract with its sub-consultants, sub-contractors and other third parties engaged or involved in ADB-related activities, such sub-consultants, sub-contractors and other third parties similarly undertake the foregoing duty to cooperate fully in any screening or investigation when requested by ADB to do so.

3.4 The Employer hereby puts the Bidder on notice that the Bidder or any joint venture partner of the Bidder (if any) may not be able to receive any payments under the Contract if the Bidder or any of its joint venture partners, as appropriate, is, or is owned (in whole or in part) by a person or entity subject to applicable sanctions.

3.5 Furthermore, Bidders shall be aware of the provision stated in Subclause 1.15 and 15.6 of the Conditions of Contract

4. Eligible Bidders

4.1 A Bidder may be a natural person, private entity, or government-owned enterprise subject to ITB 4.5—or any combination of them with a formal intent to enter into an agreement or under an existing agreement in the form of a Joint Venture. In the case of a Joint Venture,

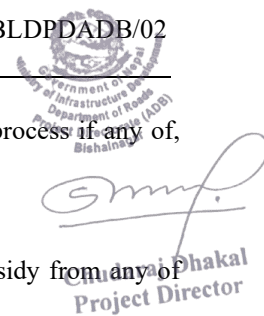
- (a) all partners shall be jointly and severally liable; and
- (b) the Joint Venture shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the parties of the Joint Venture during the bidding process and, in the event the Joint Venture is 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 5 (Eligible Countries). A Bidder shall be deemed to have the nationality of a country if the Bidder is a citizen or is constituted, incorporated, or registered, 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.

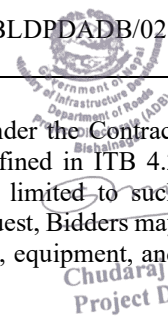
4.3 A Bidder shall not have a conflict of interest. All Bidders found to have a conflict of interest shall be disqualified. A Bidder may be considered to be in a

conflict of interest with one or more parties in the 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, except for alternative offers permitted under ITB 13 of the Bidding Document. 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 a Bidder as a Subcontractor in another Bid or of a firm as a Subcontractor in more than one Bid; or
 - (f) a Bidder, joint venture partner, associates, parent company, or any 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 or Borrower as Engineer for the contract; or
 - (h) A Bidder would be providing goods, works, or non-consulting services resulting from or directly related to consulting services for the preparation or implementation of the project specified in the BDS ITB 2.1 that it provided or were provided by any affiliate that directly or indirectly controls, is controlled by, or is under common control with that firm.
- 4.4 A firm shall not be eligible to participate in any procurement activities under an ADB-financed, -administered, or -supported project while under temporary suspension or debarment by ADB pursuant to its Anticorruption Policy (see ITB 3), whether such debarment was directly imposed by ADB, or enforced by ADB pursuant to the Agreement for Mutual Enforcement of Debarment Decisions. A bid from a temporary suspended or debarred firm will be rejected.
- 4.5 Government-owned enterprises in the Employer's country shall be eligible only if they can establish that they (i) are legally and financially autonomous, (ii) operate under commercial law, and (iii) are not a dependent agency of the Employer.
- 4.6 A Bidder shall not be under suspension from bidding by the Employer as the result of the execution of a Bid-Securing Declaration.
- 4.7 Bidders shall provide such evidence of their continued eligibility satisfactory to the Employer, as the Employer shall reasonably request.
- 4.8 Firms shall be excluded if by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, the Borrower's country prohibits any import of goods or contracting of works or services from that country or any payments to persons or entities in that country.
- 4.9 In case a prequalification process has been conducted prior to the bidding process, this bidding is open only to prequalified Bidders.



Government of Nepal
Ministry of Infrastructure
Department of Roads
Bishalpur
Project Director



5. Eligible Materials, Equipment and Services

- 5.1 The materials, equipment, and services to be supplied under the Contract shall have their origin in eligible source countries as defined in ITB 4.2 above 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 Document

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 1 - Instructions to Bidders (ITB)
- Section 2 - Bid Data Sheet (BDS)
- Section 3 - Evaluation and Qualification Criteria (EQC)
- Section 4 - Bidding Forms (BDF)
- Section 5 - Eligible Countries (ELC)

PART II Requirements

- Section 6 - Employer's Requirements (ERQ)

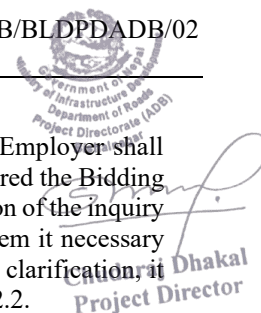
PART III Conditions of Contract and Contract Forms

- Section 7 - General Conditions of Contract (GCC)
- Section 8 - Particular Conditions of Contract (PCC)
- Section 9 - Contract Forms (COF)

- 6.2 The 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 IFB.
- 6.4 The Bidder is expected to examine all instructions, forms, terms, and specifications in the Bidding Document. 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 on the Bidding Document shall contact the Employer in writing at the Employer's address indicated in the BDS or raise his inquiries during the pre-bid meeting if provided for in accordance with ITB 7.4. The Employer will respond in writing to any request for clarification, provided that such request is received no later than



21 days prior to the deadline for submission of bids. The Employer shall forward copies of its response to all Bidders who have acquired the Bidding 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 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 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 not later than 1 week before the meeting.
- 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.

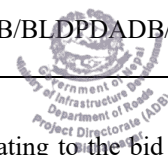
8. Amendment of Bidding Document

- 8.1 At any time prior to the deadline for submission of Bids, the Employer may amend the Bidding Document by issuing 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

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.



[Signature]
Project Director

10. Language of Bid

- 10.1 The Bid, as well as all correspondence and documents relating to the bid exchanged by the Bidder and the Employer, shall be written in the language specified in the BDS. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages in the language specified in the BDS, in which case, for purposes of interpretation of the Bid, such translation shall govern.

**11. Documents
Comprising the Bid**

- 11.1 The Bid shall comprise two envelopes submitted simultaneously, one called the Technical Bid containing the documents listed in ITB 11.2 and the other the Price 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 or Bid-Securing Declaration, in accordance with ITB 19;
- (c) alternative Bids, 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) Any other document required in the BDS.

11.3 The Price Bid shall comprise the following:

- (a) Letter of Price Bid;
- (b) completed Price Schedules, in accordance with ITB 12 and ITB 14;
- (c) alternative price Bids, at Bidder's option and if permissible, in accordance with ITB 13;
- (d) Any other document required in the BDS.

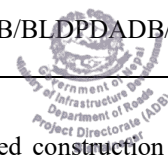
- 11.4 In addition to the requirements under ITB 11.2, Bids submitted by a Joint Venture shall include a copy of the Joint Venture Agreement entered into by all partners. Alternatively, a Letter of Intent to execute a Joint Venture Agreement in the event of a successful Bid shall be signed by all partners and submitted with the Bid, together with a copy of the proposed agreement.

**12. Letters of Bid and
Schedules**

- 12.1 The Letters of Technical Bid and Price Bid, and the Schedules, including the Bill of Quantities, shall be prepared using the relevant forms furnished in Section 4 (Bidding Forms). 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 and as required in the BDS.

13. Alternative Bids

- 13.1 Unless otherwise indicated in the BDS, alternative Bids shall not be considered.
- 13.2 When alternative times for completion are explicitly invited, a statement to that effect will be included in the BDS, as will the method of evaluating different times for completion.
- 13.3 Except as provided under ITB 13.4 below, Bidders wishing to offer technical alternatives to the requirements of the Bidding 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,



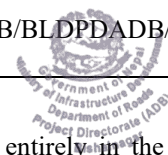
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Project Director

technical specifications, breakdown of prices, and proposed construction methodology and other relevant details. Only the technical alternatives, if any, of the lowest evaluated Bidder conforming to the basic technical requirements shall be considered by the Employer.

- 13.4 When specified in the BDS, Bidders are permitted to submit alternative technical solutions for specified parts of the Works. Such parts will be identified in the BDS and described in Section 6 (Employer's Requirements). The method for their evaluation will be stipulated in Section 3 (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 Bill of Quantities shall conform to the requirements specified below.
- 14.2 The Bidder shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items against which no rate or price is entered by the Bidder 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, in accordance with ITB 12.1, shall be the total price of the Bid, excluding any discounts offered. Absence of the total bid price in the Letter of Price Bid may result in the 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 The prices shall be either fixed or adjustable as specified in the BDS.
- (a) In the case of Fixed Price, prices quoted by the Bidder shall be fixed during the Bidder's performance of the contract and not subject to variation on any account. A Bid submitted with an adjustable price will be treated as nonresponsive and rejected.
- (b) In the case of Adjustable Price, prices quoted by the Bidder shall be subject to adjustment during performance of the contract to reflect changes in the cost elements such as labor, material, transport, and contractor's equipment in accordance with the provisions of the Conditions of Contract. A Bid submitted with a fixed price will be treated as non-responsive and be rejected. The Bidder shall furnish the indexes and weightings for the price adjustment formulas in the Tables of Adjustment Data included in Section 4 (Bidding Forms) and the Employer may require the Bidder to justify its proposed indexes and weightings. Any bid that omits indexes and weightings shall be subject to clarification with the Bidder.
- 14.6 If so indicated in ITB 1.1, bids are being 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.
- 14.7 All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause, as of the date 28 days prior to the deadline for submission of bids, shall be included in the rates and prices and the total Bid Price submitted by the Bidder.



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15. Currencies of Bid and Payment

15.1 The unit rates and the prices shall be quoted by the Bidder entirely in the currency specified in the BDS.

15.2 Bidders shall indicate the portion of the bid price that corresponds to expenditures incurred in the currency of the Employer's country in the Schedule of Payment Currencies included in Section 4 (Bidding Forms).

15.3 Bidders expecting to incur expenditures in other currencies for inputs to the Works supplied from outside the Employer's country and wishing to be paid accordingly may indicate up to other currencies in the Schedule of Payment Currencies included in Section 4 (Bidding Forms).

15.4 The rates of exchange to be used by the Bidder for currency conversion during bid preparation shall be the selling rates for similar transactions prevailing on the date 28 days prior to the deadline for submission of bids published by the source specified in the BDS. If exchange rates are not so published for certain currencies, the Bidder shall state the rates used and the source. Bidders should note that for the purpose of payments, the exchange rates confirmed by the source specified in the BDS as the selling rates prevailing 28 days prior to the deadline for submission of Bids shall apply for the duration of the Contract so that no currency exchange risk is borne by the Bidder.

15.5 Foreign currency requirements indicated by the Bidders in the Schedule of Payment Currencies shall include but not limited to the specific requirements for

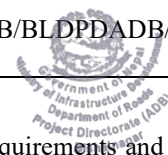
- (a) expatriate staff and labor employed directly on the Works;
- (b) social, insurance, medical and other charges relating to such expatriate staff and labor, and foreign travel expenses;
- (c) imported materials, both temporary and permanent, including fuels, oil and lubricants required for the Works;
- (d) depreciation and usage of imported Plant and Contractor's Equipment, including spare parts, required for the Works;
- (e) foreign insurance and freight charges for imported materials, Plant and Contractor's Equipment, including spare parts; and
- (f) Overhead expenses, fees, profit, and financial charges arising outside the Employer's country in connection with the Works.

15.6 Bidders may be required by the Employer to clarify their foreign currency requirements, and to substantiate that the amounts included in the unit rates and prices and shown in the Schedule of Payment Currencies are reasonable and responsive to ITB 15.3 above, in which case a detailed breakdown of its foreign currency requirements shall be provided by the Bidder.

15.7 Bidders should note that during the progress of the Works, the foreign currency requirements of the outstanding balance of the Contract Price may be adjusted by agreement between the Employer and the Contractor in order to reflect any changes in foreign currency requirements for the Contract, in accordance with Sub clause 14.15 of the Conditions of Contract. Any such adjustment shall be effected by comparing the percentages quoted in the bid with the amounts already used in the Works and the Contractor's future needs for imported items.

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 4 (Bidding Forms), in sufficient detail to demonstrate



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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 3 (Evaluation and Qualification Criteria) the Bidder shall provide the information requested in the corresponding information sheets included in Section 4 (Bidding Forms).

17.2 Domestic Bidders, individually or in joint ventures, applying for eligibility for domestic preference shall supply all information required to satisfy the criteria for eligibility as described in ITB 36.

**18. Period of Validity of
Bids**

18.1 Bids shall remain valid for the period specified in the BDS after the bid submission deadline date prescribed by the Employer. 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 28 days beyond the deadline of the extended validity period. A Bidder may refuse the request without forfeiting its bid security. A Bidder granting the request shall not be required or permitted to modify its Bid.

**19. Bid Security/Bid-
Securing
Declaration**

19.1 Unless otherwise specified in the BDS, the Bidder shall furnish as part of its Bid, in original form, either a Bid-Securing Declaration or a bid security as specified in the BDS. In the case of a bid security, the amount and currency shall be as specified in the BDS.

19.2 If a Bid-Securing Declaration is required pursuant to ITB 19.1, it shall use the form included in Section 4 (Bidding Forms). The Employer will declare a Bidder ineligible to be awarded a Contract for a specified period of time, as indicated in the BDS, if the Bid-Securing Declaration is executed.

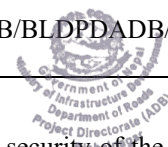
19.3 If a bid security is specified pursuant to ITB 19.1, the bid security shall be, at the Bidder's option, in any of the following forms:

- (a) an unconditional bank guarantee,
- (b) an irrevocable letter of credit, or
- (c) a cashier's or certified check,
- (d) swift message in the form of MT760.

all from a reputable source from an eligible country as described in Section 5 (Eligible Countries). In the case of a bank guarantee, the bid security shall be submitted either using the Bid Security Form included in Section 4 (Bidding Forms) or another form acceptable to the Employer. The form must include the complete name of the Bidder. The bid security shall be valid for 28 days beyond the original validity period of the bid, or beyond any period of extension if requested under ITB 18.2.

19.4 Unless otherwise specified in the BDS, any Bid not accompanied by a substantially compliant bid security or Bid-Securing Declaration, if one is required in accordance with ITB 19.1, shall be rejected by the Employer as nonresponsive.

19.5 If a bid security is specified pursuant to ITB 19.1, the bid security of unsuccessful Bidders shall be returned promptly upon the successful Bidder's furnishing of the performance security pursuant to ITB 45.



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- 19.6 If a bid security is specified pursuant to ITB 19.1, the bid security of the successful Bidder shall be returned promptly once the successful Bidder has signed the Contract and furnished the required performance security.
- 19.7 The bid security may be forfeited or the Bid Securing Declaration executed,
- (a) if notwithstanding ITB 24.3, 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) sign the Contract in accordance with ITB 44;
 - (ii) furnish a performance security in accordance with ITB 45;
 - (iii) accept the arithmetical correction of its Bid in accordance with ITB 34; or
 - (iv) furnish a domestic preference security, if so required.
- 19.8 If the bid security is required as per ITB 19.1, 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 name of any or all of the Joint Venture partners. If the Bid-Securing Declaration is required as per ITB 19.1, the Bid-Securing Declaration 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-Securing Declaration 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 set 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 Technical and Price Bids, 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.
- 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. If a Bidder submits a deficient authorization, the Bid shall not be rejected in the first instance. The Employer shall request the Bidder to submit an acceptable authorization within the number of days as specified in the BDS. Failure to provide an acceptable authorization within the prescribed period of receiving such a request shall cause the rejection of the Bid. If either the Letter of Technical Bid or Letter of Price Bid or Bid-Securing Declaration (if applicable) are not signed, the Bid shall be rejected.
- 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 Bidders may always submit their Bids by mail or by hand. When so specified in the BDS, Bidders shall have the option of submitting their Bids

electronically. Procedures for submission, sealing, and marking are as follows:

- (a) Bidders submitting Bids by mail or by hand shall enclose the original of the Technical Bid, the original of the Price Bid, and each copy of the Technical Bid and each copy of the Price Bid, in separate sealed envelopes, duly marking the envelopes as **“ORIGINAL - TECHNICAL BID,” “ORIGINAL - PRICE BID,”** and **“COPY NO... - TECHNICAL BID”** and **“COPY NO.... - PRICE BID.”** These envelopes, the first containing the originals and the others containing copies, shall then be enclosed in one single envelope per set. If permitted in accordance with ITB 13, alternative Bids shall be similarly sealed, marked and included in the sets. The rest of the procedure shall be in accordance with ITB 21.2 and ITB 21.5.
- (b) Bidders submitting Bids electronically shall follow the electronic bid submission procedures specified in the BDS.

21.2 The inner and outer envelopes shall

- (a) bear the name and address of the Bidder;
- (b) be addressed to the Employer in accordance with BDS 22.1; and
- (c) bear the specific identification of this bidding process indicated in the BDS 1.1.

21.3 The outer envelopes and the inner envelopes containing the Technical Bid 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 envelopes 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.

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, Substitution, and Modification of Bids

24.1 A Bidder may withdraw, substitute, 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 substitution or modification of the Bid must accompany the respective written notice. All notices must be

- (a) prepared and submitted in accordance with ITB 20 and ITB 21 (except that withdrawal notices do not require copies), and in addition, the respective envelopes shall be clearly marked **“WITHDRAWAL,” “SUBSTITUTION,” “MODIFICATION”;** and



(b) received by the Employer no later than the deadline prescribed for submission of Bids, in accordance with ITB 22.

24.2 Bids requested to be withdrawn in accordance with ITB 24.1 shall be returned unopened to the Bidders.

24.3 No Bid may be withdrawn, substituted, or modified in the interval between the deadline for submission of Bids and the expiration of the period of bid validity specified by the Bidder on the Letters of Technical Bid and Price Bid or any extension thereof.

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 and anyone who chooses to attend. Any specific electronic bid opening procedures required if electronic bidding is permitted in accordance with ITB 21.1, shall be as specified in the BDS. 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 the Price Bid are submitted together in one envelope, the Employer may reject the entire Bid. Alternatively, the Price Bid may be immediately resealed for later evaluation.

25.2 First, envelopes marked "WITHDRAWAL" shall be opened and read out and the envelope with the corresponding Bid shall not be opened, but returned to the Bidder. No bid withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at bid opening.

25.3 Second, outer envelopes marked "SUBSTITUTION" shall be opened. The inner envelopes containing the Substitution Technical Bid and/or Substitution Price Bid shall be exchanged for the corresponding envelopes being substituted, which are to be returned to the Bidder unopened. Only the Substitution Technical Bid, if any, shall be opened, read out, and recorded. Substitution Price Bid will remain unopened in accordance with ITB 25.1. No envelope shall be substituted unless the corresponding substitution notice contains a valid authorization to request the substitution and is read out and recorded at bid opening.

25.4 Next, outer envelopes marked "MODIFICATION" shall be opened. No Technical Bid and/or Price Bid shall be modified unless the corresponding modification notice contains a valid authorization to request the modification and is read out and recorded at the opening of Technical Bids. Only the Technical Bids, both Original as well as Modification, are to be opened, read out, and recorded at the opening. Price Bids, both Original as well as Modification, will remain unopened in accordance with ITB 25.1.

25.5 All other envelopes holding the Technical 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 or substitution;
- (c) the presence of a bid security or Bid-Securing Declaration, if required; and
- (d) any other details as the Employer may consider appropriate.

Only Technical Bids and alternative Technical Bids read out and recorded at bid opening shall be considered for evaluation. Unless otherwise specified in the BDS, all pages of the Letter of Technical Bid are to be initialed by at least three representatives of the Employer attending bid opening. No Bid shall be rejected at the 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, substitution, or modification; alternative proposals; and the presence or absence of a bid security or Bid-Securing Declaration, if one was required. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders who submitted Bids on time, and posted online when electronic bidding is permitted.

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 reasonable notice of 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 or substitution;
- (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, and alternative offers read out and recorded during the opening of Price Bids shall be considered for evaluation. Unless otherwise specified in the BDS, all pages of the Letter of Price Bid and Bill of Quantities are to be initialed by at least three representatives of the Employer attending bid opening. 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, 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. A copy of the record shall be distributed to all Bidders who submitted Bids on time, and posted online when electronic bidding is permitted.

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 the 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.

27.2 If a Bidder does not provide clarifications of its Bid by the date and time set in the Employer's request for clarification, its Bid may be rejected.

28. Deviations, Reservations, and Omissions

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

- (a) "Deviation" is a departure from the requirements specified in the Bidding 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 Bids

29.1 The Employer shall examine the Technical Bid to confirm that all documents and technical documentation requested in ITB 11.2 have been provided, and to determine the completeness of each document submitted.

29.2 The Employer shall confirm that the following documents and information have been provided in the Technical Bid. If any of these documents or information is missing, the offer shall be rejected.

- (a) Letter of Technical Bid;
- (b) written confirmation of authorization to commit the Bidder;
- (c) Bid Security or Bid-Securing Declaration, if applicable; and
- (d) Technical Proposal in accordance with ITB 16.

30. Responsiveness 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 6 (Employer's 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.

31. Nonmaterial Nonconformities

31.1 Provided that a Bid is substantially responsive, the Employer may waive any nonconformities 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 method indicated in Section 3 (Evaluation and Qualification Criteria).

32. Qualification of the Bidder

32.1 The Employer shall determine to its satisfaction during the evaluation of Technical Bids whether Bidders meet the qualifying criteria specified in Section 3 (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. Unless permitted in the BDS, the determination shall not take into consideration the qualifications of other firms such as the Bidder's subsidiaries, parent entities, affiliates, subcontractors (other than Specialist Subcontractors if permitted in ITB 33.2 of the Bidding document), or any other firm(s) different from the Bidder.

32.3 An affirmative determination shall be a prerequisite for the opening and evaluation of a Bidder's Price Bid. The Employer reserves the right to reject the bid of any bidder found to be in circumstances described in GCC 15.2(e). 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. Subcontractors

33.1 Unless otherwise stated in the BDS, the Employer does not intend for the contractor to execute any specific elements of the Works through nominated subcontractors.

33.2 If subcontractors are proposed for any of the key activities listed in Section 3 – Evaluation and Qualification Criteria 2.4.2, they shall be considered as "Specialist Subcontractors" and shall meet qualification requirements for the relevant key activities.



34. Correction of Arithmetical Errors

34.1 During the evaluation of Price Bids, the Employer shall correct arithmetical errors on the following basis:

- (a) If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected, unless in the opinion of the Employer there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price shall be corrected.
- (b) If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected.
- (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.

34.2 If the Bidder that submitted the lowest evaluated bid does not accept the correction of errors, its Bid shall be disqualified and its bid security may be forfeited or its Bid-Securing Declaration executed.

35. Conversion to Single Currency

35.1 For evaluation and comparison purposes, the currency(ies) of the Bid shall be converted into a single currency as specified in the BDS.

36. Domestic Preference

36.1 Unless otherwise specified in the BDS, domestic preference shall not apply.

37. Evaluation and Comparison of Price Bids

37.1 The Employer shall use the criteria and methodologies listed in this Clause. No other evaluation criteria or methodologies shall be permitted.

37.2 To evaluate the Price Bid, the Employer shall consider the following:

- (a) the bid price, excluding Provisional Sums and the provision, if any, for contingencies in the Summary Bill of Quantities, but including Daywork items, where priced competitively;
- (b) price adjustment for correction of arithmetic errors in accordance with ITB 34.1;
- (c) price adjustment due to discounts offered in accordance with ITB 14.4;
- (d) converting the amount resulting from applying (a) to (c) above, if relevant, to a single currency in accordance with ITB 34;
- (e) adjustment for nonconformities in accordance with ITB 31.3;
- (f) assessment whether the bid is abnormally low in accordance with ITB 38; and
- (g) application of all the evaluation factors indicated in Section 3 (Evaluation and Qualification Criteria).

37.3 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.

37.4 If this Bidding Document allows Bidders to quote separate prices for different contracts, and the award to a single Bidder of multiple contracts,



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 3 (Evaluation and Qualification Criteria).

- 37.5 The Employer shall compare all substantially responsive Bids to determine the lowest evaluated Bid price, in accordance with ITB 37.2.

38. Abnormally Low Bids

- 38.1 An abnormally low bid is one where the bid price, in combination with other elements of the bid, appears to be so low that it raises concerns as to the capability of the Bidder to perform the contract for the offered bid price.

- 38.2 When the bid price appears to be abnormally low, the Employer shall undertake a three-step process as follows:

- (a) identify abnormally low costs and unit rates by comparing them with the engineer's estimates, other substantially responsive bids, or recently awarded similar contracts;
- (b) clarify and analyze the bidder's resource inputs and pricing, including overheads, contingency and profit margin; and
- (c) decide on whether to accept or reject the bid.

- 38.3 With regard to ITB 38.2 (b) above, the Employer will seek a written explanation from the bidder of the reasons for the offered bid price, including a detailed analysis of costs and unit prices, by reference to the scope, proposed methodology, schedule, and allocation of risks and responsibilities. This may also include information regarding the economy of the manufacturing process; the services to be provided, or the construction method to be used; the technical solutions to be adopted; and any exceptionally favorable conditions available to the bidder for the works, equipment or services proposed.

- 38.4 After examining the explanation given and the detailed price analyses presented by the bidder, the Employer may:

- (a) accept the bid, if the evidence provided satisfactorily accounts for the low bid price and costs, in which case the bid is not considered abnormally low;
- (b) accept the bid, but require that the amount of the performance security be increased at the expenses of the bidder to a level sufficient to protect the Employer against financial loss. The amount of the performance security shall generally be not more than 20% of the contract price; or
- (c) reject the bid if the evidence provided does not satisfactorily account for the low bid price, and make a similar determination for the next ranked bid, if required.



39. Unbalanced or Front-Loaded Bids

39.1 If the Bid, which results in the lowest evaluated Bid Price, is seriously unbalanced or front loaded in the opinion of the Employer, the Employer may require the Bidder to produce detailed price analyses for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with the construction methods and schedule proposed, as well as the pricing and sources of materials, equipment and labor.

39.2 After the evaluation of the information and detailed price analyses presented by the Bidder, the Employer may as appropriate:

- (a) accept the Bid; or
- (b) accept the Bid, but require that the total amount of the Performance Security be increased at the expense of the Bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract subject to ITB 45.2; or
- (c) reject the Bid and make a similar determination for the next ranked bid.

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

40.1 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.

41. Notice of Intention for Award of Contract

41.1 If Standstill provisions apply as specified in the BDS, the standstill period shall be defined in the BDS to specify the duration subsequent to notification of intention for award of contract (before making the actual contract award) within which any unsuccessful bidder can challenge the proposed award.

F. Award of Contract

42. Award Criteria

42.1 The Employer shall award the Contract to the Bidder whose offer has been determined in line with ITB 37 to 39 above to be the lowest evaluated Bid and is substantially responsive to the Bidding Document, provided further that the Bidder is determined to be qualified to perform the Contract satisfactorily.

43. Notification of Award

43.1 Prior to the expiration of the period of bid validity and upon expiry of the standstill period specified in ITB 41.1, or upon satisfactory resolution of a complaint filed within standstill period, if applicable, the Employer shall transmit the Notification of Award (using the form included in Section 9 (Contract Forms)) to the successful Bidder, in writing, that its Bid has been accepted.

43.2 Unless standstill period applies, upon notification of award, 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 and/or in a debriefing meeting to any unsuccessful Bidder who, after publication of contract award, requests a debriefing.

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



43.4 Within 2 weeks of the award of contract or expiry of the standstill period, where such period applies, or, if a complaint has been filed within the standstill period, upon receipt of ADB's confirmation of satisfactory resolution of the complaint, the borrower shall publish in an English language newspaper or widely known and freely accessible website the results identifying the bid and lot or package numbers, as applicable and the following information:

- (a) name of each Bidder who submitted a Bid;
- (b) bid prices as read out at bid opening;
- (c) name and evaluated prices of each Bid that was evaluated;
- (d) name of bidders whose bids were rejected and the reasons for their rejection; and
- (e) name of the winning Bidder, and the price it offered, as well as the duration and summary scope of the contract awarded.

44. Signing of Contract

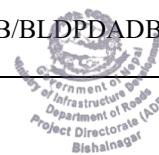
- 44.1 Promptly after notification, the Employer shall send the successful Bidder the Contract Agreement.
- 44.2 Within 28 days of receipt of the Contract Agreement, the successful Bidder shall sign, date, and return it to the Employer.

45. Performance Security

- 45.1 Within 28 days of the receipt of notification of award from the Employer, the successful Bidder shall furnish the performance security in accordance with the conditions of contract, subject to ITB 38 and 39, using for that purpose the Performance Security Form included in Section 9 (Contract Forms), or another form acceptable to the Employer. If the institution issuing the performance security is located outside the country of the employer, it shall have a correspondent financial institution located in the country of the employer to make it enforceable.
- 45.2 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 or execution of the Bid-Securing Declaration. In that event, the Employer may award the Contract to the next lowest evaluated Bidder whose offer is substantially responsive and is determined by the Employer to be qualified to perform the Contract satisfactorily.
- 45.3 The above provision shall also apply to the furnishing of a domestic preference security if so required.

46. Bidding-Related Complaints

- 46.1 The procedures for dealing with Bidding-related Complaints arising out of this bidding process are specified in the BDS.



Chudraj Dhakal
Project Director

Section 2 - Bid Data Sheet

A. General

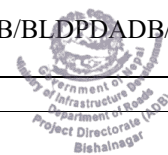
ITB 1.1	The number of the Invitation for Bids (IFB) is: SHIP/2026/01
ITB 1.1	The Employer is: Ministry of Infrastructure Development, Department of Roads, Project Directorate (ADB), Bishalnagar, Kathmandu, Nepal The Authorized Representative is: Project Director The Project Directorate (ADB)
ITB 1.1	The name of the bidding process is: Open Competitive Bidding (National advertisement), Single Stage: Two Envelope Construction of Project Directorate Office Building with Necessary Accessories at Bishalnagar (Completion of Remaining Works), Kathmandu The identification number of the (OCB-NAT) is: SHIP/OCB/BLDPDADB/02 The number and identification of lots comprising this OCB are “1(One)” with the following Contract identification numbers: Contract No.: SHIP/OCB/BLDPDADB/02
ITB 2.1	The Borrower is: Nepal
ITB 2.1	The name of the Project is: SASEC Highway Improvement Project (SHIP), Construction of Project Directorate Office Building Project (Completion of Remaining Works)
ITB 4.4	Add following line at the end of clause 4.4: A firm that is under a declaration of ineligibility by the Government of Nepal/Development Partner in accordance with ITB 3, at the date of the deadline for bid submission or thereafter, shall be disqualified.

B. Contents of Bidding Documents

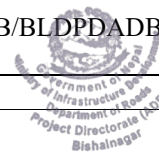
ITB 7.1	For <u>clarification purposes</u> only, the Employer's address is: Attention: The Project Director Department of Roads, Project Directorate (ADB) Bishalnagar, Kathmandu Tel No.: +977 1 4537492/4537493 Fax. No.: +977 1 4537488 E-mail: pdadb@dor.gov.np
ITB 7.4	A Pre-Bid meeting shall take place. It will be at the following date, time and place: Date: 31 August, 2026 Time: 15:00 hours (Nepal Standard Time) Place: Project Directorate (ADB), Bishalnagar, Kathmandu A site visit conducted by the Employer will not be organized.

C. Preparation of Bids

ITB 10.1	The language of the Bid Is English .



ITB 11.2 (g)	The Bidder shall submit with its Technical Bid the following additional documents: ➤ Up-to-date Firm/Company Registration Certificate (by all Firms in case of Joint Venture) ➤ VAT Registration Certificate (Mandatory for domestic bidders and resident foreign bidders only) ➤ Tax Clearance Certificate/Tax return submission evidence/evidence of time extension (Mandatory for domestic bidders and resident foreign bidders only) ➤ Business Registration (License) Certificate ➤ Bank Voucher/Cash Receipt for cost of Bid Document ➤ In case a Bidder is a Joint Venture, the Bidder shall submit a JV Undertaking document, as follows: ➤ JV Undertaking, setting out the legal undertaking between the two or more partners as a JV. This document shall be signed by all the partners who are members of the JV, and shall be addressed to the Employer and shall include: a. each such member's undertaking to be jointly and severally liable to the Employer for the performance of the Contractor's obligations under the Contract; b. identification and authorization of the leader of the JV; and c. identification of the separate scope or part of the Works (if any) to be carried out by each member of the JV. The Undertaking shall indicate precisely the role of each partner of the JV, indicating distribution of responsibilities of each partner in execution of the Works, in respect of works execution and resource mobilization (construction equipment, key personnel, financing), and percentage share of responsibility, in the following format: <table><tr><th>Sl. No.</th><th>Name of the Partner</th><th>Role of each Partner (Identify Lead Partner / Each Partner)</th><th>Distribution of responsibilities in execution of the Works</th><th>% Participation</th></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></table>	Sl. No.	Name of the Partner	Role of each Partner (Identify Lead Partner / Each Partner)	Distribution of responsibilities in execution of the Works	% Participation																				
Sl. No.	Name of the Partner	Role of each Partner (Identify Lead Partner / Each Partner)	Distribution of responsibilities in execution of the Works	% Participation																						
ITB 11.3 (d)	The Bidder shall submit with its Price Bid the following additional documents: Not Applicable																									
ITB 12.1	The units and rates in figures entered into the Bill of Quantities and Daywork Schedule should be typewritten or if written by hand, must be in print form. Bill of Quantities and Daywork Schedule not presented accordingly may be considered nonresponsive.																									
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: Not Applicable																									
ITB 14.5	The prices quoted by the Bidder shall not be adjustable																									
ITB 15.1	The unit rates and the prices shall be quoted by the Bidder entirely in: Nepalese Rupees (NRs.)																									
ITB 16.1	Add the following para: Technical Proposal shall also include a. Emergency Preparedness Plan to ensure actions in place during emergency event b. Occupational Health and Safety Plan Any bid not accompanied by the Emergency Preparedness and Occupation Health and Safety Plan shall be rejected by the Employer as nonresponsive.																									

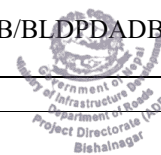


Chudaraj Dhakal
Project Director

ITB 18.1	The bid validity period shall be 120 days .
ITB 19.1	The Bidder shall furnish a bid security in the amount of NRs. 4.95 million
ITB 19.2	The ineligibility period will be: Not Applicable
ITB 19.4	Subject to the succeeding, any bid not accompanied by an irrevocable and callable bid security shall be rejected by the Employer as nonresponsive. However, if a bidder submits a bid security that (i) deviates in form, amount, and/or period of validity, or (ii) does not provide sufficient identification of the Bidder (including, without limitation, failure to indicate the name of the Joint Venture or, where the Joint Venture has not yet been constituted, the names of the all future Joint Venture Partners), the Employer shall request the Bidder to submit a compliant bid security within Fourteen (14) days of receiving such a request. Failure to provide a compliant bid security within the prescribed period of receiving such a request shall cause the rejection of the Bid.
ITB 20.1	In case of bids submitted in hard copy: In addition to the original of the bid, the number of copies is: One (1).
ITB 20.2	The written confirmation of authorization to sign on behalf of the Bidder shall consist of: An organizational document, board resolution or its equivalent, or power of attorney specifying the representative's authority to sign the Bid on behalf of, and to legally bind, the Bidder. If the Bidder is an intended or an existing joint venture, the power of attorney should be signed by all partners and specify the authority of the named representative of the joint venture to sign on behalf of, and legally bind, the intended or existing joint venture. If the joint venture has not yet been formed, also include evidence from all proposed joint venture partners of their intent to enter into a joint venture in the event of a contract award in accordance with ITB 11.4.
ITB 20.2	The Bidder shall submit an acceptable authorization within Fourteen (14) days .

D. Submission and Opening of Bids

ITB 21.1	Bidders shall submit their Bids by mail or by hand <table><tr><td>Name of Bank</td><td>Name of the office</td><td>Revenue Account No</td><td>Office Code</td><td>Revenue Heading No.</td><td>Cost of Bidding Document</td></tr><tr><td>Rastriya Banijya Bank, Thamel Branch</td><td>Department of Roads, Project Directorate (ADB)</td><td>1000100200010000</td><td>337013518</td><td>14229</td><td>NRs. 20,000</td></tr></table>	Name of Bank	Name of the office	Revenue Account No	Office Code	Revenue Heading No.	Cost of Bidding Document	Rastriya Banijya Bank, Thamel Branch	Department of Roads, Project Directorate (ADB)	1000100200010000	337013518	14229	NRs. 20,000
Name of Bank	Name of the office	Revenue Account No	Office Code	Revenue Heading No.	Cost of Bidding Document								
Rastriya Banijya Bank, Thamel Branch	Department of Roads, Project Directorate (ADB)	1000100200010000	337013518	14229	NRs. 20,000								
ITB 21.1 b.	The electronic bidding submission procedure shall be: Not Applicable												
ITB 22.1	For <u>bid submission purposes</u> only, the Employer’s address is: Department of Roads Project Directorate (ADB) Bishalnagar, Kathmandu Attention: The Project Director The deadline for bid submission is: Date: 16 September, 2026 Time: 12:00 hours (Local Time)												
ITB 24.1	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.												



Chudaraj Dhakal
Project Director

ITB 25.1	The opening of the Technical Bid shall take place at: Department of Roads Project Directorate (ADB) Bishalnagar, Kathmandu Date: 16 September, 2026 Time: 13:00 hours (Local Time)
ITB 25.5	The letter of Technical Bid shall be initialed by Three (3) representatives of the Employer attending Bid opening.
ITB 25.10	The letter of Price Bid and Bill of Quantities shall be initialed by Three (3) representatives of the Employer attending Bid opening.

E. Evaluation and Comparison of Bids

ITB 32.2	Qualifications of other firms such as the Bidder's subsidiaries, parent entities, affiliates, subcontractors shall not be permitted.
ITB 33.1	The Employer does not intend for the contractor to execute any specific elements of the Works through nominated subcontractors.
ITB 33.2	N/A
ITB 35.1	<i>The currency that shall be used for bid evaluation and comparison purposes to convert all bid prices expressed in various currencies into a single currency is: Nepalese Rupees</i> <i>The source of the selling exchange rate shall be: Nepal Rastra Bank, Kathmandu, Nepal</i> <i>The date for the selling exchange rate shall be: 28 days prior to the deadline for submission of bids.</i>
ITB 36.1	Domestic preference shall not apply.
ITB 41.1	The Standstill period shall apply. The duration of standstill period will be ten (10) days from the date of notice of Intention for award of contract. The Employer shall, at the start of the Standstill period, notify in writing each bidder that submitted a bid, of its intention to award a contract to the successful bidder at the end of Standstill period. The notification (using the form included in Section 9 (Contract Forms) shall include the following information: (a) the name of each Bidder who submitted the Bid; (b) the bid prices as read out at bid opening; (c) the name and evaluated prices of each bid that was evaluated; (d) the name of bidders whose bids were rejected and the reasons for their rejection; (e) the name of the winning bidder, and the price it offered, as well as the duration and summary scope of the contract awarded; and (f) a statement of the reason(s) the bid of the unsuccessful bidder to whom the notification is addressed was unsuccessful, unless the price information under (e) of this paragraph already reveals the reason.

G. Award of Contracts

ITB 46.1	The procedures for Bidding-related Complaints are referenced in the " Procurement Regulations for ADB Borrowers (Appendix 7). " The Bidder should submit its complaint following these procedures, in writing, to: For the attention: The Project Director Title/position: Project Director, Employer: Project Directorate (ADB), Bishalnagar, Kathmandu Email address: pdadb@wlink.com.np Fax number: +977 1 4437488



Chudaraj Dhakal
Project Director

Section 3 - Evaluation and Qualification Criteria

- Without Prequalification -

This Section contains all the criteria that the Employer shall use to evaluate bids and qualify Bidders. In accordance with ITB 32 and ITB 36, no other methods, criteria and factors shall be used. The Bidder shall provide all the information requested in the forms included in Section 4 (Bidding Forms).

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1. Evaluation

In addition to the criteria listed in ITB 37.2 (a) – (f), other relevant factors are as follows:

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 6 (Employer's Requirements).

Non-compliance with equipment and personnel requirements described in Section 6 (Employer's Requirements) shall not normally be a ground for bid rejection and such non-compliance will be subject to clarification during bid evaluation and rectification prior to contract award.

1.2 Completion Time

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

1.3 Technical Alternatives

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

1.4 Specialist Subcontractors

Only the specific experience of Specialist Subcontractors for key activities specified in criterion 2.4.2 Construction Experience in Key Activities will be considered. The experience of similar size and nature and financial resources of the Specialist Subcontractors shall not be added to those of the Bidder for purposes of qualification of the Bidder.

1.5 Quantifiable Nonconformities and Omissions

Subject to ITB 14.2 and ITB 37.2, 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, including omissions in Daywork where competitively priced but excluding omission of prices in the Bill of Quantities. 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.”

1.6 Domestic Preference: Not applicable

1.7 Other Criteria

The Employer will take into account the quality of the a) Emergency Preparedness Plan to ensure actions in place during emergency event b.) Occupational Health and Safety Plan attached to the Technical Proposal in its evaluation of the Adequacy of the Technical Proposal.

1.8 Multiple Contracts: Not Applicable



Chudaraj Dhakal
Project Director

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 Subclause 4.2.	must meet requirement	must meet requirement	must meet requirement	not applicable	Forms ELI - 1; ELI - 2 with attachments

2.1.2 Conflict of Interest

No conflicts of interest in accordance with ITB Subclause 4.3.	must meet requirement	must meet requirement	must meet requirement	not applicable	Letter of Technical Bid

2.1.3 ADB Eligibility

Not having been declared ineligible by ADB, as described in ITB Subclause 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 Subclause 4.5.	must meet requirement	must meet requirement	must meet requirement	not applicable	Forms ELI - 1; ELI - 2 with attachments

2.1.5 United Nations Eligibility

Not having been excluded by an act of compliance with a United Nations Security Council resolution in accordance with ITB Subclause 4.8	must meet requirement	must meet requirement	must meet requirement	not applicable	Letter of Technical Bid



Chudaraj Dhakal
Project Director

2.2 Historical Contract Non-Performance

2.2.1 History of Non-Performing Contracts

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
Non-performance of a contract ² did not occur as a result of contractor default since 1st January 2019.	Must meet requirement	Must meet requirement	Must meet requirement ³	Not applicable	Form CON-1

2.2.2 Suspension Based on Execution of Bid-Securing Declaration

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
Not under suspension based on execution of a Bid-Securing Declaration pursuant to ITB 4.6.	must meet requirement	must meet requirement	must meet requirement	Not applicable	Letter of Technical Bid

2.2.3 Pending Litigation and Arbitration

Pending litigation and arbitration criterion **shall not** apply.

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

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



2.3 Financial Situation

2.3.1 Historical Financial Performance

Criteria		Compliance Requirements			Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
Submission of audited financial statements or, if not required by the law of the Bidder's country, other financial statements acceptable to the Employer, for the last Five (5) years to demonstrate the current soundness of the Bidder's financial position. As a minimum, (i) the Bidder's net worth for the last year calculated as the difference between total assets and total liabilities should be positive, and (ii) the Bidder's working capital for the last year calculated as the difference between current assets and current 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**

Criteria		Compliance Requirements			Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
Minimum average annual construction turnover of NRs. 329.00 million calculated as total certified payments received for contracts in progress or completed, within the last Five (5) years.	must meet requirement	must meet requirement	must meet 25% of the requirement	must meet 40% of the requirement	Form FIN - 2

**2.3.3 Financial Resources**

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
For Single Entities: The Bidder must demonstrate that its financial resources defined in FIN - 3, less its financial obligations for its current contract commitments defined in FIN - 4, meet or exceed the total requirement for the Subject Contract of NRs. 65 million .	must meet requirement	not applicable	not applicable	not applicable	Form FIN – 3 and Form FIN – 4
For Joint Ventures: (1) One partner must demonstrate that its financial resources defined in FIN - 3, less its financial obligations for its own current contract commitments defined in FIN - 4, meet or exceed its required share of NRs. 26.00 million . From the total requirement for the Subject Contract. AND	not applicable	not applicable	not applicable	must meet requirement	Form FIN – 3 and Form FIN – 4
(2) Each partner must demonstrate that its financial resources defined in FIN - 3, less its financial obligations for its own current contract commitments defined in FIN - 4, meet or exceed its required share of NRs. 16.25 million from the total requirement for the Subject Contract. AND	not applicable	not applicable	must meet requirement	not applicable	Form FIN – 3 and Form FIN – 4
(3) The joint venture must demonstrate that the combined financial resources of all partners defined in FIN - 3, less all the partners' total financial obligations for the current contract commitments defined in FIN - 4, meet or exceed the total requirement for the Subject Contract of NRs. 65.00 million .	not applicable	must meet requirement	not applicable	not applicable	Form FIN – 3 and Form FIN – 4



Chudaraj Dhakal
Project Director

2.4 Construction Experience

2.4.1 Contracts of Similar Size and Nature

Criteria		Compliance Requirements			Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
Participation as a contractor, JV partner, or subcontractor, in at least two contracts that have been Satisfactorily and substantially completed within the last Five (5) years and that are similar to the proposed works, where the value of the Bidder's participation under a contract exceeds NRs. 175 million . The similarity of the Bidder's participation shall be based on Construction of Frame structured building with basement with at least total floor area 40,000.00 Sqft completed within last five years.	must meet requirement	Must meet requirement Either one partner must meet requirement Or Any two partners must each demonstrate one (1) satisfactorily and substantially completed contract of similar size and nature	Must meet requirement as follows: Participation in at least one contract that has been satisfactorily and substantially completed within the last 5 years and that is similar to the proposed works, where the value of the Bidder's participation exceeds NRs. 43.75 million or its equivalent.	NA	Form EXP - 1



2.4.2 Construction Experience in Key Activities

In case of a Joint Venture Bidder, at least one of the partners must have experience in key activities if the Bidder itself will carry out the relevant key activity.

Not Applicable

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Project Director

FOR WEBSITE



Chudaraj Dhakal
Chudaraj Dhakal
Project Director

Section 4 - Bidding Forms

- Without Prequalification -

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

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Schedule of Payment Currencies

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Bill of Quantities

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[Signature]
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Project Director

Letter of Technical Bid

The bidder must accomplish the Letter of Technical Bid on its letterhead clearly showing the bidder's complete name and address.

Date:

OCB No.:

Invitation for Bid No.:

To:

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (ITB) 8.
- (b) We offer to execute in conformity with the Bidding Documents the following Works:
[.....insert narrative.....]
- (c) Our Bid consisting of the Technical Bid and the Price Bid shall be valid for a period of [.....insert bid 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.
- (e) 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.
- (f) We are not participating, as a Bidder, either individually or as partner in a joint venture, 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.
- (g) Our firm, joint venture partners, associates, parent company, its affiliates or subsidiaries, including any Subcontractors or Suppliers for any part of the contract, are not subject to, or not controlled by any entity or individual that is subject to, a temporary suspension or a debarment imposed by the Asian Development Bank or a debarment imposed by the Asian Development Bank in accordance with the Agreement for Mutual Enforcement of Debarment Decisions between the Asian Development Bank and other development banks.¹
- (h) Our firm, joint venture partners, associates, parent company, affiliates or subsidiaries, including any Subcontractors or Suppliers for any part of the Contract, are not, or have never been, temporarily suspended, debarred, declared ineligible, or blacklisted by the employer's country, any international organization, and other donor agency.

If so debarred, declared ineligible, temporarily suspended, or blacklisted, please state details (as applicable to each joint venture partner/associate/parent company /affiliate/ subsidiaries/ subcontractors/ suppliers):

¹ These institutions include African Development Bank, European Bank for Reconstruction and Development (EBRD), Inter-American Development Bank (IADB), and the World Bank Group. According to paragraph 9 of the Agreement, other international financial institutions may join upon the consent of all Participating Institutions and signature of a Letter of Adherence by the international financial institution substantially in the form provided (Annex B to the Agreement). Upon adherence, such international financial institution shall become a Participating Institution for purposes of the Agreement. Bidders are advised to check www.adb.org/integrity for updates.



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- (i) Name of Institution: _____
- (ii) Period of debarment, ineligibility, or blacklisting (start and end date): _____
- (iii) Reason for the debarment, ineligibility, or blacklisting: _____

- (i) Our firm's, joint venture partners', associates', parent company's affiliates' or subsidiaries', including any Subcontractors or Suppliers key officers and directors have not been [charged or convicted] of any criminal offense (including felonies and misdemeanors) or infractions/violations of ordinance which carry the penalty of imprisonment.

If so charged or convicted, please state details:

- (i) Nature of the offense/violation: _____
- (ii) Court/Area of jurisdiction: _____
- (iii) Resolution (i.e. dismissed; settled; convicted/duration of penalty): _____
- (iv) Other relevant details: _____
- (j) We understand that it is our obligation to notify ADB should our firm, joint venture partners, associates, parent company, affiliates or subsidiaries, including any Subcontractors or Suppliers, be temporarily suspended, debarred or become ineligible to work with ADB or any other MDBs, the employer's country, international organizations, and other donor agencies, or any of our key officers and directors be charged or convicted of any criminal offense or infractions/violations of ordinance which carry the penalty of imprisonment.
- (k) Our firm, joint venture partners, associates, parent company, affiliates or subsidiaries, including any subcontractors or suppliers, are not from a country which is prohibited to export goods to or receive any payments from the employer's country 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.
- (l) [We are not a government-owned enterprise] / [We are a government-owned enterprise but meet the requirements of ITB 4.5].¹
- (m) We have not been suspended nor declared ineligible by the Employer based on execution of a Bid-Securing Declaration in accordance with ITB 4.6.
- (n) We agree to permit ADB 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 ADB.
- (o) If our Bid is accepted, we commit to mobilizing key equipment and personnel in accordance with the requirements set forth in Section 6 (Employer's Requirements) and our technical proposal, or as otherwise agreed with the Employer.
- (p) We understand that any misrepresentation that knowingly or recklessly misleads, or attempts to mislead may lead to the automatic rejection of the Bid or cancellation of the contract, if awarded, and may result in remedial actions, in accordance with ADB's Anticorruption Policy (1998, as amended to date) and Integrity Principles and Guidelines (2015, as amended from time to time).

Name

In the capacity of

Signed

Duly authorized to sign the Bid for and on behalf of

Date

¹ Use one of the two options as appropriate.



Chudraj Bhakal
Project Director

Letter of Price Bid

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

Date:

OCB No.:

Invitation for Bid No.:

To: [...insert complete name of the 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) 8.
- (b) We offer to execute in conformity with the Bidding Documents and the Technical Bid submitted for the following Works. [...insert narrative ...]
- (c) The total price of our Bid, excluding any discounts offered in item (d) below is or, when left blank, is the Bid Price indicated in the summary of Bill of Quantities

[amount of foreign currency in words], [amount in figures], and [amount of local currency in words], [amount in figures]

- (d) The discounts offered and the methodology for their application are: [...insert discounts and methodology for their application if any ...]
- (e) Our Bid shall be valid for a period of [...insert bid 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.
- (f) If our Bid is accepted, we commit to obtain a performance security in accordance with the Bidding Documents.
- (g) We have paid, or will pay the following commissions, gratuities, or fees with respect to the bidding process or execution of the Contract.¹

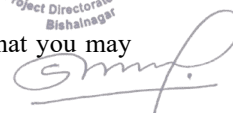
Name of Recipient	Address	Reason	Amount
.....			
.....			

- (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.

¹If none has been paid or is to be paid, indicate "None"



- (i) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive.
- (j) We agree to permit ADB 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 ADB.


Chudanga Dhakal
Project Director

Name

In the capacity of

Signed

Duly authorized to sign the Bid for and on behalf of

Date

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Chudaraj Dhakal
Project Director

Bid Security Bank Guarantee

.....*Bank's name, and address of issuing branch or office*¹.....

Beneficiary: *Name and address of the employer*

Date:

Bid Security No.:

We have been informed that *name of the bidder* (hereinafter called "the Bidder") has submitted to you its bid dated (hereinafter called "the Bid") for the execution of *name of contract* under Invitation for Bids 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 *name of bank* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of *amount in words* (*amount in figures*) 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 its Bid during the period of bid validity specified by the Bidder in the Letters of Technical and Price Bid; or
- (b) does not accept the correction of errors in accordance with the Instructions to Bidders (hereinafter "the ITB"); or
- (c) 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 (iii) fails or refuses to furnish a domestic preference security, if required.

This guarantee will expire (a) if the Bidder is the successful Bidder, upon our receipt of copies of the Contract Agreement signed by the Bidder and the Performance Security issued to you upon the instruction of the Bidder; or (b) if the Bidder is not the successful Bidder, upon the earlier of (i) our receipt of a copy of your notification to the Bidder of the name of the successful Bidder, or (ii) 28 days after the expiration of the Bidder's bid i. e. [. . . *insert Date* . . .]

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

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458.²

.....*Authorized signature(s) and bank's seal (where appropriate)*

¹ All italicized text is for use in preparing this form and shall be deleted from the final document.

² Or 758 as applicable.



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Chudaraj Dhakal
Project Director

Technical Proposal

The Bidder shall submit Technical Proposal for Office Construction Works in the forms and sheets as attached in the Bidding Forms in the following pages.

Construction Works

Personnel

The bidder shall propose for deployment full complement of staff necessary for the successful execution of the works.

Equipment

The bidder shall provide required construction equipment and ensure their maintenance for efficient and continuous work progress. Bidder will also provide proper work shop and other maintenance facilities at site.

Site Organization

The bidder is required to submit proposed site organization structure (organogram) showing the management, supervisory and quality control units indicating their lines of communication and responsibility shown in an organogram.

Method Statement

The bidder shall state all major works, site camp facilities (sanitary, water supply, telecommunication, inspection vehicles etc.), road alignment, earth work, pavement work, drainage structure, bridges & culverts works etc. The bidder is required to describe works how to start and complete different sections of works.

Mobilization Schedule

The bidder shall mobilize personnel, equipment, deployment of work force, collection of construction materials and prepare a mobilization bar chart. Likewise, the bidder will provide site camp, stack yard etc. at different working places for efficient execution of works.

Construction Schedule

The bidder shall submit Schedule using MS Project or equivalent project management software showing sequence of works for items in Bill of Quantities (BOQ) together with program and progress of works.



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Project Director

Personnel

Form PER – 1: Proposed Personnel

Bidder should provide the details of the proposed personnel and their experience record in the relevant Information Forms below for each candidate:

The Bidder shall provide for Office Construction Works

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

-- Note --

* As listed in Section 6 (Employer's Requirements).

Form PER – 2: **Resume of Proposed Personnel**

The Bidder shall provide all the information requested below. Use one form for each position.

Chudaraj Dhakal
Project Director

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

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

[illegible]



Chudaraj Dhakal
Project Director

Equipment

Form EQU: Equipment (Bidder shall provide the details of equipment)

The Bidder shall provide adequate information and details to demonstrate clearly that it has the capability to meet the equipment requirements indicated in Section 6 (Employer's Requirements), using the Forms below. A separate Form shall be prepared for each item of equipment listed, or for alternative equipment proposed by the Bidder.

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

Omit the following information for equipment owned by the Bidder.

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




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Project Director

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Project Director

Construction Schedule

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Chandraj Dhakal
Project Director

COVID-19 specific Site Health and Safety Management Plan

The bidder should demonstrate in the Plan the health and safety measures they will put in place on site in relation to COVID-19 prevention and controls, including but not limited to, PPE requirements, site set up, training, induction and mobilization of new personnel, equipment and plants cleaning and other hazard management measures while undertaking site work activities, site visitors health and safety protocols, as well as the approach to the monitoring and reporting of the Plan. The Plan should be fit for purpose for the particular construction works of this contract and be aligned with “Standard Operating Procedure (SOP) for COVID-19 Risk Management at Workplaces” as attached under Section 6 - Employer’s Requirement.

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Project Director

Bidders Qualification

To establish its qualifications to perform the contract in accordance with Section 3 (Evaluation and Qualification Criteria) the Bidder shall provide the information requested in the corresponding Information Sheets included here under.

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Chudaraj Dhakal
Project Director

Form ELI - 1: Bidder's Information Sheet

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



Signature

Chudaraj Dhakal
Project Director

Form ELI - 2: Joint Venture Information Sheet

Each member of the Joint Venture and Specialist Subcontractor must fill out this form separately.

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



Chudrajy Nakal
Project Director

Form CON - 1: Historical Contract Non-Performance

Each Bidder must fill out this form in accordance under Criterion 2.2.1 and 2.2.3 of Section 3 (Evaluation and Qualification Criteria) to describe any history of non-performing contracts and pending litigation or arbitration formally commenced against it.

In case of a Joint Venture, each Joint Venture Partner must fill out this form separately and provide the Joint Venture Partner's name below:

Joint Venture Partner: _____

Table 1: History of Non-Performing Contracts

Choose one of the following:			
☐ No non-performing contracts.			
☐ Below is a description of non-performing contracts involving the Bidder (or each Joint Venture member if Bidder is a Joint Venture).			
Year	Description	Amount of non-performed portion of contract (\$ equivalent)	Total Contract Amount (\$ equivalent)
[insert year]	Contract Identification: [indicate complete contract name/ number, and any other identification] Name of Employer: [insert full name] Address of Employer: [insert street/city/country] Reason(s) for nonperformance: [indicate main reason(s)]	[insert amount]	[insert amount]



Signature
Chudaraj Dhakal
Project Director

Form FIN - 1: Historical Financial Performance

Each Bidder must fill out this form.

In case of a Joint Venture, each Joint Venture Partner must fill out this form separately and provide the Joint Venture Partner's name below:

Joint Venture Partner: _____

Financial Data for Previous Years [\$ Equivalent]

Year 1:	Year 2:	Year 3:	Year 4:	Year 5:

Information from Balance Sheet

Total Assets (TA)					
Total Liabilities (TL)					
Net Worth = TA – TL					
Current Assets (CA)					
Current Liabilities (CL)					
Working Capital = CA - CL					

Most Recent Working Capital		To be obtained for most recent year and carried forward to FIN - 3 Line 1; in case of Joint Ventures, to the corresponding Joint Venture Partner's FIN - 3.

Information from Income Statement

Total Revenues					
Profits Before Taxes					
Profits After Taxes					

- ☐ Attached are copies of financial statements (balance sheets including all related notes and income statements) for the last ____ years, as indicated above, complying with the following conditions:
- Unless otherwise required by Section 3 of the Bidding Document, all such documents reflect the financial situation of the legal entity or entities comprising the Bidder and not the Bidder's parent companies, subsidiaries, or affiliates.
 - Historical financial statements must be audited by a certified accountant.
 - Historical financial statements must be complete, including all notes to the financial statements.
- Historical financial statements must correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted).



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Project Director

Form FIN - 2: Average Annual Construction Turnover

Each Bidder must fill out this form.

The information supplied should be the Annual Turnover of the Bidder or each member of a Joint Venture in terms of the amounts billed to clients for each year for work in progress or completed, converted to US dollars at the rate of exchange at the end of the period reported.

In case of a Joint Venture, each Joint Venture Partner must fill out this form separately and provide the Joint Venture Partner's name below:

Joint Venture Partner: _____

Annual Turnover Data for the Last Years (Construction only)			
Year	Amount Currency	Exchange Rate	\$ Equivalent
Average Annual Construction Turnover			



Signature
Chudang Chakal
 Project Director

Form FIN – 3: Availability of Financial Resources

Bidders must demonstrate sufficient financial resources, usually comprising of Working Capital supplemented by credit line statements or overdraft facilities and others to meet the Bidder's financial requirements for

- (a) its current contract commitments, and
- (b) the subject contract.

In case of a Joint Venture, each Joint Venture Partner must fill out this form separately and provide the Joint Venture Partner's name below:

Joint Venture Partner: _____

Financial Resources		
No.	Source of financing	Amount (\$ equivalent)
1	Working Capital (to be taken from FIN - 1)	
2	Credit Line ^a	
3	Other Financial Resources	
Total Available Financial Resources		

^aTo be substantiated by a letter from the bank issuing the line of credit.



Signature
Chudhary Sakal
 Project Director

Form FIN- 4: Financial Requirements for Current Contract Commitments

Bidders (or each Joint Venture partner) 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.

In case of a Joint Venture, each Joint Venture Partner must fill out this form separately and provide the Joint Venture Partner's name below:

Joint Venture Partner: _____

Current Contract Commitments						
No.	Name of Contract	Employer's Contact (Address, Tel, Fax)	Contract Completion Date	Outstanding Contract Value (X) ^a	Remaining Contract Period in months (Y) ^b	Monthly Financial Resources Requirement (X / Y)
1						
2						
3						
4						
Total Monthly Financial Requirement for Current Contract Commitments						\$

^a Remaining outstanding contract values to be calculated from 28 days prior to the bid submission deadline (\$ equivalent based on the foreign exchange rate as of the same date).

^b Remaining contract period to be calculated from 28 days prior to bid submission deadline.


Form FIN - 5: Self-Assessment Tool for Bidder's Compliance to Financial Resources (Criterion 2.3.3 of Section 3)

This form requires the same information submitted in Forms FIN - 3 and FIN - 4. All conditions of "Available Financial Resources Net of CCC $\geq$ Requirement for the Subject Contract" must be satisfied to qualify.

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Project Director

Form FIN - 5A: For Single Entities

For Single Entities: (A)	Total Available Financial Resources from FIN - 3 (B)	Total Monthly Financial Requirement for Current Contract Commitments (CCC) from FIN - 4 (C)	Available Financial Resources Net of CCC $D = (B - C)$	Requirement for the Subject Contract (E)	Results: Yes or No [D must be greater than or equal to E] (F)
_____ (Name of Bidder)					

Form FIN - 5B: For Joint Ventures

For Joint Ventures: (A)	Total Available Financial Resources from FIN - 3 (B)	Total Monthly Financial Requirement for Current Contract Commitments (CCC) from FIN - 4 (C)	Available Financial Resources Net of CCC $D = (B - C)$	Requirement for the Subject Contract (E)	Results: Yes or No [D must be greater than or equal to E] (F)
One Partner:					
_____ (Name of Partner)					
Each Partner:					
_____ (Name of Partner 1)					
_____ (Name of Partner 2)					
_____ (Name of Partner 3)					
All partners combined	$\Sigma D =$ Sum of available financial resources net of current contract commitments for all partners		$\Sigma D =$ _____		

Form FIN - 5 is made available for use by the bidder as a self-assessment tool, and by the employer as an evaluation work sheet, to determine compliance with the financial resources requirement as stated in 2.3.3. Failure to submit Form FIN - 5 by the Bidder shall not lead to bid rejection.



Signature
Chudaraj Dhakal
Project Director

Form EXP – 1: Contracts of Similar Size and Nature

Fill out one (1) form per contract.

The exchange rate to be used to calculate the value of the contract for conversion to a specific currency shall be the selling rate of borrower's national bank on the date of the contract.

Contract of Similar Size and Nature		
Contract No of	Contract Identification	
Award Date	Completion Date	
Total Contract Amount	NRs. or Its Equivalent	
Partner in a Joint Venture or subcontractor, specify participation of total contract amount	Percent of Total	Amount
Employer's name Address Telephone number Fax number E-mail		
Description of the Similarity in Accordance with Criterion 2.4.1 of Section 3 (Evaluation and Qualification Criteria)		
Participation as a contractor, JV partner, or subcontractor, in at least two contracts that have been satisfactorily and substantially completed within the last Five (5) years and that are similar to the proposed works, where the value of the Bidder's participation under a contract exceeds NRs. 175 Million. The similarity of the Bidder's participation shall be based on construction of at least Framed Structured Building with basement with Total Floor area 40,000 sqm completed within last five years.		



Chudaraj Dhakal
Chudaraj Dhakal
Project Director

Form EXP - 2: Construction Experience in Key Activities

Fill out one (1) form per contract.

Each Bidder must fill out this form.

In case of a Joint Venture, at least one of the Joint Venture Partners who will comply with the requirements must fill out this form and provide the Joint Venture Partner's name below:

Joint Venture Partner: _____

Contract with Similar Key Activities		
Contract No of	Contract Identification	
Award Date	Completion Date	
Total Contract Amount	NRs. or Its Equivalent	
partner in a Joint Venture or subcontractor, specify participation of total contract amount	Percent of Total	Amount
Employer's name Address Telephone number Fax number E-mail		
Description of the Key Activities in Accordance with Criterion 2.4.2 of Section 3 (Evaluation and Qualification Criteria)		



Chudaraj Dhakal
Project Director

Schedules

Schedule of Payment Currencies

For insert name of Section of the Works

Separate tables may be required if the various sections of the Works (or of the Bill of Quantities) will have substantially different foreign and local currency requirements. In such a case, the Employer should prepare separate tables for each Section of the Works.

	A	B	C	D
Name of Payment Currency	Amount of Currency	Rate of Exchange to Local Currency	Local Currency Equivalent $C = A \times B$	Percentage of Net Bid Price (NBP) $\frac{100 \times C}{NBP}$
Local Currency		1.00		
Foreign Currency #1				
Foreign Currency #2				
Foreign Currency #3				
Net Bid Price				100.00
Provisional Sums Expressed in Local Currency		1.00		
BID PRICE				

- Note -

The rates of exchange shall be the selling rates 28 days prior to the deadline for submission of bids published by the source specified in BDS 15.




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Project Director

Tables of Adjustment Data: Not Applicable

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Bill of Quantities

A. Preamble

1. The Bill of Quantities shall be read in conjunction with the Instruction to Bidders, Bid Data Sheet, General and Particular Conditions of Contract, Standard Specifications and Special Provisions, and Drawings.
2. The quantities given in the Bill of Quantities are estimated and provisional, and are given to provide a common basis for bidding. The basis of payment will be the actual quantities of work ordered and carried out as measured by the Contractor and verified by the Engineer and valued at the rates and prices bid in the priced Bill of Quantities, where applicable, and otherwise at such rates and prices as the Engineer may fix within the terms of the Contract.
3. The rates and prices bid in the priced Bill of Quantities shall, except as otherwise provided under the Contract, include all constructional 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.
4. A rate or price shall be entered against each item in the priced Bill of Quantities, whether quantities are stated or not. The cost of items against which the Contractor has failed to enter a rate or price shall be deemed covered by other rates and prices entered in the Bill of Quantities. The units and rates in figures entered into the Bill of Quantities should be typewritten or if written by hand, must be in print form. Bill of Quantities not presented accordingly may be considered nonresponsive.
5. The whole cost of complying with the provisions of the Contract shall be included in the items provided in the priced Bill of Quantities, and where no items are provided the cost shall be deemed to be distributed among the rates and prices entered for the related Items of Work.
6. General directions and descriptions of work and materials are not necessarily repeated or summarized in the Bill of Quantities. References to the relevant sections of the Contract documentation shall be made before entering prices against each item in the priced Bill of Quantities.
7. Provisional Sums included and so designated in the Bill of Quantities shall be expended in whole or in part at the direction and discretion of the Engineer in accordance with the Conditions of Contract.
8. The method of measurement of completed work for payment shall be in accordance with the Specifications (see Part II: Employer's Requirement, Section 6B and 6C of these documents).
9. Arithmetic errors will be corrected by the Employer as follows:
 - (a) If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected, unless in the opinion of the Employer there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price shall be corrected.
 - (b) If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected.
 - (c) If there is a discrepancy between the bid price in the Summary of Bill of Quantities and the bid amount in item (c) of the Letter of Bid, the bid price in the Summary of Bill of Quantities will prevail and the bid amount in item (c) of the Letter of Bid will be corrected.
 - (d) If there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a), (b), and (c) above.
10. Bidders shall price the Bill of Quantities in Nepalese Rupees (NRs.) only and shall indicate in the "Schedule of Payment Currencies" the percentage expected for payment in foreign currency or currencies.

B. Day works Schedule

**General**

1. Work shall not be executed on a day work basis except by written order of the Engineer. Bidders shall enter basic rates for day work items in the Schedules, which rates shall apply to any quantity of day work ordered by the Engineer. 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.

Day work Labor

2. In calculating payments due to the Contractor for the execution of day work, 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 return to the original place of departure, but excluding meal breaks and rest periods. Only the time of classes of labor directly doing work ordered by the Engineer and for which they are competent to perform will be measured. The time of gangers (charge hands) actually doing work with the gangs will also be measured but not the time of foremen or other supervisory personnel.
3. The Contractor shall be entitled to payment in respect of the total time that labor is employed on Day work, calculated at the basis rates entered by him 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) the amount of wages paid to such labor, transportation time, overtime, subsistence allowances, and any sums paid to or on behalf of such labor for social benefits in accordance with (Country of Borrower) law, as well as Contractor's profit; overheads; superintendence; liabilities and insurance and allowance to labor; timekeeping and clerical and office work; the use of consumable stores water, lighting, and power; the use and repair of stagings, scaffolding workshops and stores portable power tools; manual plant and tools; supervision by the Contractor's staff, foremen, and other supervisory personnel; and charges incidental to the foregoing. The rates shall be stated in the Nepalese Rupees (NRs.) but the payments will be made on currency proportions as indicated in the "Schedule of Payment Currencies".

Day work Material

4. The Contractor shall be entitled to payment in respect of materials used for Daywork (except for materials for which the cost is included in the percentage addition to labor costs as detailed heretofore), at the rates entered by him in the Schedule of Daywork Rates: 2. Materials and shall be deemed to include overhead charges and profit as follows;
 - (a) 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. The rates shall be stated in the Nepalese Rupees (NRs.) but the payments will be made on currency proportions as indicated in the "Schedule of Payment Currencies".
 - (b) the cost of hauling materials for use on work ordered to be carried out as Daywork from the store or stockpile on the Site to the place where it is to be used shall also be deemed included in the same rate.

**Day work Equipment**

5. The Contractor shall be entitled to payments in respect of Contractor's Equipment already on Site and employed on Day work at the basic rental rates entered by him in the Schedule of Daywork Rates; 3. Contractor's Equipment. The said rates shall be deemed to include due and complete allowance for depreciation, interest, indemnity and insurance, repairs, maintenance, supplies, fuel, lubricants, and other consumables, and all overhead profit and administrative costs related to the use of such equipment.
6. In calculating the payment due to the Contractor's Equipment employed on Daywork, only the actual number of working hours will be eligible for payment, except that where applicable and agreed with the Engineer, the traveling time from the part of the Site where the Construction Plant was located when ordered by the Engineer to be employed on Daywork and the time for return journey thereto shall be included for payment.
7. The basic rental rates for Contractor's Equipment employed on Daywork shall be stated in Nepalese Rupees (NRs.) but the payments will be made on currency proportions as indicated in the "Schedule of Payment Currencies".

Units of Measurement

The following units of measurement and abbreviations are used:

Unit	Abbreviation	Unit	Abbreviation
a) cubic meter	m ³ or cu m	b) millimeter	mm
c) hectare	ha	d) month	mon
e) hour	h	f) number	nr
g) kilogram	kg	h) square meter	m ² or sq m
i) kilometer	km	j) kilometer month	km-mon
k) lump sum	sum	l) person day	per day
m) meter	m	n) week	wk
o) metric ton (1,000 kg)	t	p) square millimeter	mm ² or sq mm
q) litre	lt	r) person month	per mon
s) vehicle Month	veh - mon	t) provisional sum	PS




Chudaraj Dhakal
Project Director

C. Work Items (Bill of Quantities)

(In a Separate Volume: BoQ Volume II)

Note: The bid price shall be inclusive of all Environmental, Health and Safety management and compliance cost.

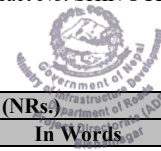
FOR WEBSITE

Government of Nepal
Ministry of Infrastructure Development
Department of Roads
Project Directorate ADB
Bishalnagar Kathmandu



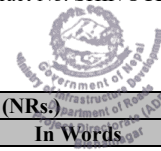
Bill of Quantities

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs.)		Amount
					In Figure	In Words	
Part A:General Items							
I		Insurance					
	2.4	Insurance cover for works, plant, material and the contractor's Equipment for entire project period	L/S	1.00			
		Insurance cover for the third party property and persons for entire project period	L/S	1.00			
II		Contractor's Material Testing Laboratory at Site					
	5.11	Providing laboratory space, installing test equipment, testing construction materials maintaining laboratory ,including required manpower, consumables, reagents all complete set during project period as per specification and instruction of engineer. (ReferAppendix 4)	L/S	9.00			
		Total of Part A					
Part B:Civil Works							
I		SITE CLEARANCE					
1.1	100	DISMENTALING WORKS					
		Safe and complete dismantle of existing drivers and security Guard's rooms and masanory boundary wall from foundation base to top storey as existed at site,cleaning,removing and hauling all type of debris to the hauling site as per requirement, specification and instruction of engineer.	LS	1.00			
		Sub total of 1					
2		EARTHWORK					
2.1	102.1	EARTH WORK IN EXCAVATION					
		Earth work in excavation to all depth and all kind of soils/soft rocks/debris including dewatering and hauling the excavated materials as per specification and instrucion of engineer	Cu.m	372.72			
2.3	102.2	EARTH WORK IN FILLING					
		Earth work in filling in foundation trenches and with materials from associated excavation including machine compaction in 15 cm layers with sprinkling water required to obtained 95% density as per the specification and approval of engineer.	Cu.m	263.46			
2.4	102	EARTH RAMMERING WORKS					
		Rammering work in foundation with Mechanical compactor completed in true line and level as per drawing, specification and instruction of engineer.	Sq.m	93.65			
2.5	107.6	SAND FILLING					
		Filling sand on the foundation and trenches all complete as per the specification and approval of engineer	Cum.	99.89			
		Sub total of 2					
3		STRUCTURAL WORKS					
3.1	107.4	DRY FLAT BRICK SOLING					
		Dry flat brick soling (one layer) at ramp,parking yard,foundation of boundary wall with the bricks obtained from dismantled works including sand fillings all complete as per drawing, specification and approval of engineer.	Sq.m	808.63			
3.2	107.5	STONE SOLING					
		Stone soling in foundation with dry stones completed in true line and level as per drawing, specification and approval of engineer.	Cum.	19.54			
3.3	104	PCC PLAIN OR RCC WORKS					
3.3.1	104	PLAIN CEMENT CONCRETE (PCC) M15					
		Supply, pouring, compacting and curing of Machine mixed M15 Grade(1:2:4) Concrete for PCC works at Foundation base and other specified places at all height. The cost shall include all costs of Material, equipments and manpower all complete as per specificaion and instruction of engineer	Cu.m	56.99			
3.3.2	104	P.C.C FOR R.C.C. WORKS (M20)					
		Supply, pouring, compacting and curing of Ready mix M20 Grade design mix Concrete for RCC works at Sill ,lintel bands and other specified places at all height. The cost shall include all costs of all material, Super Plasticizer, equipments and Manpower all complete as per specificaion and instruction of engineer	Cu.m	68.40			
3.3.3	104	P.C.C. FOR R.C.C. WORKS (M25)					
		Supply, pouring, compacting and curing of Ready mix M25 Grade design mix concrete for RCC works at Foundations, slab, Basement all, lift wall , staircase and other specified places at all height. The cost shall include all costs of material, Super Plasticizer, euipments and manpower all complete as per specificaion and instruction of engineer.	Cu.m	10.20			
3.3.4	104	P.C.C. FOR R.C.C. WORKS (M30)					



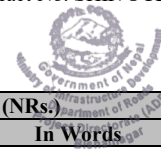
Bill of Quantities

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs.)		Amount
					In Figure	In Words	
		Supply, pouring, compacting and curing of Ready mix M30 Grade Design mix Concrete for RCC works at Column, beams and other specified places at all height. The cost shall include all costs of Material, microsilica, Super Plasticizer, equipments and manpower all complete as per specification and instruction of engineer.	Cu.m	12.43			
3.5	105	FORM WORKS					
3.5.1		Supply, fabricate, place and fix 15 mm thick waterproof plywood/steel form work for Slab, Staircase, Foundation, PCC, Bands and shear walls and all other specified works including nails staging/supports, labour, lead and lift at any height removal and disposal as per drawing, specification and approval of engineer.	Sq.m	1072.93			
3.5.2		Supply, fabricate, place and fix 19 mm thick waterproof plywood/steel form work for Beam works including nails staging/supports, labour, lead and lift at any height removal and disposal as per drawing, specification and approval of engineer.	Sq.m	1027.70			
3.5.3		Supply, fabricate, place and fix 19 mm thick waterproof plywood/steel form work for Column works including nails staging/supports, labour, lead and lift at any height removal and disposal as per drawing, specification and approval of engineer.	Sq.m	75.56			
3.6	104.3	REINFORCEMENT BAR					
		Supply, delivery, cutting, bending and tying in position High Tensile Fe 500 TMT bars of different diameters at all heights and depths. The cost shall cover cost of material, wastage, manpower, binding wire, cover blocks, false works, chairs and spacers all complete as per design, drawing, specification and instruction of engineer	Mt.	38.75			
3.7		BRICK MASONRY WORKS					
3.7.1	103	BRICK MASONRY WORKS IN CM (1:4) AT GROUND FLOOR AND BOUNDARY WALL					
		Providing and laying brick masonry using first class local chimney burnt bricks with cement sand mortar 1:4 at ground floor including scaffolding, curing, filling, cleaning and racking out mortar joints making ducts, recesses where required including all materials, labour, lead and lift all complete as per drawing, specification and approval of engineer.	Cu.m	208.18			
3.7.2	103	BRICK MASONRY WORKS IN CM (1:4) ABOVE GROUND FLOOR					
		Providing and laying brick masonry using first class local chimney burnt bricks with cement sand mortar 1:4 above ground floor including scaffolding, curing, filling, cleaning and racking out mortar joints making ducts, recesses where required including all materials, labour, lead and lift all complete as per drawing, specification and approval of engineer.	Cu.m	80.94			
3.8	108	PLASTER WORKS					
3.8.1		Supply, mixing, placing, 20 mm thick cement sand plaster (1:4) at Wall, Column, of the building at any height completed including cost of scaffolding, material, labour, curing as per drawing, specification and approval of engineer.	Sq.m	5443.03			
3.8.2		Supply, mixing, placing, 12.5 mm thick cement sand plaster (1:4) at ceiling, beam, of the building at any height completed including cost of scaffolding, material, labour, curing as per drawing, specification and approval of engineer.	Sq.m	2101.03			
		Sub total of 3					
4	109	COLOURING /PAINTING WORKS					
4.1	109.2	EMULSION PAINTS INTERNAL					
		Supply and applying one coat primer and two or more coats of plastic emulsion paints approved brand and colour over plastered surface at any level finished smooth and uniform shaded including watering preparation of base, cost of scaffolding, material, labour all complete as per drawing, specification and approval of engineer.	Sq.m	14736.61			
4.2	109.2	EXTERIOR PAINTS					
		Supply and applying one coat primer and two or more coats of water and weather proof apex paints approved brand and colour over plastered surface at any level finished smooth and uniform shaded including watering preparation of base, cost of scaffolding, material, labour all complete as per drawing, specification and approval of engineer.	Sq.m	3641.18			
4.3	109.3	WALL PUTTY					
		Supply and applying super fine 2mm thick birla putty /cement putty over plastered surface at any level finished smooth uniform shaded including watering, filling the pores, preparation of base, cost of scaffolding, material, labour all complete as per drawing, specification and approval of engineer.	Sq.m	18377.79			
4.4	109.4	ENAMEL PAINT					



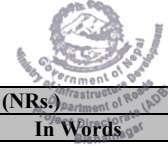
Bill of Quantities

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs)		Amount
					In Figure	In Words	
		Supply and applying one coat primer and two or more coats of enamel paints approved brand and colour over wood, metal and plastered surface at any level finished smooth and uniform shaded including watering, preparation of base, cost of scaffolding, material, labour all complete as per drawing, specification and approval of engineer	Sq.m	1022.37			
		Sub total of 4					
5.00		FLOORING AND FINISHING WORKS					
5.1	107.1	SCREEDING WORK					
		Supply, mixing, placing, compacting 50 mm thick cement, sand and coarse sand /chips screed (1:2:4) finished on floors including materials, labour and curing etc. all complete as per drawing, specification and approval of engineer.	Sq.m	5886.46			
5.2	108.2	CEMENT PUNNING					
		Supply, mixing, placing, compact and cure cement punning 3mm thick over screed in panel, trowel finished including material, labour, curing at any height completed as per drawing, specification and approval of engineer.					
i.		On Floor	Sq.m	1109.82			
ii.		On Wall (Skirting)	Sq.m	22.56			
5.3	107.8	MARBLE FLOORING					
		Supply, mixing, placing good quality 16 mmthick Marble in, 12.5mm thick cement sandmortar (1:3) ratio, of selected color, quality and sizes including cutting adjusting, rebates and drillings holes, brackets, dowels, anchors, and butt joints finish, grouting, molding, grinding, rubbing, and polishing at any height completed as per drawing, specification and approval of engineer.					
i.		Marble Flooring	Sq.m	717.73			
ii.		Marble skirting	Sq.m	16.51			
iii	107.8	MARBLE EDGE MOLDING					
		Supply and installing 16mm thick mable in, 12.5mm thick cement sand mortar (1:3)ratio,of selected colour,quality and sizes at windows sills with two side half round molded edge all complete as per specification, drawing and approval of engineer.	run.m	1832.26			
5.4	107.7	GRANITE FLOORING					
		Supply, mixing, placing with white cement base 16 mmthick Granite in 20mm thick cement sand mortar (1:2)ratio, of selected quality and sizes including cutting adjusting, rebates and drillings holes, brackets, dowels, anchors, and butt joints finish, grouting, molding, grinding, rubbing, and polishing at any height completed as per drawing, specification and approval of engineer.					
i.		Granite Flooring	Sq.m	323.83			
ii.		Granite skirting	Sq.m	46.83			
5.5	107.3	TILE FLOORING					
		Supply, laying and placing 24"x24" GVT tiles of approved make size, colour laid in grey cement (1:4) including base plaster, fittings and grouting of joints in white or colour grout at any height completed as per drawing, specification and approval of engineer.					
i.		Lobby	Sq.m	3416.47			
ii.		Lobby Skirting	Sq.m	161.96			
5.6	107.2	TERRAZO TILE					
		Supply, mixing, placing good quality 20 mmthick Terazzo tile in, 20mm thick cement sandmortar (1:4) ratio, including cutting adjusting, rebates and drillings holes, brackets, dowels, anchors, and butt joints finish, grouting, molding, grinding, rubbing, and polishing at any height completed as per drawing, specification and approval of engineer.					
i.		For Terrace	Sq.m	619.20			
ii.		Terrace Skirting	Sq.m	34.84			
5.7	107.9	KOTA STONE FLOORING					
		Supply, mixing, placing good quality Kota stone flooring at any height completed as per drawing, specification and approval of engineer.					
i.		Kota stone flooring	Sq.m	241.01			
ii.		Skirting	Sq.m	6.54			
5.8	116	INTERLOCKING CONCRETE BLOCK					
		Supplying and laying 60mm thick single colour heavy duty interlocking concrete block(240mm*120mm*60mm) of grade equivalent to M35 in perfect line and level as per specifications and approval of engineer.	Sq.m	441.71			
		Sub total of 5					
6		ALLUMINIUM DOORS AND WINDOWS					
6.1	106	Alluminium WINDOWS					
6.1.1		Structural Glazing					



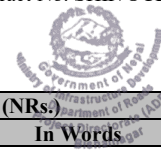
Bill of Quantities

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs.)		Amount
					In Figure	In Words	
		Providing and fixing Structural Glazing of aluminum section in natural or color anodized/powder coated color Section size (60x75+13x1.6 mm) fitted with 5 mm color glass . (average panel area 6.00 Sq.ft.) including cost of material, labour, as per drawing, specification and approval of engineer.	Sq.m	526.73			
6.1.2		Alluminium Windows					
		Providing and fixing 2 or 3 Panel Sliding window of aluminium section in naturally anodized or black anodized/powder coated color, Section size (87*56*1.50 mm) fitted with 5 mm clear glass without fly mesh shutter (Window size 6'*5' or average area 30 Sq. feet per window). all complete as per drawing specification and approval of engineer	Sq.m	379.81			
6.1.3		Alluminium Sliding Window with Top fixed					
		Providing and fixing 2 or 3 Panel Sliding window with top fix glass of aluminium section in naturally anodized or black anodized/powder coated color, Section size (87*56*1.50 mm) fitted with 5 mm clear glass without fly mesh shutter (Window size 6'*5' or average area 30 Sq. feet per window).all complete as per drawing specification and approval of engineer	Sq.m	29.77			
6.1.4		Alluminium FixedWindow					
		Providing and fixing fixed window with top fix glass of aluminium section in naturally anodized or black anodized/powder coated color, Section size (87*25+12*1.50 mm) fitted with 5 mm clear glass without fly mesh shutter (Average area 5 Sq. feet per panel).	Sq.m	86.06			
6.2		Alluminium Doors					
6.2.1		Aluminium Single Swing Door					
		Providing and fixing Single Panel Swing Door of aluminium section in naturally anodized or black anodized/powder coated color Section size (102*45*1.5 mm) fitted with 5 mm clear glass or 9 mm both side laminated board (excluding the cost of handle).all complete as per drawing specification and approval of engineer	Sq.m	159.39			
6.2.2		Aluminium Double Swing Door					
		Providing and fixing Double Panel Swing Door of aluminium section in naturally anodized or black anodized/powder coated color Section size (102*45*1.5 mm) fitted with 5 mm clear glass or 9 mm both side laminated board (excluding the cost of handle).all complete as per drawing specification and approval of engineer	Sq.m	12.60			
6.2.3		Ordinary Handles for Doors					
		Supplying and fitting of Aluminium Ordinary handle as per drawing, specification and approval of engineer.	nos.	184.00			
6.2.4		TOUGHNED GLASS					
6.2.5		Toughened Glass Partition					
		Providing and Fixing of Glass Partition of 12mm Clear Toughened Glass with Stainless Steel Patches or Aluminium Frame all complete as per drawing specification and approval of engineer	Sq.m	271.82			
6.2.6		Toughened Glass Door					
		Providing and Fixing of Glass Door of 12mm Clear Toughened Glass with Stainless Steel Patches or Aluminium Frame at .all complete as per drawing specification and approval of engineer	Sq.m	40.95			
		Sub total of 6					
7		METALWORKS					
7.1		STAINLESS STEEL WORKS					
7.1.1	110	STAINLESS STEEL RAILING					
		Supply & fixing in position 50 mm dia stainless steel handrail including 50 mm vertical post spacing at 2m and 3 nos of 25 mm dia horizontal baluster ,upto ht from 2.5' to 3' railing at Terrace including cost of fixing polishing all complete as per drawing, specification & approval of engineer	R.m	275.00			
7.1.2	110	STAINLESS STEEL HANDRAIL					
		Supply & fixing in position 50 mm dia stainless steel handrail including 50 mm vertical post spacing at 2m and 3 nos of 25 mm dia horizontal baluster ,upto ht from 2.5' to 3' railing at Staircase including cost of fixing polishing all complete as per drawing, specification & approval of engineer	R.m	111.42			
7.2	111	STRUCTURAL METALWORKS					
		Supply, making and fixing in position decorative type metal works for decoration or other wise including cost of fixing, grinding polishing in all levels including one coat of red oxide paints approved colour all complete as per drawing, specification & approval of engineer.	kg	102.24			
		Supply ,fabrication and fixing of metal sliding gate including neccessary guide rail,roller,hinge etc all complete as per specification and approval of engineer.	kg	253.75			
7.2.1	113	FENCE RAILING WORKS					
		Supply, fabrication and fixing the fence railing at specified height above compound wall as per design drawing,specifications and approval of engineer.	Sq.m	167.76			
		Sub total of 7					



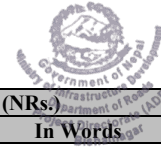
Bill of Quantities

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs)		Amount
					In Figure	In Words	
8	118	FURNITURES WORKS					
		Supply, delivery and installation of various office furnitures at specified places in perfect manner all complete as per provided specification and approval of engineer.(Refer appendix 2)	LS	1.00			
		Sub total of 8					
9		MISCELLANEOUS WORKS					
9.1	117	WATER PROOF WORKS - Surface Treatment					
9.1.1		For Terrace					
		Supply and applying one coat of base and two coats polymer coating or applying injection grouting on RCC surface floor and wall joints with bonding mortar, filling epoxy modified mortar on junction between floor and wall joints "V" shape groove cutting all complete as per drawing, specification and approval of engineer.	Sq.m	1526.76			
9.1.2	117	Joint tape for basement					
		Applying water proofing joint tape of 100 mm thickness all complete as per drawing, specification and approval of engineer.	run.m.	22.40			
9.2	101.3	TURFING WORKS					
		Supply and laying of Bermuda grass on the ground at specified places as per the specifications and approval of engineer.	Sq.m	355.56			
9.3	114	ACP WORKS					
		Supply, making and fixing in position ACP board at any level finished smooth and uniform level including Metal frame with adjustable arrangement filling the pores, cost of scaffolding ,material, labour all complete as drawing, specification & approval of engineer.	Sq.m	300.00			
		Sub total of 9					
		Total of Part B					
Part C:SCHEDULE OF DAY WORKS							
10	5.15	DAY WORKS					
i		Mason / Electrician / Plumber / Bar binder	MD	150.00			
ii		Labour	MD	250.00			
iii		Cement	M.T	10.00			
iv		Sand	Per Cu.m	100.00			
v		Aggregate	Per Cu.m	100.00			
vi		New Bricks	per Nos.	20000.00			
vii		Reinforcement bar	M.T	5.00			
viii		Ply wood (Form works)	Per Sq.m	2000.00			
		Total Of Part C					
D		Provisioinal Items					
	5.13	Provisional Sum for carrying out independent laboratory tests (Compliance and control) for construction material such as Aggregate, Sand, Cement, Bricks, Reinforcement and Cube, Cement motar etc. before and during construction for the sole use of the Project Manager.Construction and dismantle of temporary metal truss shed with CGI sheet as per the design drawing and instruction of engineer.	P/S	1.00	3,000,000.00	Three Million only.	3,000,000.00
		Total Of Part D					
		Total Of CIVIL WORKS (A TO D)					
PART E:SANITARY WORKS							
1	202.3	Indian pattern white glazed Porcelain clay One Piece type Comode with 'P' & 's' trap and slow falling seat cover with cistern,pipe connector all complete set.(Boolan, cera, Hindware, Parryware, Somany,or equivalent)	Set	32.00			
2	202.4	Porcelain clay White glazed EWC floor mounted Comode with low level glazed cistern with complete set.	Set	6.00			
3	202.7	Indian pattern white glazed Porcelain clay (50X40)cm Porcelain clay white glaze Wash basin with pillar cock,pedetsal ,pipe connector, bottle trap complete set. (Boolan, cera, Hindware, Parryware, Somany, or equivalent)	Set	3.00			
4	202.7	Indian Pattern white glaze Porcelain clay 50x40cm Oval Wash basin with swan type piller cock (Boolan, Hindware, Parryware, Classica, cera or equivalent)	set	22.00			
5	202.7	Indian pattern white glazed Porcelain clay (50x40)cm Oval Wash basin with mixer,pipe connector, bottle trap, complete set. (Boolan, cera, Hindware, Parryware, Somany, or equivalent)	Set	8.00			
6	202.7	Indian pattern white glazed Porcelain clay Wash basin for disable and swan type piller cock and grab bar -2 nos 600-900mm long, swinging/folding type wall hing,pipe connector , bottle trap all complete set.	Set	6.00			
7	202.8	Stainless Steel 1mm thickness, Steel 37" long 8" deep with swan type /single lever sink cock all complete set.	set	2.00			
8	202.6	Indian pattern white glazed Porcelain clay(61x41x38)cm size Large Flat back Urinal with bottle trap set.(Boolan, cera, Hindware, Parryware, Somany, or equivalent)	Set	12.00			
9	202.6	68x30cm size White Glazed Urinal Partation with all complete set.	Set	6.00			



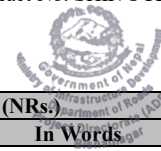
Bill of Quantities

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs.)		Amount
					In Figure	In Words	
	202.5	Supplying and Fixing Indian pattern C.P. valves with wall flange Including c.p. nipple all complete set.					
10	202.5	Supplying and fixing C P 15 mmø Angle valve with wall flange,cp nipple all complete set	nos	145.00			
11	202.5	Supplying and fixing C P 15 mm Comode spray with wall flange,cp nipple all complete set.	nos	38.00			
12	202.14	C.P.15mm dia. single lever wall(bath) mixer Exposed type with inbuilt bath spout and including telephonic shower with stand/clamp all complete.	set	2.00			
13	202.1	15mmø C.P. Urinal Auto closing Valve with built in control cock with spreader all complete set.	nos	12.00			
		Supplying and Fixing Indian pattern bathroom accessories all complete set.					
14		Hand Dryer Chinese with complete accessories	Set	29.00			
15		Stainless Steel Liquid Soap Container European Pattern	nos	29.00			
16		Stainless steel bucket(Container) 6.0 lit.(european pattern)	set	29.00			
17		Paper Dispenser with paper including necessary accessories all complete set.	set	29.00			
18	202.13	Looking Mirror Modi guard 600x700mm	nos	39.00			
19	202.11	Chrome Plate Toilet Paper Holder	nos	38.00			
20	202.12	Chrome Plate Soap Dish.	nos	43.00			
21	202.10	C P towel rod 1.5x45cm (½"x 18") size	nos	43.00			
22		C.P. Grab bar European pattern 300mm long bend type Grohe, Essel or Eqv.	nos	12.00			
23		15.0 Ltr Electric Water Heater (Geyser), (Aeroston, fazer or eqv.)	Set	11.00			
		Supplying and Fixing Stainless steel roof water tank With screw type cover including drain hole ,inlet outlet, over flow etc.all complete set .		0.00			
24	204	2000 litre stainless steel water tank (304 grade steel) fitting with all complete.	nos	3.00			
		Supplying and Fixing Electric moter Pump single or three phase phase with base, nut and bolts all complete set (Kirloskar, Compton,or equiv.)		0.00			
25		5 H.P. Electrical motor water pump Monoblock type	Set	2.00			
26		2 H.P. Electrical motor water pump Multi stage coupled pump (Crompton)	Set	2.00			
27		1.0 H.P. Electrical motor water pump, Submersible pump Italian or Equivalent.	Set	2.00			
28		1.0 H.P. Electrical motor water pump, Monoblock type	Set	1.00			
29		Supplying and Fixing Float switch with panel for auto pump On and off all complete set with testing and ready for operation.	set	4.00			
30		Motor Starter Switch (Crompton or Eqv.)	nos	4.00			
	203.5	Chlorinated Poly Vinyl Chloride pipe(hot and cold). or equivalent with CPVC fittings/ specials (Tees, elbows, Unions etc) clamps(m.s plate with nut and bolt with hexagonal screws for clamp in ceiling,wall), nails, including jointing materials,installation of pipes and specials including making holes on walls or floor and repairing the same to its original finish, all complete set as per specification and instruction. (Flow guard or ISI standard) .		0.00			
31		20 mm CPVC (Chlorinated Polyvinyl Chloride) Pipe SDR 11 CTS, 28.1 kg/cm2 (Flowguard or ISI Standard)	Rm	429.00			
32		25 mm CPVC (Chlorinated Polyvinyl Chloride) Pipe SDR 11 CTS, 28.1 kg/cm2 (Flowguard or ISI Standard)	Rm	99.00			
33		32 mm CPVC (Chlorinated Polyvinyl Chloride) Pipe SDR 11 CTS, 28.1 kg/cm2 (Flowguard or ISI Standard)	Rm	36.00			
34		40 mm CPVC (Chlorinated Polyvinyl Chloride) Pipe SDR 11 CTS, 28.1 kg/cm2 (Flowguard or ISI Standard)	Rm	138.00			
35		50 mm CPVC (Chlorinated Polyvinyl Chloride) Pipe SDR 11 CTS, 28.1 kg/cm2 (Flowguard or ISI Standard)	Rm	126.00			
		Supplying and fixing CPVC:- Chlorinated Poly Vinyl Chloride valve including jointing materials. all complete set as per specification and instruction.		0.00			
36		20 mm CPVC Ball Valve, CTS sockets	nos	14.00			
37		25 mm CPVC Ball Valve, CTS sockets	nos	18.00			
38		32 mm CPVC Ball Valve, CTS sockets	nos	2.00			
39		40 mm CPVC Ball Valve, CTS socket	nos	6.00			
40		50 mm CPVC Ball Valve, CTS sockets	nos	4.00			
41		Supplying and Fixing 25mmdia Gun metal check valve full way medium all complete set.	nos	2.00			
42		Supplying and Fixing 50mmdia Gun metal check valve full way medium all complete set.	nos	4.00			
43		Supplying and Fixing 32mmdia Gun metal check valve full way medium all complete set.	nos	2.00			
44		(G.M.) Float valve 50mm dia	set	2.00			
	201.3.1	Supplying and Fixing uPVC pipe 6kg/sqcm all complete set including Fittings as Bend,Tee,Y-branch,vent cowl etc. per specification and instruction. (Panchakanya, Mangalam, Nepatop, Supreme or equi.)		0.00			
45		50 mm dia PVC Pipe 6 kg/cm2 with Fittings all complete set.	Rm	116.00			



Bill of Quantities

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs.)		Amount
					In Figure	In Words	
46		75 mm dia PVC Pipe 6 kg/cm2 with Fittings all complete set.	Rm	420.00			
47		110 mm dia PVC Pipe 6 kg/cm2 with Fittings all complete set.	Rm	639.00			
48		160mm dia PVC Pipe 6 kg/cm2 with Fittings all complete set.	Rm	153.00			
49	201.4	PVC Floor Trap 11x7.5cm (4" X 2½")	nos	66.00			
50		110 mm Gully trap/P trap	nos	12.00			
51		Stainless steel cockrach trap	set	66.00			
52	201.3	75mm dia.Steel split clamp with waher hexagon nut with grip all complete	set	132.00			
53	201.3	110mm dia.Steel split clamp with waher hexagon nut with grip all complete	set	190.00			
54	201.3	160mm dia.Steel split clamp with waher hexagon nut with grip all complete	set	36.00			
55	203.17	CI Cover 18" X 18" (14 kg) Medium Duty Cover with frame all complete set.	Set	15.00			
56	203.17	CI Cover 22" X 22" (20 kg) Medium Duty Cover with frame all complete set.	Set	5.00			
57	203.17	500 mm dia 100 kg CI Heavy Cover with frame all complete.	Set	6.00			
58	203.17	CI Tank Cover 24"Dia (16 kg) Round (Locking Type)	Set	4.00			
59		CI Gully Grating 375x450 mm heavy(25 kg)	set	4.00			
	207.18	Providing and laying non-pressure NP2-NP3 class RCC pipes with collars jointed with stiff mixture of cement mortar in the proportion of 1:2 (1 cement : 2 find sand) including testing of joints etc. complete.		0.00			
60	207.2	150 mm RCC hump pipe NP2 with collar	Rm	87.00			
61	207.2	200 mm RCC hump pipe NP2 with collar	Rm	18.00			
62	207.2	300 mm RCC hump pipe NP3	Rm	24.00			
		Sub Total of 1		0.00			
63		Providing and fixing 5-6 kg ABC type fire extinguishers consisting of welded MS cylindrical body, squeeze lever discharge valve fitted with pressure indicating gauge internal discharge tube, 30 cms long high pressure discharge hose, discharge nozzle, suspension bracket, conforming to ISI finished externally with red enamel paint and fixed to wall with brackets complete with internal charge. Fire extinguisher ABC type Minimax, eversafe or equivalent	nos	14.00			
64		Supplying and fixing Fire pump:-20H.P.x2set or 40H.P. (Head- up to70.0mtr.,Discharge-2400lpm)Fire pump set with 5.0h.p Stainless steel verticle jockey pump,(Main pump start Automatically If jockey pump pressure drop) including control panel board,Required Cable,Stairmer for both pump,presure switches,presure guage all complete set,	Set	1.00			
65		Diesel engine driven Fire pump set, horizontal end Split Casing suction type with gland packing and capable to deliver 2300 lit/minute at head 70.0 meter complete set. The pump shall be coupled to suitable HP of Diesel engine radiator water cooled type and complete set shall be mounted on common base frame, two sets of battery leads with stand, Fuel tank (for 6 hours operation and double container type) with stand and gauge glass, fuel piping with valves. The quoted rate shall include pressure releif valve, air release valve, coupling guard and other standard accessories and foundation bolts etc. complete set. Make Approved vendor necessary fitting all complete with testing and ready for operation	set	1.00			
66		Weather proof outdoor type hose cabinet made of not less than 1.5 mm CRCA MS sheet having glazed door, locking arrangement, painted with two coats of enamel paint over a coat of primer and of size suitable to accomodate yard hydrant hose reels, two nos. 15 m lengths of 63 mm dia RRL hose pipe and branch pipe complete as per the drawing. Size approximate of 1500x750x250mm	Set	12.00			
67		VALVES, FITTINGS AND VESSEL:-MS Hydroneumatic vessel with 100mm flanged inlet connection from pump and 25mm MS pipe heavy grade IS:1239 and GM Gate Valve Heavy grade connection for drainout, Pressure Gauge, air relief valve etc. complete set suitable for a working pressure of minimum 10 kg/cm2. The vessel should have the parameters as: Dia -450mm, HOS -2000mm, shell thickness -12mm, Dishend thickness -10mm, test pressure -20 kg/cm2	set	1.00			
68		Supplying and fixing Landing valve ,63 mm rubber braided 30.0 m. long or 2x15 mtr. Hose reel with nozzle, Mild steel hose reel drum with flange, all complete set .Minimax or equivalent.	Set	9.00			
69		Supplying and fixing 20mm rubber braided 30.0 m. long Hose reel with nozzle, Mild steel hose reel drum,360.degree swing with valve, all complete set .	Set	9.00			
70		G.I/MS. Flange 80 mmø with washer and nut and bolt all complete set.	set	4.00			
71		G.I/MS. Flange 100 mmø with washer and nut and bolt all complete set.	set	15.00			
72		Flanged type . 100mmø butterfly valve with jointing material all complete set	nos	5.00			
73		Flanged type 100mmø C.I. Non return/check(Horizontal/ verticle) valve all complete set.	nos	3.00			
74		100mm dia Y stairner with flange all complete set.	set	3.00			
75		50mm butterfly valve	set	2.00			
76		100mm dia Dual plate check valve	set	4.00			



Bill of Quantities

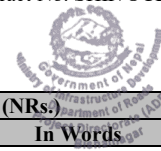
Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs)		Amount
					In Figure	In Words	
		M.S. seamless pipe SCH-40, with necessary M.S. pipe fittings in welded joint with necessary MS weldable flanged ser as required(Nut,Bolt Gasket)including necessary pipe sleeve in the wall,Brackets Clamps,Hanger Etc.Testing of pipe lins with hydraulic presure of 10 kg/sq.cm,rectifying the leakage,if any,and also painted with one coat of primer and two coat of emulsion of required colour(all the underground pipe line must be painted with two coat of cold setting(CS)bitument paint all complete set		0.00			
77		100 mm dia. Ms Seamless Pipes SCH 40 with fittings all complete set.	Rm	174.00			
78		25 mm G. I. Pipe 'B' class (MEDIUM)	Rm	18.00			
79		Gun metal two way collection head with 63mm dia. Insteintaneous type inlet including built in check valve for Fire Bridgade connection to under ground water tank or hose reel.	set	1.00			
80		G.M. 25mm Air Valve	set	2.00			
		Sub Total of 2					
211		Deep Boring 150 mm dia. Depth up to 270 mtr.					
81		Rig setting up and preparation of mud pit	Job	1.00			
82		Camp setting and preparataion including site clearance	Job	1.00			
83		Assembling centralising and sinking of guide pipe(Conductor of pipe) of size 550mm dia. To a depth of 10 mtr	Mtr.	6.00			
84		Drilling of pilot hole by direct rotary machine in soft formation(Consists of clay,silt, and sand)	Mtr.	150.00			
85		Drilling of of pilot hole by with DRILLING RIG machine in medium formation(Consists of gravel fine to medium)	Mtr.	120.00			
86		Drilling of of pilot hole by with DRILLING RIG machine in hard formation(Consists of gravel fine to medium)	Mtr.	1.00			
87		Drilling in soft formation (First Reaming of PILOT HOLE)	Mtr.	120.00			
88		Drilling in medium formation (First Reaming of PILOT HOLE)	Mtr.	270.00			
89		Drilling in hard formation (First Reaming of PILOT HOLE)	Mtr.	1.00			
90		Reconditioning of Bore hole before lowering of pipe assembly.	Mtr.	270.00			
91		lowering of pipe assembly including Supplying and packing pea gravel 2-5mm size. .	Mtr.	270.00			
92		Well development by drilling rig machine for well .(back washing and inner washing)	Mtr.	1.00			
93		Well development by drilling rig machin for well.(water jetting)	Mtr.	1.00			
94		Well development by compressor machin for well .(Water jetting) with Sod. Hex. Meta-phosphate.	Job	1.00			
95		Time draw down pump test for deep tube well(Aquifer test)	Job	1.00			
96		Electric logging of bore hole after drilling of pilot hole	Job	1.00			
97		Physical,Biological,Chemical analysis of water and report preparation and submission .	Job	1.00			
		Supply of materials:-		0.00			
98	211	Casing Pipe:- 150mm dia.MS ERW pipe 5.4mm thick with anticorrosion paint two coat(Electrically resistance welding)M.S.Iron black pipe,One end socketed and non threaded,other end without socket and non threaded,having including collar all complete set.	Mtr.	220.00			
99	211	Well screen:-150mm dia.MS ERW screen(Slotted) pipe 5.4mm thick with anticorrosion paint two coat M.S.Slotted pipe(black pipe(Electrically resistance welding) with collar and anti corrosion paint all complete,N.S.,Jindal or ISI. trade mark.Vertically slotted,	Mtr.	50.00			
100		150 mm dia well cover plate with flange set:-hole at center of the plate 10mm thick.	Nos	1.00			
101		Supply and Installation Submersible water pump of discharge capacity min:- up to 10.0lit/sec.Type-Multiple stage,Submersible motor pump, Head up to 90meters,Make-Varuna,KSB, Kirlsokar, or equivalent,Volt-380 to 440,Connection star delta, Motor -10 HP ,Frequency-50HZ. ,connection star delta system. with Control panel:- 10 H.P. auto startings with button type ,auto starting system, push bottom type,having Ammeter,Voltmeter,Mccb And Required cable as per pump power as per site all complete set.	set	1.00			
102		Tremis pipe- 25mmdia. G.i.pipe	Rm	6.00			
103		50 mm dia. G.I.pipe heavy class with bend,nipples etc all complete.	Rm	84.00			
		Sub Total of 3					
212		Water Treatment Plant					
		Design, Supply, delivery and installation of 10000 lph capacity Water Treatment Plant(Treated water quality to be as per National Drinking water Supply standard.					
104		Close Type Aeration system with capacity 10000 Lph with vessel size- 600x2500 mm ht. with air blower or compressor as per aeration with necessary fitting all complete with testing and ready for operation	Set	1.00			
105		Electronic Dosing system with chemical dosing tank 500 liters HDPE	Set	2.00			



Bill of Quantities

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs.)		Amount
					In Figure	In Words	
106		Iron Removal Filter with Filter media, multiport valve of capacity 10000 Lph along with necessary piping and activated media all complete. Size of filter: 36"x72" FRP,with necessary fitting all complete with testing and ready for operation	Set	1.00			
107		Activated Carbon Filter with Filter media multiport valve of capacity 10000 Lph along with necessary piping and activated media all complete. Size of filter: 36"x72" FRP,with necessary fitting -Pebbles,Gravels,Sand,activated Carbon-800+IV Indian Grade all complete with testing and ready for operation.	Set	1.00			
108		Organic scavenger Filter Filter media with multiport valve of capacity 10000Lph along with necessary piping and activated media all complete. Size of filter: 36"x72" FRP,with necessary fitting all complete with testing and ready for operation	Set	1.00			
109		Amonia removal Filter with Filter media multiport valve of capacity 10000.0Lph along with necessary piping and activated media all complete. Size of filter: 36"x72" FRP,Media-Amonia Exchsng Resin- Indian 225 Hwth necessary fitting all complete with testing and ready for operation	Set	1.00			
110		Water Filter back wash pump-20000.0 Ltr./hour@22 mtr, head all complete set.	Set	1.00			
111		Water Filter feed pump-10000.0 Ltr./hour@30 kf/sq cm, head all complete set.	Set	1.00			
Sub Total of 4							
Total of Part E							

PART F:ELECTRICAL WORKS							
A		Sub-Station					
1	327	Transformer (Supply, delivery, installation, and commissioning along with allied civil works as per drawing, specification and instruction all complete)					
1.1	327.1	250 KVA 11000/400V, 3 Phase, 50Hz, ON/AN Colling, Core type, Copper Wound, Outdoor Distribution Transformer with low loss as per NEA Distribution Transformer	nos	1.00			
1.2	327.1	11 Meter Steel Tubular Pole Set with foundation	pc	2.00			
1.3	327.2	Channel Set for Transformer, CT, PT, DO fuse, LA etc	Set	1.00			
1.4	327.5	Drop out Fuse	Set	1.00			
1.5	327.5	11 kv lightning Arrester	Set	6.00			
1.6	327.5	11 Kv disc Insulator	Set	2.00			
1.7	327.5	11 Kv Pin Insulator	Set	9.00			
1.8	317.21	Earthing Set Copper	Set	3.00			
1.9	327.3	3core x 50 sq mm Alu. HT, armoured , XLPE, Cable	Set	30.00			
1.10	321.7	50 Sqmm Cable Shoe	Pcs	16.00			
1.11	321.7	Different size cable shoes	Pcs	20.00			
1.12	327.5	11KV HT Terminal Kit	set	2.00			
1.13	327.5	Rabbit ACSR conductor 50 mm2	Mtr	50.00			
1.14	327.4	10 core cable for TOD meter	Mtr	5.00			
1.15	327.4	TOD meter	set	1.00			
1.16	327.4	HT Meter Unit CT 25/5 (11000/110V)	set	1.00			
1.17	327.4	HT Shut Down charge	Hr	4.00			
1.18	327.2	Installation and Commissioning along with all the miscilenious items required for the installation.	lot	1.00			
2		Generator Set (Supply, delivery, installation, and commissioning along with allied civil works as per drawing, specification and instruction all complete) Make: CAT, Greaves, Kiloskar, Ashok Leyland, Cummins and Perkins					
2.1	328	Supply, installation,testing and commissioning of silent type liquid colled, diesel generator set of 200 KVA DG with inbuild AMF panel. DG set shall be rated at 415V , 50Hz, 0.80 Power factor at 1500 RPM, Water cooled Diesel engine, electric start , four stroke, inline six cylinders, with overloading for one hour in any 12 hours of duration, including mounted on a common base frame, complete with control panel, fuel tank, silencer, AVM pads, AMF Controllers, Batteries & Leads as per drawing specification and instruction all complete .	nos	1.00			
2.2	328	Supply, installation,testing and commissioning of silent type liquid colled, diesel generator set of 62.5 KVA DG with inbuild AMF panel. DG set shall be rated at 415V , 50Hz, 0.80 Power factor at 1500 RPM, Water cooled Diesel engine, electric start , four stroke, inline six cylinders, with overloading for one hour in any 12 hours of duration, including mounted on a common base frame, complete with control panel, fuel tank, silencer, AVM pads, AMF Controllers, Batteries & Leads as per drawing specification and instruction all complete .	nos	1.00			



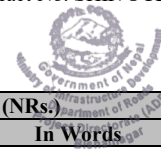
Bill of Quantities

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs)		Amount
					In Figure	In Words	
3		Hybrid Solar PV System (Supply, delivery, installation, and commissioning along with allied civil works as per drawing, specification and instruction all complete) Make: As mentioned in Technical Specification					
3.1	331	Supply and Delivery of Solar PV Module, Mono-crystalline Solar PV Module, 300 WP, Class: Tier I manufacturer, Efficiency: $\geq 16\%$ Number of Cell ≥ 72 , Voc=43.68, Isc=9.36A	nos	20.00			
3.2	331	Supply and Delivery of Grid-Tie Hybrid Solar Inverter, 10 KVA/48V, Output voltage 230 VAC+ 2%, Frequency 50Hz, Three Phase, Anti-island Effect along with essential protection system, Compatible for monitoring and control system	nos	1.00			
3.3	331	Supply and Delivery of Solar Gel Tubular Battery, 12V, 100AH@C10 battery, minimum 1500 cycles @ 80% DoD, along Battery Rack for required numbers of the Battery	nos	16.00			
3.4	331	Supply and Delivery of Battery Management System, For the continuous monitoring of the Battery Charging Voltage	lot	1.00			
3.5	331	Supply and Delivery of Charge Controller, 70A, Nominal battery voltage 12 / 24 / 36 / 48V Auto Select, Compatible for monitoring and control system	nos	1.00			
3.6	331	Supply and Delivery of Cable, Conduit and accessories	lot	1.00			
3.7	331	Supply and Delivery of Solar PV mounting frame, Non-corrosive mounting structures for solar modules (with GI nut & bolts, GI cable ties etc.)	set	20.00			
3.8	317.21	Supply, Installation, testing & commissioning of long life maintenance Free Earthing System with 50 year life without periodic watering. The Electrode shall be of flat inside pipe technology with 2 meter long, 80 mm dia & minimum 4 mm wall thickness Cu pipe, which does not require manual addition of water. The Earthing system should be with 50 Kg pre cast or in-situ cast in high purity electrically conductive granular (Marconite), having ultra low resistivity of 0.001 Ohm - m. Electrode made of electrically conductive granular mixed with cement to pre cast or backfill the voids surrounding the metal conductor in augured bore hole of 100 mm dia x 2000 mm depth, resulting in increase of effective surface area of the earth electrode or grid of multiple electrodes to lower the earth resistance in all type of soil including dry or rocky soils. Earth enhancing material should not leach into the adjacent soil or underground water channels and its pH should be in neutral range. The earth station shall be with suitable poly-plastic pit/Cast Iron Plate cover with locable arrangement. (Make: Ashok/Pragati or eqvt)	set	1.00			
B	322	LT Panels Make - MCCB: Schneider NSX Series/ Legrand DP X3 Series and Siemens; MCB Schneider Acti9, Legrand DX3 and Siemens; Fabricator - AVONE, Hyonjan & Ankur Metal 					
		Indoor floor mounted/ wall mounted double door vertical/horizontal type Distribution Boards conforming IS: 8623 and IS: 13032, IP42 for indoor type LT cubicle panel of suitable size suitable for operation on 400 volts, 50 Hz AC 3 phase 4 wire supply system fabricated from CRCA sheet steel of 2/1.6 thick for frame work and covers, 3mm thick for gland plates with stiffeners wherever required, having vibration free structure chemically treated with seven tank process or better before painting for surface treatment and powder coated in approved shade, with suitable electrolytic grade high conductivity bus bars extensible, DMC/ SMC (whichever is superior) bus bar supports, with short circuit withstand capacity as mentioned, fabrication shall be done in transportable sections, entire panel shall have a common earth bar of required size at the rear with 2 Nos. earth stud, connections and interconnection with solid conductor wires / copper strips, neutral links, control wiring with 1.5 sqmm. & 2.5sqmm. PVC insulated FRLS copper conductor S/C cable for voltage & current respectively, including providing and fixing following switch gears and as per schedules, technical specifications etc. complete as required.					
	a	Bus bar shall be high conductivity (99%), ETP - Electrical grade copper					
	b	Bus bar shall be designed on 45 deg. Ambient temperature and limit of temperature rise shall be 35 deg. Over and above Ambient temperature.					
	c	Suitable aluminium earth bus to be provided throughout the length of each switchboard.					
	d	Bus bars shall be with heat shrinkable PVC sleeves.					
	e	Only cast resin CT's to be used.					
	f	Phase indication lamps and ON / OFF Indication lamp shall be LED type and shall be controlled / protected by suitable control fuses of required fault withstand capacity (kA rating of switch board) MPCBs / MCB's.					
	g	Drawing approval shall be taken for each panel before manufacturing.					



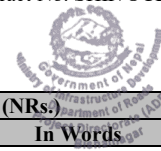
Bill of Quantities

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs)		Amount
					In Figure	In Words	
	h	MCCB's shall be with Ics= Icu rating.					
	i	MCCB's shall be with Extended rotary handles.					
	k	MCB's shall be with Ics= Icu rating.					
	l	MCB's shall be of minimum 10kA fault with stand capacity.					
	m	MCB's used for protection shall be of type "C" characteristic only.					
4.1	322	Main Distribution Panel (MDP)					
	322.1	Supply, delivery, installation,commissioning and testing of Floor Mounted Type tested main distribution panel with automatic load management system for Diesel Generator with push button lock, rotor handel and made of 14 SWG MS metal sheet including neutral bar, phase bar and earth bus bar with adequate space for incomming and outgoing cable with complete internal wiring and External Capacitor Bank for future provision with protection scheme of Phase Failuare & Reverse, OV, UV and Earth Fault. (MDP must be of type tested panle as per drawing, specification and instruction all complete. [Ref Make: Siemens, Legerand & GE]	No.	1.00			
	322.4	MCCB up to 250A shall be with thermal magnetic based release (O/C, S/C protection) and above 250A with microprocessor based release (O/C, S/C protection)					
		INCOMER-1					
	322.4	400/630A TP Manually Operated Fixed Type MCCB (16kA) with built-in Microprocessor Based Release for (O/C, S/C Protection), Aux. Cont. & ROM	No.	1.00			
		Rear Terminals + Shield (630A TP)	No.	1.00			
		630A FP AC-1 Duty Power Contactor	No.	1.00			
		Digital Voltmeter with selector switch, Cl.-1.0, 96x96sq.mm., Flush Mounted	No.	1.00			
		Digital Ammeter with selector switch, Cl.-1.0, 96x96sq.mm., Flush Mounted	No.	1.00			
		CTs 630/5A, Class-1.0, 15VA for Metering (Resin Cast)	Nos.	3.00			
		Auxiliary Contactor 2NO+2NC	No.	1.00			
		Auto/Manual Selector Switch	No.	1.00			
		Push Button - ON/OFF	Nos.	2.00			
		Indicating lamps - R/Y/B/ON/OFF	Nos.	5.00			
		6A SP Control MCB (10kA), C-Curve	Nos.	4.00			
		INCOMER-2					
	322.4	400/500A TP Manually Operated Fixed Type MCCB (16kA) with built-in Microprocessor Based Release for (O/C, S/C Protection), Aux. Cont. & ROM	No.	1.00			
		Rear Terminals + Shield (500A TP)	No.	1.00			
		630A FP AC-1 Duty Power Contactor	No.	1.00			
		Digital Voltmeter with selector switch, Cl.-1.0, 96x96sq.mm., Flush Mounted	No.	1.00			
		Digital Ammeter with selector switch, Cl.-1.0, 96x96sq.mm., Flush Mounted	No.	1.00			
		CTs 500/5A, Class-1.0, 15VA for Metering (Resin Cast)	Nos.	3.00			
		Auxiliary Contactor 2NO+2NC	No.	1.00			
		Auto/Manual Selector Switch	No.	1.00			
		Push Button - ON/OFF	Nos.	2.00			
		Indicating lamps - R/Y/B/ON/OFF	Nos.	5.00			
		6A SP Control MCB (10kA), C-Curve	Nos.	4.00			
		INCOMER-3					
	322.4	100/160A TP Manually Operated Fixed Type MCCB (16kA) with built-in Thermal Magnetic Based Release for (O/C, S/C Protection), Aux. Cont. & ROM	No.	1.00			
		Rear Terminals + Shield (160A TP)	No.	1.00			
		200A FP AC-1 Duty Power Contactor	No.	1.00			
		Digital Voltmeter with selector switch, Cl.-1.0, 96x96sq.mm., Flush Mounted	No.	1.00			
		Digital Ammeter with selector switch, Cl.-1.0, 96x96sq.mm., Flush Mounted	No.	1.00			
		CTs 160/5A, Class-1.0, 15VA for Metering (Resin Cast)	Nos.	3.00			
		Auxiliary Contactor 2NO+2NC	No.	1.00			
		Auto/Manual Selector Switch	No.	1.00			
		Push Button - ON/OFF	Nos.	2.00			
		Indicating lamps - R/Y/B/ON/OFF	Nos.	5.00			
		6A SP Control MCB (10kA), C-Curve	Nos.	4.00			
		BUS COUPLER					



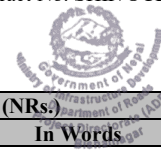
Bill of Quantities

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs.)		Amount
					In Figure	In Words	
	322.4	400/630A TP Manually Operated Fixed Type MCCB type Isolator with Aux. Cont. ROM	No.	1.00			
		Rear Terminals + Shield (630A TP)	No.	1.00			
		630A FP AC-1 Duty Power Contactor	No.	1.00			
		Auxiliary Contactor 2NO+2NC	No.	1.00			
		Auto/Manual Selector Switch	No.	1.00			
		Push Button - ON/OFF	Nos.	2.00			
		Indicating lamps - ON/OFF	Nos.	2.00			
		6A SP Control MCB (10kA), C-Curve	No.	1.00			
		INTERLOCKING					
		Electrical/Mechanical Interlocking among 3nos. Incomers and 1no. Bus Coupler	Set	1.00			
		OUTGOINGS					
	322.4	400A TP+N Manually Operated Fixed Type MCCB (16kA) with built-in Microprocessor Based Release for (O/C, S/C Protection) & ROM	Nos.	2.00			
		Rear Terminals + Shield (400A TP)	Nos.	2.00			
	322.4	100A TP Manually Operated Fixed Type MCCB (16kA) with built-in Thermal Magnetic Based Release for (O/C, S/C Protection) & ROM	No.	1.00			
	322.4	63A TP Manually Operated Fixed Type MCCB (16kA) with built-in Thermal Magnetic Based Release for (O/C, S/C Protection) & ROM	No.	1.00			
	322.4	50A TP Manually Operated Fixed Type MCCB (16kA) with built-in Thermal Magnetic Based Release for (O/C, S/C Protection) & ROM	No.	1.00			
	322.4	32A TP Manually Operated Fixed Type MCCB (16kA) with built-in Thermal Magnetic Based Release for (O/C, S/C Protection) & ROM	Nos.	4.00			
		Supply, Delivery, Installation and commissioning of 60 KVAR Power Factor Correction Unit panel; Floor Mount, with different size capacitors for minimum 8 automatic step switching with protection including suitable Capacitor Switching/ Capacitory Duty Contactors, MCCB, MCB, wires with cable up MDP (Main Distribution Panel) and necessary accessories as per drawing, specification and instruction all complete.					
		100kVAR Power Factor Correction Capacitor Panel with 10-Steps (external panel but part of MDP Panel) including suitable Capacitor Switching/ Capacitory Duty Contactors					
		Incomer of Capacitor Panel:-					
	322.4	250A TP Manually Operated Fixed Type MCCB (16kA) with built-in Microprocessor Based Release for (O/C, S/C Protection) & ROM	No.	1.00			
		Rear Terminals + Shield (320A TP)	No.	1.00			
		Indicating lamps - R/Y/B	Nos.	3.00			
		6A SP Control MCB (10kA), C-Curve	Nos.	3.00			
		10-Steps APFC Relay	No.	1.00			
		OFF Delay Timer	No.	1.00			
		Outgoings of Capacitor Panel:-					
		25kVAR CAPACITOR FEEDER CONSISTS OF:-					
	322.4	63A TP Manually Operated Fixed Type MCCB (16kA) with built-in Thermal Magnetic Based Release for (O/C, S/C Protection), Aux. Cont. & ROM	Nos.	2.00			
		25kVAR Capacitor Duty Contactor	Nos.	2.00			
		(2*25KVAR) MPP Duty Capacitor Bank	Set	1.00			
		Auxiliary Contactor 2NO+2NC	Nos.	2.00			
		Auto/Manual Selector Switch	Nos.	2.00			
		Push Button - ON/OFF	Nos.	4.00			
		Indicating Lamps - ON/OFF	Nos.	4.00			
		6A SP Control MCB (10kA), C-Curve	Nos.	2.00			
		10kVAR CAPACITOR FEEDER CONSISTS OF:-					
		25A TP MCB (10kA), C-Curve, Aux. Cont.	Nos.	2.00			
		10kVAR Capacitor Duty Contactor	Nos.	2.00			
		(2*10KVAR) MPP Duty Capacitor Bank	Set	1.00			
		Auxiliary Contactor 2NO+2NC	Nos.	2.00			
		Auto/Manual Selector Switch	Nos.	2.00			
		Push Button - ON/OFF	Nos.	4.00			
		Indicating Lamps - ON/OFF	Nos.	4.00			
		6A SP Control MCB (10kA), C-Curve	Nos.	2.00			
		5kVAR CAPACITOR FEEDER CONSISTS OF:-					
		16A TP MCB (10kA), C-Curve, Aux. Cont.	Nos.	5.00			
		5kVAR Capacitor Duty Contactor	Nos.	5.00			
		(5*5KVAR) MPP Duty Capacitor Bank	Set	1.00			
		Auxiliary Contactor 2NO+2NC	Nos.	5.00			



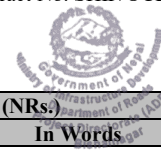
Bill of Quantities

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs)		Amount
					In Figure	In Words	
		Auto/Manual Selector Switch	Nos.	5.00			
		Push Button - ON/OFF	Nos.	10.00			
		Indicating Lamps - ON/OFF	Nos.	10.00			
		6A SP Control MCB (10kA), C-Curve	Nos.	5.00			
4.2	322	Solar/UPS MDP					
		Supply, delivery, installation, commissioning and testing of floor/wall mounted double cover Solar/UPS MDP distribution panel made of 16 SWG MS metal sheet powder coated paint with push button lock, Safety Arcilic Sheet Cover with warning sign at exposed portion, DB name embossed in Metal tag, including neutral bar, phase bar and earth bar with adequate space for incoming and outgoing cable with complete internal wiring each accommodating following items as per drawing, specification and instruction all complete.	nos.	1.00			
		25A TP MCCB 16 KA ICS- Incommer	nos.	1.00			
		25A TPN RCCB 100mA	nos.	1.00			
		16A DP MCB 10 KA ICS (1F,2F,3F,4F,5F,6F)	nos.	8.00			
		20A DP MCB 10 KA ICS (Basement, GF, O1, O2)	nos.	4.00			
		Multifunction Meter	nos.	1.00			
		Selector Switch	set.	2.00			
		CT coil	set	1.00			
		Indicator lamp with 2A MCB	nos.	3.00			
		Floor Distribution Panel (FDP) and Distribution Box (DB)					
		Basement					
4.3	322	FDP- Basement [FDP-B]					
		Supply, delivery, installation, commissioning and testing of floor/wall mounted double cover FDP-B distribution panel made of 16 SWG MS metal sheet powder coated paint with push button lock, Safety Arcilic Sheet Cover with warning sign at exposed portion, DB name embossed in Metal tag, including neutral bar, phase bar and earth bar with adequate space for incoming and outgoing cable with complete internal wiring each accommodating following items as per drawing, specification and instruction all complete.	nos.	1.00			
		25A TP MCCB 16 KA ICS- Incommer	nos.	1.00			
		25A TPN RCCB 100mA	nos.	1.00			
		16A TP MCB, 16 KA ISC	nos.	2.00			
		20A DP MCB 10 KA ICS (UPS Incommer)	nos.	1.00			
		16A SP MCB 10 KA ICS	nos.	4.00			
		10A SP MCB 10 KA ICS	nos.	5.00			
		6A SP MCB 10 KA ICS	nos.	2.00			
		Multifunction Meter	nos.	1.00			
		Selector Switch	set.	2.00			
		CT coil	set	1.00			
		Indicator lamp with 2A MCB	nos.	3.00			
		Ground Floor					
4.5	322	FDP- Ground Floor [FDP-GF]					
		Supply, delivery, installation, commissioning and testing of floor/wall mounted double cover FDP-GF distribution panel made of 16 SWG MS metal sheet powder coated paint with push button lock, Safety Arcilic Sheet Cover with warning sign at exposed portion, DB name embossed in Metal tag, including neutral bar, phase bar and earth bar with adequate space for incoming and outgoing cable with complete internal wiring each accommodating following items as per drawing, specification and instruction all complete.	nos.	1.00			
		50A TP MCCB 16 KA ICS- Incommer	nos.	1.00			
		50A TPN RCCB 100mA	nos.	1.00			
		32A TP MCCB, 16 KA ISC (FDP-B & DB-GF's)	nos.	6.00			
		25A DP MCB, 10 KA ISC (DB-O-01, DB-O-2)	nos.	3.00			
		16A DP MCB 10 KA ICS (UPS Incommer)	nos.	1.00			
		Voltmeter	nos.	1.00			
		Ammeter	nos.	1.00			
		Selector Switch	set.	2.00			
		CT coil	set	1.00			
		Indicator lamp with 2A MCB	nos.	3.00			
4.6		Distribution Box Outdoor-1 [DB-O-01]					



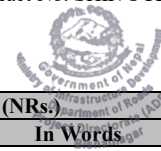
Bill of Quantities

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs)		Amount
					In Figure	In Words	
		Supply, delivery, installation,commissioning and testing of floor/wall mounted double cover [DB-O-01] distribution board with minium IP 54 rating made of 16 SWG MS metal sheet powder coated paint with push button lock, Safety Arcilic Sheet Cover with warning sign at exposed portion , DB name embrossed in Metal tag, including neutral bar, phase bar and earth bar with adequate space for incomming and outgoing cable with complete internal wiring each accomodating following items as per drawing,specification and instruction all complete. [Ref Make: Siemens, Legerand & GE]	nos.	1.00			
		20A DP 10 KA ICS- Incommer	nos.	1.00			
		20A DP RCCB 30mA	nos.	1.00			
		16A DP MCB 10 KA ICS (UPS Incommer)	nos.	1.00			
		16A SP MCB 10 KA ICS	nos.	3.00			
		10A SP MCB 10 KA ICS	nos.	3.00			
4.7	322	Distribution Box Outdoor-2 [DB-O-02]					
		Supply, delivery, installation,commissioning and testing of floor/wall mounted double cover [DB-O-02] distribution board with minium IP 54 rating made of 16 SWG MS metal sheet powder coated paint with push button lock, Safety Arcilic Sheet Cover with warning sign at exposed portion , DB name embrossed in Metal tag, including neutral bar, phase bar and earth bar with adequate space for incomming and outgoing cable with complete internal wiring each accomodating following items as per drawing,specification and instruction all complete. [Ref Make: Siemens, Legerand & GE]	nos.	1.00			
		20A DP 10 KA ICS- Incommer	nos.	1.00			
		20A DP RCCB 30mA	nos.	1.00			
		16A DP MCB 10 KA ICS (UPS Incommer)	nos.	1.00			
		16A SP MCB 10 KA ICS	nos.	3.00			
		10A SP MCB 10 KA ICS	nos.	3.00			
4.8	322	Distibution Board [DB-GF-01]					
		Supply, delivery, installation,commissioning and testing of floor/wall mounted double cover DB-GF-01 distribution panel made of 16 SWG MS metal sheet powder coated paint with push button lock, Safety Arcilic Sheet Cover with warning sign at exposed portion , DB name embrossed in Metal tag, including neutral bar, phase bar and earth bar with adequate space for incomming and outgoing cable with complete internal wiring each accomodating following items as per drawing,specification and instruction all complete.	nos.	1.00			
		20A TP MCB, 16 KA ISC (incommer)	nos.	1.00			
		20A TPN RCCB 30mA	nos.	1.00			
		10A DP MCB 10 KA ICS (UPS Incommer)	nos.	1.00			
		16A DP MCB 10 KA ICS (Façade & outdoor lights)	nos.	3.00			
		16A SP MCB 10 KA ICS	nos.	4.00			
		10A SP MCB 10 KA ICS	nos.	6.00			
		6A SP MCB 10 KA ICS	nos.	4.00			
		Indicator lamp with 2A MCB	nos.	3.00			
4.9	322	Distibution Board [DB-GF-02]					
		Supply, delivery, installation,commissioning and testing of floor/wall mounted double cover DB-GF-02 distribution panel made of 16 SWG MS metal sheet powder coated paint with push button lock, Safety Arcilic Sheet Cover with warning sign at exposed portion , DB name embrossed in Metal tag, including neutral bar, phase bar and earth bar with adequate space for incomming and outgoing cable with complete internal wiring each accomodating following items as per drawing,specification and instruction all complete.	nos.	1.00			
		20A TP MCB, 16 KA ISC (incommer)	nos.	1.00			
		20A TPN RCCB 30mA	nos.	1.00			
		10A DP MCB 10 KA ICS (UPS Incommer)	nos.	1.00			
		16A SP MCB 10 KA ICS	nos.	3.00			
		10A SP MCB 10 KA ICS	nos.	6.00			
		6A SP MCB 10 KA ICS	nos.	3.00			
		Indicator lamp with 2A MCB	nos.	3.00			
4.10	322	Distibution Board [DB-GF-03]					



Bill of Quantities

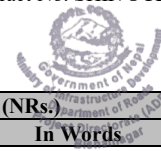
Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs.)		Amount
					In Figure	In Words	
		Supply, delivery, installation,commissioning and testing of floor/wall mounted double cover DB-GF-03 distribution panel made of 16 SWG MS metal sheet powder coated paint with push button lock, Safety Arcilic Sheet Cover with warning sign at exposed portion , DB name embrossed in Metal tag, including neutral bar, phase bar and earth bar with adequate space for incomming and outgoing cable with complete internal wiring each accomodating following items as per drawing,specification and instruction all complete.	nos.	1.00			
		20A TP MCB, 16 KA ISC (incommer)	nos.	1.00			
		20A TPN RCCB 30mA	nos.	1.00			
		10A DP MCB 10 KA ICS (UPS Incommer)	nos.	1.00			
		16A SP MCB 10 KA ICS	nos.	3.00			
		10A SP MCB 10 KA ICS	nos.	8.00			
		6A SP MCB 10 KA ICS	nos.	5.00			
		Indicator lamp with 2A MCB	nos.	3.00			
4.10	322	Distibution Board [DB-GF-04]					
		Supply, delivery, installation,commissioning and testing of floor/wall mounted double cover DB-GF-04 distribution panel made of 16 SWG MS metal sheet powder coated paint with push button lock, Safety Arcilic Sheet Cover with warning sign at exposed portion , DB name embrossed in Metal tag, including neutral bar, phase bar and earth bar with adequate space for incomming and outgoing cable with complete internal wiring each accomodating following items as per drawing,specification and instruction all complete.	nos.	1.00			
		20A TP MCB, 16 KA ISC (incommer)	nos.	1.00			
		20A TPN RCCB 30mA	nos.	1.00			
		10A DP MCB 10 KA ICS (UPS Incommer)	nos.	1.00			
		16A SP MCB 10 KA ICS	nos.	3.00			
		10A SP MCB 10 KA ICS	nos.	6.00			
		6A SP MCB 10 KA ICS	nos.	3.00			
		Indicator lamp with 2A MCB	nos.	3.00			
		First Floor					
4.11	322	FDP- First Floor [FDP-1F]					
		Supply, delivery, installation,commissioning and testing of floor/wall mounted double cover FDP-1F distribution panel made of 16 SWG MS metal sheet powder coated paint with push button lock, Safety Arcilic Sheet Cover with warning sign at exposed portion , DB name embrossed in Metal tag, including neutral bar, phase bar and earth bar with adequate space for incomming and outgoing cable with complete internal wiring each accomodating following items as per drawing,specification and instruction all complete.	nos.	1.00			
		50A TP MCCB 16 KA ICS- Incommer	nos.	1.00			
		50A TPN RCCB 100mA	nos.	1.00			
		16AA DP MCB, 10 KA ISC (UPS Incommer)	nos.	1.00			
		25A TP MCCB, 16 KA ISC	nos.	3.00			
		16A SP MCB 10 KA ICS	nos.	6.00			
		10A SP MCB 10 KA ICS	nos.	4.00			
		6A SP MCB 10 KA ICS	nos.	4.00			
		Voltmeter	nos.	1.00			
		Ammeter	nos.	1.00			
		Selector Switch	set.	2.00			
		CT coil	set	1.00			
		Indicator lamp with 2A MCB	nos.	3.00			
4.12	322	Distibution Board [DB-1F-01]					
		Supply, delivery, installation,commissioning and testing of floor/wall mounted double cover DB-1F-01 distribution panel made of 16 SWG MS metal sheet powder coated paint with push button lock, Safety Arcilic Sheet Cover with warning sign at exposed portion , DB name embrossed in Metal tag, including neutral bar, phase bar and earth bar with adequate space for incomming and outgoing cable with complete internal wiring each accomodating following items as per drawing,specification and instruction all complete.	nos.	1.00			
		20A TP MCB, 16 KA ISC (incommer)	nos.	1.00			
		20A TPN RCCB 30mA	nos.	1.00			
		10A DP MCB 10 KA ICS (UPS Incommer)	nos.	1.00			
		16A SP MCB 10 KA ICS	nos.	3.00			
		10A SP MCB 10 KA ICS	nos.	8.00			
		6A SP MCB 10 KA ICS	nos.	5.00			
		Indicator lamp with 2A MCB	nos.	3.00			



Bill of Quantities

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs.)		Amount
					In Figure	In Words	
4.13	322	Distibution Board [DB-1F-02]					
		Supply, delivery, installation,commissioning and testing of floor/wall mounted double cover DB-1F-02 distribution panel made of 16 SWG MS metal sheet powder coated paint with push button lock, Safety Arcilic Sheet Cover with warning sign at exposed portion , DB name embrossed in Metal tag, including neutral bar, phase bar and earth bar with adequate space for incomming and outgoing cable with complete internal wiring each accomodating following items as per drawing,specification and instruction all complete.	nos.	1.00			
		20A TP MCB, 16 KA ISC (incommer)	nos.	1.00			
		20A TPN RCCB 30mA	nos.	1.00			
		10A DP MCB 10 KA ICS (UPS Incommer)	nos.	1.00			
		16A SP MCB 10 KA ICS	nos.	4.00			
		10A SP MCB 10 KA ICS	nos.	5.00			
		6A SP MCB 10 KA ICS	nos.	5.00			
		Indicator lamp with 2A MCB	nos.	3.00			
		Second Floor					
4.14	322	FDP- Second Floor [FDP-2F]					
		Supply, delivery, installation,commissioning and testing of floor/wall mounted double cover FDP-2F distribution panel made of 16 SWG MS metal sheet powder coated paint with push button lock, Safety Arcilic Sheet Cover with warning sign at exposed portion , DB name embrossed in Metal tag, including neutral bar, phase bar and earth bar with adequate space for incomming and outgoing cable with complete internal wiring each accomodating following items as per drawing,specification and instruction all complete.	nos.	1.00			
		50A TP MCCB 16 KA ICS- Incommer	nos.	1.00			
		50A TPN RCCB 100mA	nos.	1.00			
		16A DP MCB, 10 KA ISC (UPS Incommer)	nos.	1.00			
		32A TP MCCB, 16 KA ISC	nos.	2.00			
		25A TP MCCB, 16 KA ISC	nos.	1.00			
		16A SP MCB 10 KA ICS	nos.	8.00			
		10A SP MCB 10 KA ICS	nos.	5.00			
		6A SP MCB 10 KA ICS	nos.	3.00			
		Voltmeter	nos.	1.00			
		Ammeter	nos.	1.00			
		Selector Switch	set.	2.00			
		CT coil	set	1.00			
		Indicator lamp with 2A MCB	nos.	3.00			
4.15	322	Distibution Board [DB-2F-01]					
		Supply, delivery, installation,commissioning and testing of floor/wall mounted double cover DB-2F-01 distribution panel made of 16 SWG MS metal sheet powder coated paint with push button lock, Safety Arcilic Sheet Cover with warning sign at exposed portion , DB name embrossed in Metal tag, including neutral bar, phase bar and earth bar with adequate space for incomming and outgoing cable with complete internal wiring each accomodating following items as per drawing,specification and instruction all complete.	nos.	1.00			
		25A TP MCB, 16 KA ISC (incommer)	nos.	1.00			
		25A TPN RCCB 30mA	nos.	1.00			
		10A DP MCB 10 KA ICS (UPS Incommer)	nos.	1.00			
		16A DP MCB 10 KA ICS	nos.	1.00			
		16A SP MCB 10 KA ICS	nos.	6.00			
		10A SP MCB 10 KA ICS	nos.	5.00			
		6A SP MCB 10 KA ICS	nos.	3.00			
		Indicator lamp with 2A MCB	nos.	3.00			
4.16	322	Distibution Board [DB-2F-02]					
		Supply, delivery, installation,commissioning and testing of floor/wall mounted double cover DB-2F-02 distribution panel made of 16 SWG MS metal sheet powder coated paint with push button lock, Safety Arcilic Sheet Cover with warning sign at exposed portion , DB name embrossed in Metal tag, including neutral bar, phase bar and earth bar with adequate space for incomming and outgoing cable with complete internal wiring each accomodating following items as per drawing,specification and instruction all complete.	nos.	1.00			
		32A TP MCB, 16 KA ISC (incommer)	nos.	1.00			
		32A TPN RCCB 30mA	nos.	1.00			
		10A DP MCB 10 KA ICS (UPS Incommer)	nos.	1.00			
		20A SP MCB 10 KA ICS	nos.	2.00			

Chudaraj Dhakal
Project Director



Bill of Quantities

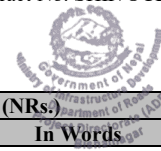
Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs.)		Amount
					In Figure	In Words	
		16A SP MCB 10 KA ICS	nos.	10.00			
		10A SP MCB 10 KA ICS	nos.	6.00			
		6A SP MCB 10 KA ICS	nos.	4.00			
		Indicator lamp with 2A MCB	nos.	3.00			
				0.00			
		Third Floor		0.00			
4.17	322	FDP- Third Floor [FDP-3F]		0.00			
		Supply, delivery, installation,commissioning and testing of floor/wall mounted double cover FDP-3F distribution panel made of 16 SWG MS metal sheet powder coated paint with push button lock, Safety Arcilic Sheet Cover with warning sign at exposed portion , DB name embossed in Metal tag, including neutral bar, phase bar and earth bar with adequate space for incoming and outgoing cable with complete internal wiring each accomodating following items as per drawing,specification and instruction all complete.	nos.	1.00			
		40A TP MCCB 16 KA ICS- Incommer	nos.	1.00			
		40A TPN RCCB 100mA	nos.	1.00			
		16A DP MCB, 10 KA ISC (UPS Incommer)	nos.	1.00			
		32A TP MCCB, 16 KA ISC	nos.	2.00			
		20A SP MCB 10 KA ICS	nos.	2.00			
		16A SP MCB 10 KA ICS	nos.	8.00			
		10A SP MCB 10 KA ICS	nos.	7.00			
		6A SP MCB 10 KA ICS	nos.	4.00			
		Voltmeter	nos.	1.00			
		Ammeter	nos.	1.00			
		Selector Switch	set.	2.00			
		CT coil	set	1.00			
		Indicator lamp with 2A MCB	nos.	3.00			
4.18	322	Distibution Board [DB-3F-01]					
		Supply, delivery, installation,commissioning and testing of floor/wall mounted double cover DB-3F-01 distribution panel made of 16 SWG MS metal sheet powder coated paint with push button lock, Safety Arcilic Sheet Cover with warning sign at exposed portion , DB name embossed in Metal tag, including neutral bar, phase bar and earth bar with adequate space for incoming and outgoing cable with complete internal wiring each accomodating following items as per drawing,specification and instruction all complete.	nos.	1.00			
		25A TP MCB, 16 KA ISC (incommer)	nos.	1.00			
		25A TPN RCCB 30mA	nos.	1.00			
		10A DP MCB 10 KA ICS (UPS Incommer)	nos.	1.00			
		20A SP MCB 10 KA ICS	nos.	2.00			
		16A SP MCB 10 KA ICS	nos.	10.00			
		10A SP MCB 10 KA ICS	nos.	8.00			
		6A SP MCB 10 KA ICS	nos.	4.00			
		Indicator lamp with 2A MCB	nos.	3.00			
		Fourth Floor					
4.19	322	FDP- Fourth Floor [FDP-4F]					
		Supply, delivery, installation,commissioning and testing of floor/wall mounted double cover FDP-4F distribution panel made of 16 SWG MS metal sheet powder coated paint with push button lock, Safety Arcilic Sheet Cover with warning sign at exposed portion , DB name embossed in Metal tag, including neutral bar, phase bar and earth bar with adequate space for incoming and outgoing cable with complete internal wiring each accomodating following items as per drawing,specification and instruction all complete.	nos.	1.00			
		40A TP MCCB 16 KA ICS- Incommer	nos.	1.00			
		40A TPN RCCB 100mA	nos.	1.00			
		16A DP MCB, 10 KA ISC (UPS Incommer)	nos.	1.00			
		32A TP MCCB, 16 KA ISC	nos.	2.00			
		20A SP MCB 10 KA ICS	nos.	2.00			
		16A SP MCB 10 KA ICS	nos.	6.00			
		10A SP MCB 10 KA ICS	nos.	5.00			
		6A SP MCB 10 KA ICS	nos.	4.00			
		Voltmeter	nos.	1.00			
		Ammeter	nos.	1.00			
		Selector Switch	set.	2.00			
		CT coil	set	1.00			
		Indicator lamp with 2A MCB	nos.	3.00			
4.20	322	Distibution Board [DB-4F-01]					



Bill of Quantities

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs.)		Amount
					In Figure	In Words	
		Supply, delivery, installation, commissioning and testing of floor/wall mounted double cover DB-4F-01 distribution panel made of 16 SWG MS metal sheet powder coated paint with push button lock, Safety Arcilic Sheet Cover with warning sign at exposed portion, DB name embossed in Metal tag, including neutral bar, phase bar and earth bar with adequate space for incoming and outgoing cable with complete internal wiring each accommodating following items as per drawing, specification and instruction all complete.	nos.	1.00			
		25A TP MCB, 16 KA ISC (incommer)	nos.	1.00			
		25A TPN RCCB 30mA	nos.	1.00			
		10A DP MCB 10 KA ICS (UPS Incommer)	nos.	1.00			
		20A SP MCB 10 KA ICS	nos.	2.00			
		16A SP MCB 10 KA ICS	nos.	10.00			
		10A SP MCB 10 KA ICS	nos.	8.00			
		6A SP MCB 10 KA ICS	nos.	5.00			
		Indicator lamp with 2A MCB	nos.	3.00			
		Fifth Floor					
4.22	322	Distibution Board [DB-5F-01]					
		Supply, delivery, installation, commissioning and testing of floor/wall mounted double cover DB-5F-01 distribution panel made of 16 SWG MS metal sheet powder coated paint with push button lock, Safety Arcilic Sheet Cover with warning sign at exposed portion, DB name embossed in Metal tag, including neutral bar, phase bar and earth bar with adequate space for incoming and outgoing cable with complete internal wiring each accommodating following items as per drawing, specification and instruction all complete.	nos.	1.00			
		25A TP MCB, 16 KA ISC (incommer)	nos.	1.00			
		25A TPN RCCB 30mA	nos.	1.00			
		10A DP MCB 10 KA ICS (UPS Incommer)	nos.	1.00			
		16A SP MCB 10 KA ICS	nos.	6.00			
		10A SP MCB 10 KA ICS	nos.	5.00			
		6A SP MCB 10 KA ICS	nos.	5.00			
		Indicator lamp with 2A MCB	nos.	3.00			
		Rising Mains [Ref make: LEGRAND, ZUCCINI and BTICINO]					
		Supply, delivery, installation, commissioning and testing of totally enclosed sandwich type Al bus bar with IP 55 rating, Rising Mains system suitable for drawing power at each floor through tap off boxes. Rising ains being of cold rolled steel sheet 2.0mm/1.6 mm with Anti corrosive electrolytic coating and finally eproxy polyester powder coating, complete with Aluinium bus bar, multilayer insulation of class-F, dube Al earth tape all along, suitable for end feeding, end cover etc. The Rising main shall have expansion joooints ect as required. Note: Busbar Rising shall be two set paraller run with minimim distance as per per company's instruction.					
5.1		630 A Aliminium Busbar Trunking 3P+N (Treated Copper Plating), Rising Mains of 3 meter length each	set	7.00			
5.2		630A End feed box (direct) with Aluminium links suitable for termination of 2 Nos. 4 C x 240 sq.mm cable with cable gland plate and required accesseries	set	2.00			
5.3		TPN TAP OFF Box/ Plug-in Box including TP MCCB	nos	10.00			
		TPN Tap off Box with 63A-160A TP MCCB with rotor handel (16 KA, C Curve)	nos	10.00			
5.4		End covers for 630A Bus Bar Rising Mains	nos	2.00			
5.5		Clamps for Supporting arrangement (Bracket, Suspansion and spring riser)	lot	1.00			
D	321,317	LT FEEDER CABLES & CABLE MANAGEMENT					
		Supply, Delivery, laying, commissioning & testing of cable following XLPE/ PVC insulated & sheathed armoured/un armoured cable including the cost of Wire Mesh Cable Tray of Required Size and accessories like cable exit, identification clip, bracket, roller, coupler, hangers etc where necessary with of required number of clamps/saddles/trench /condits /screws/cable identification tages (made of GSS sheet) for proper cable management as per drawing, specification and instruction all complete. (Ref Make: Mahalaxmi, Prakash, Litmus, Pioneer, Suraksha and Arihant)					
6.1		16 sq. mm, 4C (multiflexible), Cu, AR, PVC power cable	mtr	300.00			
6.2		240sq mm, 4C, Al,AR, XLPE power cable	mtr	100.00			
6.3		Supply, Delivery, laying, commissioning & testing of of street light points (the point wiring should include complete length from street light control switch and a connection box to light at each pole) using 2.5 sq. mm. 3core cable in a HDP pipe of size 20 mm. dia. with required accesseries as per drawing specifications and instruction all complete.	mtr	135.00			

Chudaraj Dhakal
Project Director



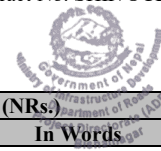
Bill of Quantities

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs)		Amount
					In Figure	In Words	
6.4		Supplying, Delivery, underground laying, commissioning & testing of street light points (the point wiring should include complete length from the nearest street light pole to central control switch and a connection box at each pole) using 10 sq. mm 3C /Al /Ar cable in a HDP pipe of size 20 mm. dia. underground as per drawing specifications and instruction all complete.	mtr	250.00			
6.5		Supply, Delivery, laying and commissioning of 300mm x 55mm wire mesh cable tray with accessories like cable exit, identification clip, bracket, roller, coupler, hangers etc where necessary all complete for Power cables.	mtr	150.00			
6.6		Supplying and laying of 150mm x 55mm wire mesh cable tray with accessories like cable exit, identification clip, bracket, roller, coupler, hangers etc where necessary all complete for Tel, CCTV, Computer cables, Fire Alarm System Cable and other ELV cables.	mtr	150.00			
E	317.32	Point Wiring (Ref Make: Mahalaxmi, Prakash, Suraksha, Arihant or equivalent NS standard cable.)					
7.1	317.11	Supply, delivery, installation, laying, commissioning and testing for concealed/surface wiring of light points for lights, emergency lights, fans, two pin outlets etc of required length of cable from MCB-Switch box or Switch Box -Switch Box to control devices or switch box to a point using 2 x 2.5 sq mm + 1 x 1.5 sq mm (from Switch to Light Point) using 650/1100 Volts grade PVC insulated FRLS copper conductor in a 20mm dia 2 mm thick medium duty FRLS PVC Conduit including all conduit accessories via junction box along with all civil works as per drawing specifications and instruction all complete. (The Cost of 6A Modular Switch (1way or 2way) & GI metal Box is included in the point wiring). All the circuit must be dressed with circuit identification tags.	point	486.15			
7.2	317.11	Supply, delivery, installation, laying, commissioning and testing for concealed/surface wiring of 6/16A Universal power Outlet using 2 x 4 sq. mm. + 1x 2.5 sq. mm, using 650/1100 Volts grade PVC insulated FRLS copper conductor in a 20mm dia 2 mm thick medium duty FRLS PVC Conduit including all conduit accessories via junction box along with all civil works as per drawing specifications and instruction all complete. All the circuit must be dressed with circuit identification tags. One Power Circuit contain 3 power sockets. Make: as mentioned on technical specification)	point	100.00			
7.4	317.11	Supply, delivery, installation, laying, commissioning and testing for concealed/surface wiring of 6/16A Universal power Outlet using 2 x 4 sq. mm. + 1x 2.5 sq. mm, using 650/1100 Volts grade PVC insulated FRLS copper conductor in a 20mm dia 2 mm thick medium duty FRLS PVC Conduit including all conduit accessories via junction box along with all civil works as per drawing specifications and instruction all complete. All the circuit must be dressed with circuit identification tags. Note: workstation power point wiring (1 nos 16A socket + 2 nos 6A socket + two switch for 16A and two 6A socket) is/shall considered as a single point only (secondary loop for the workstation power socket will not be considered as a point wiring within box)	point	31.00			
7.5	317.11	Supply, Delivery, installation, laying, commissioning and testing for 4M Popup Box with 2 x 6A (2 module universal) powersocket with using (2 x 4 sq. mm. + 1x 2.5 sq. mm, using 650/1100 Volts grade PVC insulated FRLS copper conductor in a 20mm dia 2 mm thick medium duty FRLS PVC Conduit including all conduit accessories via junction box along with all civil works as per drawing specifications and instruction all complete. All the circuit must be dressed with circuit identification tags.	set	7.00			
7.6	317.11	Supply, Delivery, installation, laying, commissioning and testing for 6M Popup Box with 1x6A (2 module universal) powersocket, 2 module HDMI, 1 module VGA & 1 module audio along with items mentioned	set	5.00			
7.7	317.11	Supply, delivery, installation, laying, commissioning and testing for concealed/surface wiring of AC power points 20 A using (2 x 4 sq. mm. + 1x 2.5 sq. mm, using 650/1100 Volts grade PVC insulated FRLS copper conductor in a 20mm dia 2 mm thick medium duty FRLS PVC Conduit including all conduit accessories via junction box along with all civil works as per drawing specifications and instruction all complete. All the circuit must be dressed with circuit identification tags.	point	1.00			
7.8	317.16	Supply, delivery, installation, laying, commissioning and testing for concealed/surface wiring with CAT-6 of 23 SWG cable for CCTV Points using appropriate cables a 20mm dia 2 mm thick medium duty FRLS PVC Conduit including all conduit accessories via junction box along with all civil works (Make: Legrand, Schinider and AMP) (Note: For outdoor CAT-6 Cable must be outdoor type)	point	29.00			
7.9	317.17	Supplying the materials and concealed wiring of Telephone points using 0.5 mm dia. 2 pair copper cable in a standard 20mm dia 2 mm thick medium duty FRLS PVC Conduit including all conduit accessories via junction box along with all civil works all complete.	point	50.00			



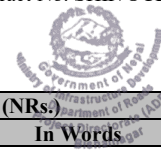
Bill of Quantities

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs.)		Amount
					In Figure	In Words	
7.10	317.18	Supply, delivery, installation, laying, commissioning and testing for concealed/surface wiring of TV points using Cu conductor with Cu shield RG-6 coaxial cable, GEL Filled, in a standard 20mm dia 2 mm thick medium duty FRLS PVC Conduit including all conduit accessories via junction box along with all civil works all complete.	point	1.00			
7.11	317.19	Supply, delivery, installation, laying, commissioning and testing for concealed/surface wiring of Computer points, Router & Eattandance using UTP CAT-6 of 23 SWG cable in a standard 20mm dia 2 mm thick medium duty FRLS PVC Conduit including all conduit accessories via junction box along with all civil works. The cable shall be laid from each point to sub-hub and then to server room as per drawing specification all complete. (Make: as mentioned on technical specification)	point	50.00			
7.12	317.20	Supply, delivery, installation, laying, commissioning and testing for concealed/surface wiring of Smoke/Heat detector/Glass break/ Hooter using 1.5 sq. mm. 2 core shielded armoured, copper conductor, PVC (RED color Insulation) insulated FRLS cable in a standard 20mm dia 2 mm thick medium duty FRLS PVC Conduit including all conduit accessories via junction box along with all civil works .The cable shall be laid from each point to Control panel as per drawing specifications all complete.	point	130.00			
F	318	Supplying and fixing of following sockets, plate including metal boxes concealed inside wall with necessary Civil works all complete. (Reference Make: Legrand Myrius, Schinider(Clipsal X), MKand Skava)					
8.1		6/16 A 3 pin round universal power socket shuttered with indicator switch including metal box of 18 SWG	nos.	100.00			
8.2		6A 3 pin universal power socket shuttered with switch including metal box of 18 SWG	nos.	87.00			
8.3		RJ11 telephone socket (1/2gang) with metal box all complete.	nos.	50.00			
8.4		RJ45 computer Jack/Socket plate with metal box of 18 SWG all complete. (for E-attandance, Wireless Access Point & HDMI)	nos.	50.00			
8.5		TV (R6-Coaxial) Socket plate with metal box of 18 SWG all complete.	nos.	2.00			
8.6		Office work station multi-outlet extension unit with following equipment	set	29.00			
		3nos x 6/10AMultistandard socket for 2/3 pin 2 module					
		1 nos RJ11 telephone socket 1 module					
		1 nos RJ45 computer socket 1 model					
		8 module cover plate with accesseries for flush mounting					
G	319	Luminaires & Fixtures (Reference Make: Legero, OPPL, Philips, GE, KESLEC, Phoenix and EGLO)					
		Supply, installation, testing and commissioning of following types of LED light fixtures complying LM79-08 certification criteria and also module should be backed with LM80-08 Certificate from the OEM. The fixtures should be warranted for minimum period of 2 years from the date of Installation. The fixtures should have some kind of embossing/ engraving to identify the brand name. The manufactures should provide all kind of test report, technical details as and when called for. If required contractor have to provide test certificate from Government approved Lab for Claimed parameters by the manufacturer without any extra cost all complete as per specification and IS: 16102 Part-2 IS: 16103 Part – 1 IS: 16013 Part – 2 IS: 16108. The Light fixtures shall be Direct Backlit LED having IP≥20, Voltage Range: 180V-270V, THD <10 %, P.F. 0.9, CRI≥ 80, Housing: die-cast aluminum , Finish: Powder Coated, Mounting: Surface/ Recessed., Burning Life>50,000 hours, lumen>90.					
9.1	319	6W, 6000K LED light surface/recessed mounting type as per drawing specifications and instruction all complete.	nos.	28.00			
9.2	319	9W, 6000K LED light surface/recessed mounting type as per drawing specifications and instruction all complete.	nos.	102.00			
9.3	319	12W, 6000K LED light surface mounting type as per drawing specifications and instruction all complete.	nos.	23.00			
9.4	319	15W, 6000K LED light surface mounting type as per drawing specifications and instruction all complete.	nos.	20.00			
9.5		18W, 6000K LED light surface mounting type as per drawing specifications and instruction all complete.	nos.	26.00			
9.6	319	36W, 6000K LED Panel Light fixture of 2ftX2ft surface/recess mounting type including frame, suspension kit and necessary accesseries as per drawing specifications and instruction all complete.	nos.	145.00			
9.7	319	2x18W LED Tube Light with reflector wall/suspended mounting type with accesseries as per drawing specifications and instruction all complete.	nos.	8.00			
9.8	319	LED Mirror Light wall mounting type including lamps as per drawing specifications and instruction all complete. (Note: Fixture will be selected by the client)	nos.	20.00			
9.9	319	Ramp Light wall mounting type including lamps as per drawing specifications and instruction all complete. (Note: Fixture will be selected by the client)	nos.	12.00			



Bill of Quantities

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs.)		Amount
					In Figure	In Words	
9.10	319	Bulk Head Light for Emergency Fire escape stair as per drawing specifications and instruction all complete.	nos.	44.00			
9.12	319	Decorative Gate Light with LED Bulb, mounting set including lamps and all complete. (Ref model: Legro LOZ 3040)	nos.	4.00			
9.13	9,322.4	75W LED light for street pole light, mounting set with complete accessories as per drawing, specifications all complete.	nos.	16.00			
9.14	319	Supplying the materials, fixing and testing of 56" (as per room size) ceiling fan with regulator/dimmer (2M step regulator along with metal box, plate all complete) as per drawing, specification and instruction all complete. (Make: Havells, Orient, Crompton, Usha & Bajaj)	nos.	5.00			
9.15	319	Supplying the materials, fixing and testing of 9" sturdy metal body with metal blades, along with Bird Screen as per drawing, specification and instruction all complete. (Make: Havells, Orient, Crompton, Usha & Bajaj)	nos.	10.00			
9.16	332.1	Supply, Delivery, Erecting and Testing of 9 mtr long (non folding, 147 kg excluding arm structure) Steel Tubular pole as per IS 2713, 410Sp-31 with nut, bolt & washer, single/double extension arm, join box, painting including the cost of RCC foundation as per IS and standard practice all complete as per drawing, technical specification and instruction.	nos.	15.00			
H	326	CCTV/ Surveillance System (Approved Make: Tiandy, Honeywell, Sony, Axis and Bosch)					
10.1	326	Supply, delivery, installation, and commissioning of 2.0 MP Cable Less, IP Outdoor Bullet camera 4mm lens, metal body, IP 67 as per drawing, specification and instruction all complete. [Tech Spec: 1/2.9" CMOS, Min Illumination: Color-0.5lux, B/W-0.01 Lux, IR Range 50m, Wide Dynamic Range: Min100dB, Digital Noise Reduction: 3D DNR, Max. Image Resolution: 1920x1080@30fps with HLC, Smart Defog, Privacy Mask]	nos.	16.00			
10.2	326	Supply, delivery, installation, and commissioning of 2.0 MP Cable Less Design, IP dome camera 2.8mm lens, with inbuilt mic and metal body, IP 66 as per drawing, specification and instruction all complete. [Tech Spec: 1/2.9" CMOS, Min Illumination: Color-0.5lux, B/W-0.01 Lux, IR Range 20m, Wide Dynamic Range: Min100dB, Digital Noise Reduction: 3D DNR, Max. Image Resolution: 1920x1080@30fps with HLC, Smart Defog, Privacy Mask]	nos.	13.00			
10.3	326	Supply, delivery, installation, and commissioning of 40Ch NVR with 4k recording and 4 SATA support along with 4nos 6TB Hard Drive as per drawing, specification and instruction all complete. [Tech Spec: I/C Band: 400Mbps, O/G Band: 200Mbps, Compression H.265/H.264, Mobile Software: P2P/IP for IOS & Android, SATA: 4 SATA for 4 HDDs, Host Stand By: Y]	nos.	1.00			
10.4	326	Supply, delivery, installation, and commissioning of POE switch with 24 PoE ports for CCTV as per drawing, specification and instruction all complete.	nos.	2.00			
10.5	326	Supply, delivery, installation, and commissioning of 80" LCD Monitor SAMSUNG, LG, Sony or Korean Eqv for NVR with essential functions needed for CCTV system as per drawing, specification and instruction all complete.	nos.	2.00			
10.6	326	Supply, delivery, installation, commissioning and testing of 6/9 U Racks	set	1.00			
10.7	326	Supply, delivery, installation, commissioning and testing of KVM over Ethernet Cable	set	1.00			
I	325	Fire Alarm and PA System (Ref Make: Cooper, Bosh, Honeywell, System Sensor and Simplex)					
11.1	325.4	Supply, delivery, installation, and commissioning of Smoke Detector. The conduit shall be laid from each point to Control panel as per drawing specifications all complete.	nos.	83.00			
11.2	325.5	Supply, delivery, installation, and commissioning of Heat Detector. The conduit shall be laid from each point to Control panel as per drawing specifications all complete.	nos.	21.00			
11.3	325.6	Supply, delivery, installation, and commissioning of Manual Break Glass points with operating voltage 17V dc to 32V dc, IP 42. The conduit shall be laid from each point to Control panel as per drawing specifications all complete.	nos.	13.00			
11.4	325.7	Supply, delivery, installation, and commissioning of Internal Wall Sounder/Hooter with flasher inbuilt with flash Energy 1Hz, sound output of 92dB, 97dB and 100dB at low, medium & high, IP 42 rated. The conduit shall be laid from each point to Control panel as per drawing specifications all complete.	nos.	13.00			
11.5	325.2	Supply, delivery, installation, and commissioning of 16 zone addressable fire detector panel with battery backup as per site location with necessary accessories.	set.	1.00			
11.6	325.3	Supply, delivery, installation, and commissioning of 16 zone addressable smoke/heat/fire detector panel to guard house with battery backup at main gate with cable; laid underground.	set.	1.00			



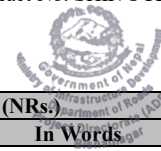
Bill of Quantities

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs.)		Amount
					In Figure	In Words	
J	324	EPABX system (Make: Alkatel;Siemens, Panasonic and Mitel)					
12.1		Main System					
	324	Universal Hybrid IP Epabx system with 12 trunk lines should be expandable including PRI/BRI E1 Interface and 100 line extension ports expandable to 128 extension ports	set	1.00			
12.2	324	Digital Operator Console (Reception)	set	2.00			
		6 line backlit display LCD Screen					
		Full duplex speaker Phone					
		24 button flexible buttons					
		with headset Jack					
12.3	324	DSS Console (Direct Station Selection) (along with Digital operator console)	set	2.00			
		48 button key console with power adapter					
12.4	324	Digital Key Phones (exucitive)	set	10.00			
		3-4 line backlit display LCD Screen					
		Full duplex speaker Phone					
		8 button flexible buttons					
		with headset Jack					
12.5	324	Single Line Telephones	set	50.00			
		Telephone Distribution Box					
12.6	323	Supply, delivery, installation, and commissioning of wall mountable 500 pair Telephone DP (distribution point box) made of 16 SWG MS sheet metal with hinged cover and push button lock to accommodate following nos. of Krone/pouyet type tag block with frame all complete. (double for jumper)	set	1.00			
		10 pair tag block with frame- 50 nos					
12.7	323	Supplying the materials and fixing of wall mountable 50 pair Telephone DP (distribution point box) made of 16 SWG MS sheet metal with hinged cover and push button lock to accommodate following nos. of Krone/pouyet type tag block with frame as per drawing,specification and instruction all complete.	nos.	6.00			
		10 pair tag block with frame- 10 nos	nos.				
12.8	323	Supplying the materials and fixing of wall mountable 10 pair Telephone DP (distribution point box) made of 16 SWG MS sheet metal with hinged cover and push button lock to accommodate following nos. of Krone type tag block with frame as per drawing,specification and instruction all complete.	nos.	4.00			
		10 pair tag block with frame- 1 no	nos.				
		Telephone Cable					
12.9	323	Supplying and laying of 0.45 mm dia copper 10 pair telephone cables inside HDP as per drawing,specification and instruction all complete.	m	200.00			
12.10	323	Supplying and laying of 0.45 mm dia copper 50 pair telephone cables inside HDP as per drawing,specification and instruction all complete.	m	80.00			
J		NETWORKING SYSTEM					
		Supply, Installation, Testing and Commissioning of networking system for Operation as directed by consultant/Client with Technical Specification:					
1		Computer Networking Points means of Cat 6 UTP cables drawn inside 20 mm dia. HDPE conduit with accessories (single run from Switch to individual Point w/o any joint in the middle of span) (Make: TrendNet; Prolink; D-Link)	Points	179.00			
2		One Gang RJ 45 Computer / Lan socket including necessary GI connection box (make; Legrand / Schneider /	set	179.00			
3		24 ports 10/100/1000 base unmanaged networking switch (Make: TrendNet; Prolink; D-Link)	set	8.00			
4		24 port Patch Panels with labelings of Cables (Make: TrendNet; Prolink; D-Link)	set	8.00			
5		Patch Cord 0.5 to 1 meter length	Nos	192.00			
6		Wireless hub for wireless networking purpose (Make: TrendNet; Prolink; D-Link)	set	6.00			
7		Category 6 Cable Pure Copper Cable (Make: Orange; D-Link)	meter	100.00			
8		27 U Racks	set	1.00			
9		Soft and Hard Soil Excavation for laying and installations of Necessary fittings and Cables etc	Job	1.00			
K		TIME ATTENDANCE, ACCESS CONTROL SYSTEM					
13.1		Supply, delivery, installation and commissioning of Multi-Biometric E-attendance all complete with face capacity >800, Finger print >1500, ID Card> 2,000, Record Capacity: 100,000, push data and with inbuilt battery, keypad as per drawing,specification and instruction all complete.	nos	3.00			
L	320	Earthing Protection System					



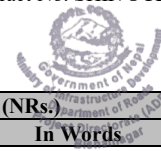
Bill of Quantities

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs.)		Amount
					In Figure	In Words	
		Plate Earthing					
5.6		Supplying the materials and carrying out earthing work using 600 x 600 x 5 mm Pure Copper plate and connecting using 25 x 3 mm copper strip up to test clamp/point as per the drawing and specification all complete.	job	8.00			
5.7		Supplying the materials and installing 25 x 3 mm Cu strip from earthing pit to DB/panel board all complete.	mtr	200.00			
H	320	Lighting Protection System (Make: Kalre, Remedies and Sertec)					
6.1		Supply,delivery and installation of lightning protection Device ESE (Protection level 1, $\Delta T=60\mu s$, protection radius = 90m) as per drawing,specification and instruction all complete.	nos	2.00			
6.2		Supply, delivery and installation of Lightning strike counter as per drawing,specification and instruction all complete.	nos	2.00			
6.3		Supply, delivery, installation and commissioning of 3mtr GI mast for mounting the terminal & adaptor to mount the LA with suitable base plate, having provision of Guy wire clamping system, termination arrangement for the Down Conductor	set	1.00			
6.4		Supply, delivery and installation of down conductor made of 25x3 sq. mm copper strip (or 70 sq.mm single core insulated flexible copper caable with necessary accessories) from LA terminal to earth test link at ground level with accesseries as per drawing, specification and instruction all complete.	mtr	70.00			
6.6		Supply, Installation, testing & commissioning of long life maintenance Free Earthing System with 50 year life without periodic watering. The Electrode shall be of flat inside pipe technology with 2 meter long, 80 mm dia & minium 4 mm wall thickness Cu pipe, which does not require manual addition of water. The Earthing system should be with 50 Kg pre cast or in-situ cast in high purity electrically conductive granular (Marconite), having ultra low resistivity of 0.001 Ohm - m. Electrode made of electrically conductive granular mixed with cement to pre cast or backfill the voids surrounding the metal conductor in augured bore hole of 100 mm dia x 2000 mm depth, resulting in increase of effective surface area of the earth electrode or grid of multiple electrodes to lower the earth resistance in all type of soil including dry or rocky soils. Earth enhancing material should not leach into the adjacent soil or underground water channels and it's pH should be in neutral range. The earth station shall be with suitable poly-plastic pit/Cast Iron Plate cover with locable arrangement. (Make: Ashok/Pragati or eqvt)	lot	2.00			
6.7		Aviation Obstruction Lights with RED LED powered from Solar	set	2.00			
M	330	Elevator System [Otis, KONE, and Schindler]					
16.1		Supply, Delivery, Installation and commissioning of Stainless Steel Mirror cab finish lift with VVVF control, polyurethane coated steel belt for traction medium with pulse monitoring system (or Fiber Core Rope System), high performance infra-red door detector (or 81 crisscross-Beam Sensor), Door with 60/120 min fire rating Door, Full Standby Mode with Automatic Braking System, carrying capacity of 13 person passenger lift (884kg) ,speed: 1.6m/s or 1.75m/s serving , floor 8 stops at single side , with Voice Syntesizer & Music, Human Interface Device, automatic rescue drive , LCD display, Sstandard protection, Along with , Bulk Head Light inside the lift at each floor with necessary wiring, Lift Distribution box with MCCB, Contactor, O/U Voltage, Phase failuare, Phase Reverse, etc all complete as per drawing,design ,specification and instruction site incharge all complete.(Machine Room Less)	nos.	1.00			
N	331	HVAC System (Approved Make: Trane, O General, Daikin and York)					
17.1		Air Conditioning System Works as per drawing, specification and instruction all complete.					
		Ground Floor					
A.		Supply, installaton, testing and commissioning of New Generation-Best in Class Heat Pump type VRV HVAC system inclusive with fully charged refrigerant (R-410A) inclusive of INVERTER COMPRESSOR, interconnecting power and control cables, individual wired/wireless remote controllers and supports made of MS angle/ rods as per specifications and drawings of following capacity:					
1		VRV INDOOR UNITS	Nos	2.00			
		Consultant Team -1					
		Ceiling Mounted Duct Type Units					
		Capacity: 4.7 TR					
		Nominal cooling capacity: 16.0 kW					
		Nominal heating capacity: 18.0 kW					
		Refrigerant: R410A					
		Sound Level (HH/H/L): 46/45/43 dBA					
		Air Flow Rate (HH/H/L): 1624/1377/1130 CFM					
		Power Supply: 1 Phz, 220-240V, 50 Hz					
		Liquid line pipe diameter: Ø 9.5 mm					



Bill of Quantities

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs)		Amount
					In Figure	In Words	
2		Gas line pipe diameter: Ø 15.9 mm					
		VRV INDOOR UNITS	Nos	1.00			
		Reception/Help Desk					
		Celing Mounted Duct Type Units					
		Capacity: 8.0 TR					
		Nominal cooling capacity: 28.0 kW					
		Nominal heating capacity: 31.5 kW					
		Refrigerant: R410A					
		Sound Level (H/L): 55/45 dBA					
		Air Flow Rate (H/L): 2825/2578 CFM					
3		Power Supply: 1 Phz, 220-240V, 50 Hz					
		Liquid line pipe diameter: Ø 9.5 mm					
		Gas line pipe diameter: Ø 22.2 mm					
		VRV OUTDOOR UNITS	Nos	1.00			
		Capacity: 18 HP					
		Nominal cooling capacity: 50.0 kW					
		Nominal heating capacity: 56.0 kW					
		Numbers of Compressors: 2 Nos.					
		Hermetically Sealed Scoll Type Compressor					
		Refrigerant: R410A					
4		Sound Level: 61/65 dBA					
		Power Supply: 3 Phz, 380V-415 V, 50 Hz					
		Machine Weight: 300 kGs.					
		Liquid line pipe diameter: Ø15.9 mm					
		Gas line pipe diameter: Ø28.6 mm/31.8mm					
		VRV INDOOR UNITS	Nos	1.00			
		Consultant Team-2					
		Celing Mounted Duct Type Units					
		Capacity: 8.0 TR					
		Nominal cooling capacity: 28.0 kW					
5		Nominal heating capacity: 31.5/30.8 kW					
		Refrigerant: R410A					
		Sound Level (H/L): 55/45 dBA					
		Air Flow Rate (H/L): 2825/2578 CFM					
		Power Supply: 1 Phz, 220-240V, 50 Hz					
		Liquid line pipe diameter: Ø 9.5 mm					
		Gas line pipe diameter: Ø 22.2 mm					
		VRV INDOOR UNITS	Nos	2.00			
		Consultant Team -3 + Inquiry/Bid Property					
		Ceiling Mounted Duct Type Units					
6		Capacity: 4.7 TR					
		Nominal cooling capacity: 16.0 kW					
		Nominal heating capacity: 18.0 kW					
		Refrigerant: R410A					
		Sound Level (HH/H/L): 46/45/43 dBA					
		Air Flow Rate (HH/H/L): 1624/1377/1130 CFM					
		Power Supply: 1 Phz, 220-240V, 50 Hz					
		Liquid line pipe diameter: Ø 9.5 mm					
		Gas line pipe diameter: Ø 15.9 mm					
		VRV OUTDOOR UNITS	Nos	1.00			
7		Capacity: 20 HP					
		Nominal cooling capacity: 56.0 kW					
		Nominal heating capacity: 63.0 kW					
		Numbers of Compressors: 2 Nos.					
		Hermetically Sealed Scoll Type Compressor					
		Refrigerant: R410A					
		Sound Level: 65 dBA					
		Power Supply: 3 Phz, 380V-415 V, 50 Hz					
		Liquid line pipe diameter: Ø15.9 mm					
		Gas line pipe diameter: Ø28.6 mm					
8		Supply, delivery Full Functions Wired/Corded Remote Controller which displays current airflow, swing, temperature, operating mode and timer settings.	Sets	6.00			
9		Supply & delivery factory made VRV Refrigerant Copper Branch Kits.	Sets	4.00			
10		Testing, commissioning of entire system with Additional refrigerant R410A	Lots	2.00			
11		Flushing entire system with dry Nitrogen.	Lots	2.00			
12		Vaccuming & Pressure testing of entire System.	Nos	2.00			
13		Lifting, shifting and placement of Indoor Units.	Nos	6.00			

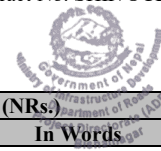


Bill of Quantities

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs.)		Amount
					In Figure	In Words	
13		Pre-Filters for Duct Units	Nos	6.00			
14		Loading, Unloading, Lifting and placement of Outdoor Units	Nos	2.00			
15		Supply, delivery and installation of VRV refrigerant copper pipes with hangers, rods and other accessories as per specifications of following sizes.					
i		Diameter: 9.6 mm	RM	41.00			
ii		Diameter: 12.7 mm	RM	12.00			
iii		Diameter: 15.9 mm	RM	49.00			
iv		Diameter: 19.1 mm	RM	0.00			
v		Diameter: 22.2 mm	RM	10.00			
vi		Diameter: 28.6 mm	RM	30.00			
16		Supply, delivery and installation of Nitrile insulation tube for refrigerant copper of 13 to 19 mm thickness as per specifications with accessories.					
i		Diameter: 9.6 mm	RM	41.00			
ii		Diameter: 12.7 mm	RM	12.00			
iii		Diameter: 15.9 mm	RM	49.00			
iv		Diameter: 19.1 mm	RM	0.00			
v		Diameter: 22.2 mm	RM	10.00			
vi		Diameter: 28.6 mm	RM	30.00			
17		Supply, installation, testing and commissioning of PPR drain pipes of 20 to 32 mm dia as required inclusive of all kinds of fittings and supports made of MS angle/rods as per specifications and drawings.	Lot	1.00			
18		Supply, delivery and installation of indoor to outdoor communication control and transmission cable with all necessary accessories with polythene conduit etc.	Lot	1.00			
19		Supply and installation of microprocessor corded remote wire with all necessary materials and conduit pipe of 16 mm and etc	Lot	1.00			
20		Supply and Installation of fresh air and exhaust air fans as per specifications and site conditions as following capacity and purposes					
i		Toilet Exhaust Inline Fans Capacity: 800 CFM Brands: Ostberg/Caryaire/Nicotra	Nos	1.00			
ii		Fresh Air Inline Fans Capacity: 600 CFM Brands: Ostberg/Caryaire/Nicotra	Nos	2.00			
21		Supply, installation testing and commissioning of Duct works					
i		<u>Ducting Work:</u> Ducting works with machine fabricated ready made and hand made GI sheet metal ducts for supply and return air complete with hangers and rods as per specification and site conditions. 0.65 mm 150 gms Zinc Coated	Sq.m.	65.00			
ii		<u>Insulation Work:</u> Thermal insulation of Nitrile Rubber Insulation sheet with 9 mm thickness and aluminium foil at one side as vapour barrier.	Sq.m.	50.00			
iii		<u>Accoustic Work:</u> Insulation for sound barrier inside supply air ducts.	Sq.m.	6.00			
22		Supply and installation of Canvas Connection between unit and duct.	Nos	6.00			
23		Supply and installation of Bird Screen protection net with GI made cowl connection.	Nos	3.00			
24		Supply and Installation of powder coated aluminium square diffusers and rectangular linear fixed bar type grills of following sizes and purposes.					
i		Supply Air Square Diffusers With VCD Size: (300 X 300) mm	Nos	16.00			
ii		Return Air Square Diffuser Without VCD Size: (300 X 300) mm	Nos	8.00			
iii		Linear Fixed Bar Grills for Exhaust Size: (200 X 200) mm	Nos	11.00			
25		VRV Outdoor base angle with red oxide coating.	Nos	2.00			
		FIRST FLOOR					
A.		Supply, installation, testing and commissioning of New Generation-Best in Class Heat Pump type VRV HVAC system inclusive with fully charged refrigerant (R-410A) inclusive of INVERTER COMPRESSOR, interconnecting power and control cables, individual wired/wireless remote controllers and supports made of MS angle/ rods as per specifications and drawings of following capacity:					
1		VRV INDOOR UNITS Conference Hall	Nos	1.00			
		Celing Mounted Duct Type Units					
		Capacity: 8.0 TR					
		Nominal cooling capacity: 28.0 kW					
		Nominal heating capacity: 31.5 kW					

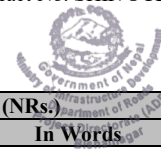
Bill of Quantities

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs)		Amount
					In Figure	In Words	
		Refrigerant: R410A					
		Sound Level (H/L): 55/47 dBA					
		Air Flow Rate (H/L): 2825/2578 CFM					
		Power Supply: 1 Phz, 220-240V, 50 Hz					
		Liquid line pipe diameter: Ø 9.5 mm					
		Gas line pipe diameter: Ø 22.2 mm					
2		VRV INDOOR UNITS	Nos	1.00			
		Meeting Room					
		Slim Ceiling Mounted Duct Type					
		Capacity: 2.0 TR					
		Nominal cooling capacity: 7.1 kW					
		Nominal heating capacity: 8.0 kW					
		Refrigerant: R410A					
		Sound Level (HH/H/L): 39/34/32 dBA					
		Air Flow Rate (HH/H/L): 583/512/459 CFM					
		Power Supply: 1 Phz, 220-240V, 50 Hz					
		Liquid line pipe diameter: Ø 6.4 mm					
		Gas line pipe diameter: Ø 12.7 mm					
3		VRV INDOOR UNITS	Nos	2.00			
		Consultant Team-4					
		Celing Mounted Duct Type Units					
		Capacity: 6.0 TR					
		Nominal cooling capacity: 22.4 kW					
		Nominal heating capacity: 25 kW					
		Refrigerant: R410A					
		Sound Level (H/L): 53/45 dBA					
		Air Flow Rate (H/L): 2295/2047 CFM					
		Power Supply: 1 Phz, 220-240V, 50 Hz					
		Liquid line pipe diameter: Ø 9.5 mm					
		Gas line pipe diameter: Ø 19.1 mm					
4		VRV INDOOR UNITS	Nos	2.00			
		Library					
		Ceiling Mounted Duct Type Units					
		Capacity: 4.7 TR					
		Nominal cooling capacity: 16.0 kW					
		Nominal heating capacity: 18.0 kW					
		Refrigerant: R410A					
		Sound Level (HH/H/L): 47/45/43 dBA					
		Air Flow Rate (HH/H/L): 1624/1377/1130 CFM					
		Power Supply: 1 Phz, 220-240V, 50 Hz					
		Liquid line pipe diameter: Ø 9.5 mm					
		Gas line pipe diameter: Ø 15.9 mm					
5		VRV INDOOR UNITS	Nos	1.00			
		Library/Previous Project Record					
		Ceiling Mounted Duct Type					
		Capacity: 4.0 TR					
		Nominal cooling capacity: 14.0 kW					
		Nominal heating capacity: 16.0 kW					
		Refrigerant: R410A					
		Sound Level (HH/H/L): 44/42/40 dBA					
		Air Flow Rate (HH/H/L): 1377/1165/988 CFM					
		Power Supply: 1 Phz, 220-240V, 50 Hz					
		Liquid line pipe diameter: Ø 9.5 mm					
		Gas line pipe diameter: Ø 15.9 mm					
6		VRV OUTDOOR UNITS	Nos	2.00			
		Capacity: 18 HP					
		Nominal cooling capacity: 50.0 kW					
		Nominal heating capacity: 56.0 kW					
		Numbers of Compressors: 2 Nos.					
		Hermetically Sealed Scoll Type Compressor					
		Refrigerant: R410A					
		Sound Level: 62/65 dBA					
		Power Supply: 3 Phz, 380V-415 V, 50 Hz					
		Liquid line pipe diameter: Ø15.9 mm					
		Gas line pipe diameter: Ø28.6 / 31.8mm					
7		Supply, delivery Full Functions Wired/Corded Remote Controller which displays current airflow, swing, temperature, operating mode and timer settings.	Sets	7.00			
8		Supply & delivery factory made VRV Refrigerant Copper Branch Kits.	Sets	6.00			



Bill of Quantities

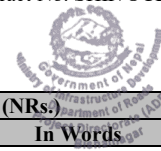
Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs.)		Amount
					In Figure	In Words	
9		Testing, commissioning of entire system with Additional refrigerant R410A	Lots	2.00			
10		Flushing entire system with dry Nitrogen .	Lots	2.00			
11		Vaccuming & Pressure testing of entire System.	Nos	2.00			
12		Lifting, shifting and placement of Indoor Units.	Nos	7.00			
13		Loading, Unloading, Lifting and placement of Outdoor Units	Nos	2.00			
14		Pre-Filters for Duct Units	Nos	7.00			
15		Supply, delivery and installation of VRV refrigerant copper pipes with hangers, rods and other accessories as per specifications of following sizes.					
i		Diameter: 9.6 mm	RM	44.00			
ii		Diameter: 12.7 mm	RM	10.00			
iii		Diameter: 15.9 mm	RM	17.00			
iv		Diameter: 19.1 mm	RM	47.00			
v		Diameter: 22.2 mm	RM	13.00			
vi		Diameter: 28.6 mm	RM	10.00			
vii		Diameter: 34.9 mm	RM	24.00			
viii		Diameter: 41.3 mm	RM	9.00			
16		Supply, delivery and installation of Nitrile insulation tube for refrigerant copper of 13 to 19 mm thickness as per specifications with accessories.					
i		Diameter: 9.6 mm	RM	44.00			
ii		Diameter: 12.7 mm	RM	10.00			
iii		Diameter: 15.9 mm	RM	17.00			
iv		Diameter: 19.1 mm	RM	47.00			
v		Diameter: 22.2 mm	RM	13.00			
vi		Diameter: 28.6 mm	RM	10.00			
vii		Diameter: 34.9 mm	RM	24.00			
viii		Diameter: 41.3 mm	RM	9.00			
17		Supply, installation, testing and commissioning of PPR drain pipes of 20 to 32 mm dia as required inclusive of all kinds of fittings and supports made of MS angle/rods as per specifications and drawings.	Lot	1.00			
18		Supply, delivery and installation of indoor to outdoor communication control and transmission cable with all necessary accessories with polythene conduit etc.	Lot	1.00			
19		Supply and installation of microprocessor corded remote wire with all necessary materials and conduit pipe of 16 mm and etc	Lot	1.00			
20		Supply and Installation of fresh air and exhaust air fans as per specifications and site conditions as following capacity and purposes					
i		Toilet Exhaust Inline Fans Capacity: 800 CFM Brands: Ostberg/Caryaire/Nicotra	Nos	1.00			
ii		Fresh Air Inline Fans Capacity: 500 CFM Brands: Ostberg/Caryaire/Nicotra	Nos	2.00			
ii		Fresh Air Inline Fans Capacity: 400 CFM Brands: Ostberg/Caryaire/Nicotra	Nos	2.00			
21		Supply, installation testing and commissioning of Duct works					
i		Ducting Work: Ducting works with machine fabricated ready made and hand made GI sheet metal ducts for supply and return air complete with hangers and rods as per specification and site conditions. 0.65 mm 150 gms Zinc Coated	Sq.m.	70.00			
ii		Insulation Work: Thermal insulation of Nitrile Rubber Insulation sheet with 9 mm thickness and aluminium foil at one side as vapour barrier.	Sq.m.	50.00			
iii		Accoustic Work: Insulation for sound barrier inside supply air ducts.	Sq.m.	14.00			
22		Supply and installation of Canvas Connection between unit and duct.	Nos	7.00			
23		Supply and installation of Bird Screen protection net with GI made cowl connection.	Nos	5.00			
24		Supply and Installation of powder coated aluminium square diffusers and rectangular linear fixed bar type grills of following sizes and purposes.					
i		Supply Air Square Diffusers With VCD Size: (300 X 300) mm	Nos	18.00			
ii		Return Air Square Diffuser Without VCD Size: (300 X 300) mm	Nos	8.00			
iii		Linear Fixed Bar Grills for Exhaust Size: (200 X 200) mm	Nos	11.00			
iv		Return Com Hatch Grill (conference, meeting, Library/Record Room) Size: (900 X 450) mm	Nos	3.00			



Bill of Quantities

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs)		Amount
					In Figure	In Words	
25		VRV Outdoor base angle with red oxide coating.	Nos	2.00			
		SECOND FLOOR					
A.		Supply, installaton, testing and commissioning of New Generation-Best in Class Heat Pump type VRV HVAC system inculsive with fully charged refrigerant (R-410A) inclusive of INVERTER COMPRESSOR, interconnecting power and control cables, individual wired/wireless remote controllers and supports made of MS angle/ rods as per specifications and drawings of following capacity:					
1		VRV INDOOR UNITS Chief Accountant Rooms	Nos	2.00			
		Ceiling Mounted Duct Type Units					
		Capacity: 3.0 TR					
		Nominal cooling capacity: 11.2 kW					
		Nominal heating capacity: 12.5 kW					
		Refrigerant: R410A					
		Sound Level (HH/H/L): 43/41/39 dBA					
		Air Flow Rate (HH/H/L): 1130/953/812 CFM					
		Power Supply: 1 Phz, 220-240V, 50 Hz					
		Liquid line pipe diameter: Ø 9.5 mm					
		Gas line pipe diameter: Ø 15.9 mm					
2		VRV INDOOR UNITS Auditor's Room	Nos	1.00			
		Ceiling Mounted Duct Type					
		Capacity: 2.5 TR					
		Nominal cooling capacity: 9.0 kW					
		Nominal heating capacity: 10.0 kW					
		Refrigerant: R410A					
		Sound Level (HH/H/L): 43/41/39 dBA (47/45/43 dBA)					
		Air Flow Rate (HH/H/L): 883/794/706 CFM					
		Power Supply: 1 Phz, 220-240V, 50 Hz					
		Liquid line pipe diameter: Ø 9.5 mm					
		Gas line pipe diameter: Ø 15.9 mm					
3		VRV INDOOR UNITS Work Station Account	Nos	1.00			
		Ceiling Mounted Duct Type					
		Capacity: 4.0 TR					
		Nominal cooling capacity: 14.0 kW					
		Nominal heating capacity: 16.0 kW					
		Refrigerant: R410A					
		Sound Level (HH/H/L):44/42/40 dBA					
		Air Flow Rate (HH/H/L): 1377/1165/988 CFM					
		Power Supply: 1 Phz, 220-240V, 50 Hz					
		Liquid line pipe diameter: Ø 9.5 mm					
		Gas line pipe diameter: Ø 15.9 mm					
4		VRV INDOOR UNITS Store Keeper	Nos	1.00			
		Slim Ceiling Mounted Duct Type					
		Capacity: 2.0 TR					
		Nominal cooling capacity: 7.1 kW					
		Nominal heating capacity: 8.0 kW					
		Refrigerant: R410A					
		Sound Level (HH/H/L): 36/34/32 (or 39/34/30) dBA					
		Air Flow Rate (HH/H/L): 583/512/459 CFM					
		Power Supply: 1 Phz, 220-240V, 50 Hz					
		Liquid line pipe diameter: Ø 6.4 mm					
		Gas line pipe diameter: Ø 12.7 mm					
5		VRV OUTDOOR UNITS	Nos	1.00			
		Capacity: 16 HP					
		Nominal cooling capacity: 45.0 kW					
		Nominal heating capacity: 50.0 kW					
		Numbers of Compressors: 2 Nos.					
		Hermetically Sealed Scoll Type Compressor					
		Refrigerant: R410A					
		Sound Level: 61 dBA					
		Power Supply: 3 Phz, 380V-415 V, 50 Hz					
		Machine Weight: 285 kGs.					
		Liquid line pipe diameter: Ø12.7 mm					
		Gas line pipe diameter: Ø28.6 mm					

Chudaraj Dhakal
Project Director



Bill of Quantities

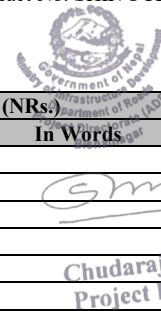
Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs)		Amount
					In Figure	In Words	
7		Supply, delivery Full Functions Wired/Corded Remote Controller which displays current airflow, swing, temperature, operating mode and timer settings.	Sets	5.00			
8		Supply & delivery factory made VRV Refrigerant Copper Branch Kits .	Sets	4.00			
9		Testing, commissioning of entire system with Additional refrigerant R410A	Lots	1.00			
10		Flushing entire system with dry Nitrogen .	Lots	1.00			
11		Vaccumming & Pressure testing of entire System.	Nos	1.00			
12		Lifting, shifting and placement of Indoor Units.	Nos	5.00			
13		Loading, Unloading, Lifting and placement of Outdoor Units	Nos	1.00			
14		Pre-Filters for Duct Units	Nos	5.00			
15		Supply, delivery and installation of VRV refrigerant copper pipes with hangers, rods and other accessories as per specifications of following sizes.					
i		Diameter: 6.4 mm	RM	15.00			
ii		Diameter: 9.6 mm	RM	32.00			
iii		Diameter: 12.7 mm	RM	25.00			
iv		Diameter: 15.9 mm	RM	17.00			
vi		Diameter: 22.2 mm	RM	15.00			
vii		Diameter: 28.6 mm	RM	10.00			
16		Supply, delivery and installation of Nitrile insulation tube for refrigerant copper of 13 to 19 mm thickness as per specifications with accessories.					
i		Diameter: 6.4 mm	RM	15.00			
ii		Diameter: 9.6 mm	RM	32.00			
iii		Diameter: 12.7 mm	RM	25.00			
iv		Diameter: 15.9 mm	RM	17.00			
vi		Diameter: 22.2 mm	RM	15.00			
vii		Diameter: 28.6 mm	RM	10.00			
17		Supply, installation, testing and commissioning of PPR drain pipes of 20 to 32 mm dia as required inclusive of all kinds of fittings and supports made of MS angle/rods as per specifications and drawings.	Lot	1.00			
18		Supply, delivery and installation of indoor to outdoor communication control and transmission cable with all necessary accessories with polythene conduit etc.	Lot	1.00			
19		Supply and installation of microprocessor corded remote wire with all necessary materials and conduit pipe of 16 mm and etc	Lot	1.00			
20		Supply and Installation of fresh air and exhaust air fans as per specifications and site conditions as following capacity and purposes					
i		Toilet Exhaust Inline Fans Capacity: 800 CFM Brands: Ostberg/Caryaire/Nicotra	Nos	1.00			
ii		Fresh Air Inline Fans Capacity: 800 CFM Brands: Ostberg/Caryaire/Nicotra	Nos	1.00			
21		Supply, installation testing and commissioning of Duct works					
i		<u>Ducting Work:</u> Ducting works with machine fabricated ready made and hand made GI sheet metal ducts for supply and return air complete with hangers and rods as per specification and site conditions. 0.65 mm 150 gms Zinc Coated Hulas Brand	Sq.m.	40.00			
ii		<u>Insulation Work:</u> Thermal insulation of Nitrile Rubber Insulation sheet with 9 mm thickness and aluminium foil at one side as vapour barrier.	Sq.m.	30.00			
iii		<u>Acoustic Work:</u> Insulation for sound barrier inside supply air ducts.	Sq.m.	5.00			
22		Supply and installation of Canvas Connection between unit and duct.	Nos	5.00			
23		Supply and installation of Bird Screen protection net with GI made cowl connection.	Nos	2.00			
24		Supply and Installation of powder coated aluminium square diffusers and rectangular linear fixed bar type grills of following sizes and purposes.					
i		Supply Air Square Diffusers With VCD Size: (300 X 300) mm	Nos	4.00			
ii		Return Air Square Diffuser Without VCD Size: (300 X 300) mm	Nos	2.00			
iii		Linear Fixed Bar Grills for Exhaust Size: (200 X 200) mm	Nos	11.00			
iv		Return Com Hatch Grill (conference, meeting, Library/Record Room) Size: (900 X 450) mm	Nos	4.00			
25		VRV Outdoor base angle with red oxide coating.	Nos	1.00			
		THIRD FLOOR		0.00			



Bill of Quantities

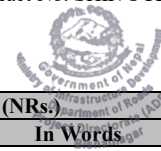
Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs)		Amount
					In Figure	In Words	
A.		Supply, installaton, testing and commissioning of New Generation-Best in Class Heat Pump type VRV HVAC system inclusive with fully charged refrigerant (R-410A) inclusive of INVERTER COMPRESSOR, interconnecting power and control cables, individual wired/wireless remote controllers and supports made of MS angle/ rods as per specifications and drawings of following capacity:					
1		VRV INDOOR UNITS Meeting Room Ceiling Mounted Duct Type Capacity: 4.0 TR Nominal cooling capacity: 14.0 kW Nominal heating capacity: 16.0 kW Refrigerant: R410A Sound Level (HH/H/L):44/42/40 dBA Air Flow Rate (HH/H/L): 1377/1165/988 CFM Power Supply: 1 Phz, 220-240V, 50 Hz Liquid line pipe diameter: Ø 9.5 mm Gas line pipe diameter: Ø 15.9 mm	Nos	1.00			
2		VRV INDOOR UNITS Personal Assitant/Waiting Room Ceiling Mounted Duct Type Units Capacity: 3.0 TR Nominal cooling capacity: 11.2 kW Nominal heating capacity: 12.5 kW Refrigerant: R410A Sound Level (HH/H/L): 43/41/39 dBA Air Flow Rate (HH/H/L): 1130/953/812 CFM Power Supply: 1 Phz, 220-240V, 50 Hz Liquid line pipe diameter: Ø 9.5 mm Gas line pipe diameter: Ø 15.9 mm	Nos	1.00			
3		VRV INDOOR UNITS PD ROOM Ceiling Mounted Duct Type Capacity: 4.0 TR Nominal cooling capacity: 14.0 kW Nominal heating capacity: 16.0 kW Refrigerant: R410A Sound Level (HH/H/L):44/42/40 dBA Air Flow Rate (HH/H/L): 1377/1165/988 CFM Power Supply: 1 Phz, 220-240V, 50 Hz Liquid line pipe diameter: Ø 9.5 mm Gas line pipe diameter: Ø 15.9 mm	Nos	1.00			
4		VRV OUTDOOR UNITS Capacity: 12 HP Nominal cooling capacity: 33.5 kW Nominal heating capacity: 37.5 kW Numbers of Compressors: 1 Nos. Hermetically Sealed Scoll Type Compressor Refrigerant: R410A Sound Level: 59 dBA Power Supply: 3 Phz, 380V-415 V, 50 Hz Liquid line pipe diameter: Ø12.7 mm Gas line pipe diameter: Ø28.6 mm	Nos	1.00			
5		VRV INDOOR UNITS Admistratives Ceiling Mounted Duct Type Units Capacity: 4.7 TR Nominal cooling capacity: 16.0 kW Nominal heating capacity: 18.0 kW Refrigerant: R410A Sound Level (HH/H/L): 46/45/43 dBA Air Flow Rate (HH/H/L): 1624/1377/1130 CFM Power Supply: 1 Phz, 220-240V, 50 Hz Liquid line pipe diameter: Ø 9.5 mm Gas line pipe diameter: Ø 15.9 mm	Nos	1.00			
6		VRV INDOOR UNITS Deputy PD4, PD3, PD 1 Slim Ceiling Mounted Duct Type Capacity: 2.0 TR Nominal cooling capacity: 7.1 kW Nominal heating capacity: 8.0 kW	Nos	3.00			

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Project Director



Bill of Quantities

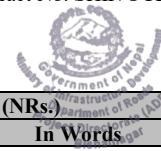
Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs.)		Amount
					In Figure	In Words	
		Refrigerant: R410A					
		Sound Level (HH/H/L): 36/34/32 dBA (or 39/34/30)					
		Air Flow Rate (HH/H/L): 583/512/459 CFM					
		Power Supply: 1 Phz, 220-240V, 50 Hz					
		Liquid line pipe diameter: Ø 6.4 mm					
		Gas line pipe diameter: Ø 12.7 mm					
7		VRV INDOOR UNITS	Nos	1.00			
		Deputy PD2					
		Ceiling Mounted Duct Type Units					
		Capacity: 3.0 TR					
		Nominal cooling capacity: 11.2 kW					
		Nominal heating capacity: 12.5 kW					
		Refrigerant: R410A					
		Sound Level (HH/H/L): 43/41/39 dBA					
		Air Flow Rate (HH/H/L): 1130/953/812 CFM					
		Power Supply: 1 Phz, 220-240V, 50 Hz					
		Liquid line pipe diameter: Ø 9.5 mm					
		Gas line pipe diameter: Ø 15.9 mm					
8		VRV OUTDOOR UNITS	Nos	1.00			
		Capacity: 14 HP					
		Nominal cooling capacity: 40.0 kW					
		Nominal heating capacity: 45.0 kW					
		Numbers of Compressors: 2 Nos.					
		Hermetically Sealed Scroll Type Compressor					
		Refrigerant: R410A					
		Sound Level: 60 dBA					
		Power Supply: 3 Phz, 380V-415 V, 50 Hz					
		Machine Weight: 285 kGs.					
		Liquid line pipe diameter: Ø12.7 mm					
		Gas line pipe diameter: Ø28.6 mm					
9		Supply, delivery Full Functions Wired/Corded Remote Controller which displays current airflow, swing, temperature, operating mode and timer settings.	Sets	8.00			
10		Supply & delivery factory made VRV Refrigerant Copper Branch Kits.	Sets	6.00			
11		Testing, commissioning of entire system with Additional refrigerant R410A	Lots	2.00			
12		Flushing entire system with dry Nitrogen.	Lots	2.00			
13		Vacuuming & Pressure testing of entire System.	Nos	2.00			
14		Lifting, shifting and placement of Indoor Units.	Nos	8.00			
15		Loading, Unloading, Lifting and placement of Outdoor Units	Nos	1.00			
16		Pre-Filters for Duct Units	Nos	8.00			
17		Supply, delivery and installation of VRV refrigerant copper pipes with hangers, rods and other accessories as per specifications of following sizes.					
	i	Diameter: 6.4 mm	RM	16.00			
	ii	Diameter: 9.6 mm	RM	41.00			
	iii	Diameter: 12.7 mm	RM	33.00			
	iv	Diameter: 15.9 mm	RM	30.00			
	v	Diameter: 19.1 mm	RM	5.00			
	vi	Diameter: 22.2 mm	RM	6.00			
	vii	Diameter: 28.6 mm	RM	17.00			
18		Supply, delivery and installation of Nitrile insulation tube for refrigerant copper of 13 to 19 mm thickness as per specifications with accessories.					
	i	Diameter: 6.4 mm	RM	16.00			
	ii	Diameter: 9.6 mm	RM	41.00			
	iii	Diameter: 12.7 mm	RM	33.00			
	iv	Diameter: 15.9 mm	RM	30.00			
	v	Diameter: 19.1 mm	RM	5.00			
	vi	Diameter: 22.2 mm	RM	6.00			
	vii	Diameter: 28.6 mm	RM	17.00			
19		Supply, installation, testing and commissioning of PPR drain pipes of 20 to 32 mm dia as required inclusive of all kinds of fittings and supports made of MS angle/rods as per specifications and drawings.	Lot	1.00			
20		Supply, delivery and installation of indoor to outdoor communication control and transmission cable with all necessary accessories with polythene conduit etc.	Lot	1.00			
21		Supply and installation of microprocessor corded remote wire with all necessary materials and conduit pipe of 16 mm and etc	Lot	1.00			
22		Supply and Installation of fresh air and exhaust air fans as per specifications and site conditions as following capacity and purposes					



Bill of Quantities

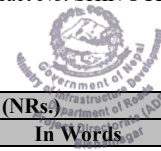
Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs)		Amount
					In Figure	In Words	
i		Exhaust Inline Fans (L+G+Janitor Room) Capacity: 200 CFM Brands: Ostberg/Caryaire/Nicotra	Nos	1.00			
ii		Toilet Exhaust Fans Capacity: 125 CFM Brands: Ostberg/Caryaire/Nicotra	Nos	5.00			
iii		Fresh Air Inline Fans Capacity: 500 CFM Brands: Ostberg/Caryaire/Nicotra	Nos	1.00			
iv		Fresh Air Inline Fans Capacity: 400 CFM Brands: Ostberg/Caryaire/Nicotra	Nos	2.00			
23		Supply, installation testing and commissioning of Duct works					
i		<u>Ducting Work:</u> Ducting works with machine fabricated ready made and hand made GI sheet metal ducts for supply and return air complete with hangers and rods as per specification and site conditions. 0.65 mm 150 gms Zinc Coated Hulas Brand	Sq.m.	55.00			
ii		<u>Insulation Work:</u> Thermal insulation of Nitrile Rubber Insulation sheet with 9 mm thickness and aluminium foil at one side as vapour barrier.	Sq.m.	50.00			
iii		<u>Acoustic Work:</u> Insulation for sound barrier inside supply air ducts.	Sq.m.	8.00			
24		Supply and installation of Canvas Connection between unit and duct.	Nos	8.00			
25		Supply and installation of Bird Screen protection net with GI made cowl connection.	Nos	9.00			
26		Supply and Installation of powder coated aluminium square diffusers and rectangular linear fixed bar type grills of following sizes and purposes.					
i		Supply Air Square Diffusers With VCD Size: (300 X 300) mm	Nos	11.00			
ii		Return Air Square Diffuser Without VCD Size: (300 X 300) mm	Nos	1.00			
iii		Linear Fixed Bar Grills for Exhaust Size: (200 X 200) mm	Nos	10.00			
iv		Return Com Hatch Grill (conference, meeting, Library/Record Room) Size: (900 X 450) mm	Nos	8.00			
27		VRV Outdoor base angle with red oxide coating.	Nos	2.00			
		FOURTH FLOOR					
A.		Supply, installation, testing and commissioning of New Generation-Best in Class Heat Pump type VRV HVAC system inclusive with fully charged refrigerant (R-410A) inclusive of INVERTER COMPRESSOR, interconnecting power and control cables, individual wired/wireless remote controllers and supports made of MS angle/ rods as per specifications and drawings of following capacity:					
1		VRV INDOOR UNITS Engineer's Room 3 Ceiling Mounted Duct Type Capacity: 2.5 TR Nominal cooling capacity: 9.0 kW Nominal heating capacity: 10.0 kW Refrigerant: R410A Sound Level (HH/H/L): 43/41/39 dBA (or 47/45/43 dBA) Air Flow Rate (HH/H/L): 883/794/706 CFM Power Supply: 1 Phz, 220-240V, 50 Hz Liquid line pipe diameter: Ø 9.5 mm Gas line pipe diameter: Ø 15.9 mm	Nos	1.00			
2		VRV INDOOR UNITS Engineer's Room 1 and 2 Slim Ceiling Mounted Duct Type Capacity: 2.0 TR Nominal cooling capacity: 7.1 kW Nominal heating capacity: 8.0 kW Refrigerant: R410A Sound Level (HH/H/L): 36/34/32 dBA (or 39/34/30) Air Flow Rate (HH/H/L): 583/512/459 CFM Power Supply: 1 Phz, 220-240V, 50 Hz Liquid line pipe diameter: Ø 6.4 mm Gas line pipe diameter: Ø 12.7 mm	Nos	2.00			
3		VRV INDOOR UNITS Work Stations Celing Mounted Duct Type Units Capacity: 6.0 TR	Nos	1.00			

Bill of Quantities



Chudaraj Dinkal
Project Director

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs)		Amount
					In Figure	In Words	
		Nominal cooling capacity: 22.4 kW					
		Nominal heating capacity: 25 kW					
		Refrigerant: R410A					
		Sound Level (H/L): 47/45 dBA (53/45 dBA)					
		Air Flow Rate (H/L): 2295/2047 CFM					
		Power Supply: 1 Phz, 220-240V, 50 Hz					
		Liquid line pipe diameter: Ø 9.5 mm					
		Gas line pipe diameter: Ø 19.1 mm					
4		VRV OUTDOOR UNITS	Nos	1.00			
		Capacity: 16 HP					
		Nominal cooling capacity: 45.0 kW					
		Nominal heating capacity: 50.0 kW					
		Numbers of Compressors: 2 Nos.					
		Hermetically Sealed Scroll Type Compressor					
		Refrigerant: R410A					
		Sound Level: 61 dBA					
		Power Supply: 3 Phz, 380V-415 V, 50 Hz					
		Liquid line pipe diameter: Ø12.7 mm					
		Gas line pipe diameter: Ø28.6 mm					
5		Supply, delivery Full Functions Wired/Corded Remote Controller which displays current airflow, swing, temperature, operating mode and timer settings.	Sets	4.00			
6		Supply & delivery factory made VRV Refrigerant Copper	Sets	3.00			
7		Testing, commissioning of entire system with Additional refrigerant R410A	Lots	1.00			
8		Flushing entire system with dry Nitrogen .	Lots	1.00			
9		Vacuuming & Pressure testing of entire System.	Nos	1.00			
10		Lifting, shifting and placement of Indoor Units.	Nos	4.00			
11		Loading, Unloading, Lifting and placement of Outdoor Units	Nos	1.00			
12		Pre-Filters for Duct Units	Nos	4.00			
13		Supply, delivery and installation of VRV refrigerant copper pipes with hangers, rods and other accessories as per specifications of following sizes.					
i		Diameter: 6.4 mm	RM	8.00			
ii		Diameter: 9.6 mm	RM	25.00			
iii		Diameter: 12.7 mm	RM	11.00			
iv		Diameter: 15.9 mm	RM	12.00			
v		Diameter: 19.1 mm	RM	23.00			
vii		Diameter: 28.6 mm	RM	3.00			
viii		Diameter: 34.9 mm	RM	7.00			
14		Supply, delivery and installation of Nitrile insulation tube for refrigerant copper of 13 to 19 mm thickness as per specifications with accessories.					
i		Diameter: 6.4 mm	RM	8.00			
ii		Diameter: 9.6 mm	RM	25.00			
iii		Diameter: 12.7 mm	RM	11.00			
iv		Diameter: 15.9 mm	RM	12.00			
v		Diameter: 19.1 mm	RM	23.00			
vii		Diameter: 28.6 mm	RM	3.00			
viii		Diameter: 34.9 mm	RM	7.00			
15		Supply, installation, testing and commissioning of PPR drain pipes of 20 to 32 mm dia as required inclusive of all kinds of fittings and supports made of MS angle/rods as per specifications and drawings.	Lot	1.00			
16		Supply, delivery and installation of indoor to outdoor communication control and transmission cable with all necessary accessories with polythene conduit etc.	Lot	1.00			
17		Supply and installation of microprocessor corded remote wire with all necessary materials and conduit pipe of 16 mm and etc	Lot	1.00			
18		Supply and Installation of fresh air and exhaust air fans as per specifications and site conditions as following capacity and purposes					
i		Exhaust Inline Fans (L+G+Janitor Room) Capacity: 200 CFM Brands: Ostberg/Caryaire/Nicotra	Nos	1.00			
ii		Toilet Exhaust Fans Capacity: 125 CFM Brands: Ostberg/Caryaire/Nicotra	Nos	3.00			
iii		Fresh Air Inline Fans Capacity: 400 CFM Brands: Ostberg/Caryaire/Nicotra	Nos	1.00			



Bill of Quantities

Item No	Spec. Cl.	Description of Works	Unit	Quantity	Rate (NRs)		Amount
					In Figure	In Words	
iv		Fresh Air Inline Fans Capacity: 300 CFM Brands: Ostberg/Caryaire/Nicotra	Nos	1.00			
19		Supply, installation testing and commissioning of Duct works					
i		Ducting Work: Ducting works with machine fabricated ready made and hand made GI sheet metal ducts for supply and return air complete with hangers and rods as per specification and site conditions. 0.65 mm 150 gms Zinc Coated	Sq.m.	30.00			
ii		Insulation Work: Thermal insulation of Nitrile Rubber Insulation sheet with 9 mm thickness and aluminium foil at one side as vapour barrier.	Sq.m.	20.00			
iii		Acoustic Work: Insulation for sound barrier inside supply air ducts.	Sq.m.	4.00			
20		Supply and installation of Canvas Connection between unit and duct.	Nos	8.00			
21		Supply and installation of Bird Screen protection net with GI made cowl connection.	Nos	6.00			
22		Supply and Installation of powder coated aluminium square diffusers and rectangular linear fixed bar type grills of following sizes and purposes.					
i		Supply Air Square Diffusers With VCD Size: (300 X 300) mm	Nos	4.00			
ii		Return Air Square Diffuser Without VCD Size: (300 X 300) mm	Nos	2.00			
iii		Linear Fixed Bar Grills for Exhaust Size: (200 X 200) mm	Nos	7.00			
iv		Return Com Hatch Grill (conference, meeting, Library/Record Room) Size: (900 X 450) mm	Nos	3.00			
23		VRV Outdoor base angle with red oxide coating.	Nos	1.00			
O		MISCELLANEOUS WORKS					
		Supply,delivery and installation of Water Pump Automation Device for pumps including laying of calbe through UPVC/HDEP conduit with all necessary work as per drawing, specification and instruction all complete.					
18.1		Water Pump Automation Device for General Pumps	nos.	2.00			
18.2		4 core x 1.5sqmm Cu, AR, flexible cable for control signal through Conduit in main trench	rm	150.00			
		Total of Part F					
		Total From (Part A to F)					
		VAT (13%)					
		Grand Total					



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Project Director

Section 5 - Eligible Countries

This Section contains the list of eligible countries.

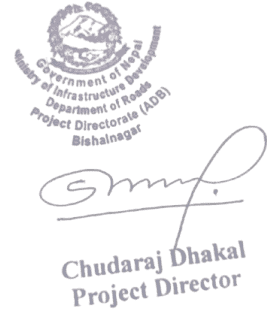
Regional Members

1.	AFG	Afghanistan	26.	MON	Mongolia
2.	ARM	Armenia	27.	MYA	Myanmar
3.	AUS	Australia	28.	NAU	Nauru
4.	AZE	Azerbaijan	29.	NEP	Nepal
5.	BAN	Bangladesh	30.	NZL	New Zealand
6.	BHU	Bhutan	31.	NU	Niue
7.	BRU	Brunei Darussalam	32.	PAK	Pakistan
8.	CAM	Cambodia	33.	PAL	Palau
9.	PRC	China, People's Republic of	34.	PNG	Papua New Guinea
10.	COO	Cook Islands	35.	PHI	Philippines
11.	FIJ	Fiji	36.	SAM	Samoa
12.	GEO	Georgia	37.	SIN	Singapore
13.	HKG	Hong Kong, China	38.	SOL	Solomon Islands
14.	IND	India	39.	SRI	Sri Lanka
15.	INO	Indonesia	40.	TAP	Taipei, China
16.	JPN	Japan	41.	TAJ	Tajikistan
17.	KAZ	Kazakhstan	42.	THA	Thailand
18.	KIR	Kiribati	43.	TIM	Timor-Leste
19.	KOR	Korea, Republic of	44.	TON	Tonga
20.	KGZ	Kyrgyz Republic	45.	TKM	Turkmenistan
21.	LAO	Lao PDR	46.	TUV	Tuvalu
22.	MAL	Malaysia	47.	UZB	Uzbekistan
23.	MLD	Maldives	48.	VAN	Vanuatu
24.	RMI	Marshall Islands	49.	VIE	Viet Nam
25.	FSM	Micronesia, Federated States of			

Non-regional Members

1.	AUT	Austria	11.	NET	The Netherlands
2.	BEL	Belgium	12.	NOR	Norway
3.	CA	Canada	13.	POR	Portugal
4.	DEN	Denmark	14.	SPA	Spain
5.	FIN	Finland	15.	SWE	Sweden
6.	FRA	France	16.	SWI	Switzerland
7.	GER	Germany	17.	TUR	Turkey
8.	IRE	Ireland	18.	UKG	United Kingdom
9.	ITA	Italy	19.	USA	United States
10.	LUX	Luxembourg			

**Government of Nepal
Ministry of Infrastructure Development
Department of Roads
Project Directorate (ADB)
Bishalnagar, Kathmandu,**



**SASEC Highway Improvement Project (SHIP)
(ADB Loan No. 3722-NEP)**

**Construction of Project Directorate Office Building with necessary accessories (Completion of
Remaining Works) at Bishalnagar, Kathmandu**

Contract No: SHIP/OCB/BLDPDADB/02

Bidding Document

Part II Employer's Requirement

Section 6A Summary of Description of Works
Section 6B Standard Specifications
Section 6C Special Provisions to Standard Specifications
Section 6D Drawings (In Separate Volume)
Section 6E Personnel Requirements Section
6F Equipment Requirements

August, 2026

Table of Contents - Summary Description



Chidaraj Dhakal
Project Director

PART I BIDDING PROCEDURES

Section 1 - Instructions to Bidders (ITB)-----1-1

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.

Section 2 - Bid Data Sheet (BDS) -----2-1

This Section consists of provisions that are specific to each procurement and supplement the information or requirements included in Section 1 - Instructions to Bidders.

Section 3 - Evaluation and Qualification Criteria (EQC)3-1

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

Section 4 – Bidding Forms (BDF) -----4-1

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

Section 5 – Eligible Countries (ELC) -----5-1

This Section contains the list of eligible countries.

PART II EMPLOYERS Requirements

Section 6 - Employer's Requirements (ERQ) ----- 6-1

This Section contains the Specifications, Drawings, and Supplementary Information that describe the Works to be procured, Personnel Requirements, and Equipment Requirements.

Section 6A – Summary of Description of Works

This Section contains the summary list of main works to be executed under the contract. Specification, Special provisions and, the Drawings, that describe the Works to be procured.

Section 6B – Standard Specifications

This document has been issued under the authority of the Government of Nepal, Ministry of Urban Development, Department of Urban Development and Building construction Singha Durbar, Kathmandu & Government of Nepal, Ministry of Physical Planning and Works, Department of Roads (July 2001), it can be purchased from the Central Road Laboratory, Kupondole, Lalitpur.

Section 6C – Special Provisions

This section contains amendments, supplements, etc. to the standard specifications to suit the specific requirements of the project.

Section 6D – Drawings

The drawings are presented in a separate volume.

Section 6E – Personnel Requirements

This section provides the information on Personnel Requirements.

Section 6F – Equipment Requirements

This section provides the information on Equipment Requirements.

PART III CONDITIONS OF CONTRACT AND CONTRACT FORMS

Section 7 - General Conditions of Contract (GCC) ----- 7-1

This Section contains the general clauses that govern the Contract. These General Conditions shall be the Conditions of Contract for Construction, Multilateral Development Bank Harmonized Edition, prepared by the Fédération Internationale des Ingénieurs- Conseil (FIDIC June 2010 MDB version). These Conditions are subject to the variations and additions set out in Section 8 (Particular Conditions of Contract).

Section 8 - Particular Conditions of Contract (PCC) ---- 8-1

This Section contains provisions which are specific to each contract and which modify or supplement the GCC. Whenever there is a conflict, the provisions herein shall prevail over those in the GCC.

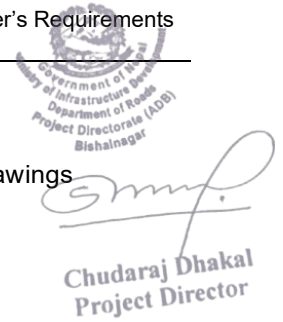
Section 9 – Contract Forms (COF) ----- 9-1

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



Chudaraj Dhakal
Project Director

FOR WEBSITE



Part II - Employers Requirements

This Section contains the Summary of Description of Works, Specifications and Drawings that describe the Works to be procured.

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Section 6A: Summary of Description of Works

The government Nepal, Department of Road intends to demolish old existing building at Bishalnagar, Kathmandu and construction of new earthquake resistant building with underground parking facility. The building plans and other important drawings for the project have been included as Section 6 D and provided in separate volume.

The estimated quantities of individual work items are contained in the Bill of Quantities. Description of works, materials, and workmanship, methods of testing and requirement and criteria for acceptance of Works etc. are detailed in the Standard Specifications and Special Provisions to the Standard Specifications in Sections 6B and 6C respectively.

The Summary Description of the main works, however, is as follows:

- i) Dismantling of old existing masonry Building, clearing site and disposal of debris.
- ii) Earth work excavation for foundation, dewatering, back filling in standard procedures.
- iii) Construction of temporary facilities and false works for the support of other structural works.
- iv) Structural works of building, Reinforced Cement Concrete (RCC), Plain Cement Concrete (PCC), Brick Masonry, plasters, flooring and other related works as per bill of quantities.
- v) Construction of boundary wall along with metal fence
- vi) Landscaping and drainage management,
- vii) Electrical works for building



Section 6B: Standard Specifications

Standard Specifications for this contract shall be the latest released version of Standard specifications for Building works issued under Government of Nepal, Ministry of Urban Development, Department of Urban Development and Building Construction (DUDBC), and in addition to this “Standard Specifications for Road and Bridge Works” issued under the authority of the Government of Nepal, Ministry of Physical Planning and Works, Department of Roads (Ashad, 2073 /July, 2016) can be used for the items if any excluded in the specification published by (DUDBC)

The Standard Specifications may be purchased from the Department of Urban Development and Building Construction (DUDBC), Singhadurbar, Kathmandu, Nepal and Departments of Roads, Central Road Laboratory, Kupondole, Lalitpur.

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Section 6C: Special Provisions to the Standard Specifications

The Standard Specifications for Building construction works issued under Government of Nepal, Ministry of Urban Development, Department of Urban Development and Building Construction (DUDBC) and Standard Specifications for Road and Bridge Works issued by the Government of Nepal, Ministry of Physical Infrastructure and Transport, Department of Roads together with these Special Provisions shall be used to specify the construction of the Works.

The Special Provisions contained herein shall be read in conjunction with the Standard Specifications and shall supplement, replace or supersede the Standard Specifications as appropriate. Where there is any ambiguity or discrepancy between the Standard Specifications and the Special Provisions; the Special Provisions shall have preference and shall govern.

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6C-A: Special Provision to the Standard Specifications for Building Construction (Civil) Works

1. General

The Work shall be carried out according to these Specifications whether specifically mentioned elsewhere or not. No extra in any form will be paid unless it is definitely stated as an item in the Bill of Quantities.

Whenever the Specifications are not given or when the Specifications are ambiguous, the relevant Nepal Standards or Indian Standards and further amendments will be considered as final and binding.

All Works shall be carried out simultaneously with electrical, plumbing, sanitary and other services and in co-operation with the Contractors of the above services. The Work shall be carried on till it is completed satisfactorily along with the completion of other essential services. The building Contractor shall keep the other Contractors informed of the proposed program of Work, well in advance, so that the building Work is not hindered. The Contractor shall further cooperate with other Contractors in respect of any facility required by them e.g. making holes in shuttering for sanitary, pipes, electric conduits, fan hook etc. However, no extra payment shall be admissible for such reasonable assistance and facilities afforded to other Contractors and the building Contractors shall be deemed to have taken these factors into consideration while quoting the rates.

The Work shall be related to the drawings which the Contractor is presumed to have studied. Nothing extra will be paid for any item because of its shape, location or other difficult circumstances, even if the schedule makes no distinction, as long as the item is shown in the drawings.

The sources of materials stated in the Specifications are those from which materials are generally available. However, materials not conforming to Specifications shall be rejected even if they come from the approved sources. The source of the material to be confirmed by the consultant after confirming the test results of those materials on their physical and chemical properties. The Contractor should satisfy himself that sufficient quantity of materials of acceptable Specification is available from the stated or other sources.

The works shall be carried out with approved plan of the health and safety measures in relation to COVID-19 prevention and controls, including but not limited to, PPE requirements, site set up, training, induction and mobilization of new personnel, equipment and plants cleaning and other hazard management measures while undertaking site work activities, site visitors health and safety protocols, as well as the approach to the monitoring and reporting of the Plan. The Plan should be fit for purpose for the particular construction works of this contract and be aligned with "Special Operating Procedure (SOP) for COVID-19 Risk Management at Workplaces" as attached under Section 6 - Employer's Requirement.

The requirements of Specifications shall be fulfilled by the Contractor without extra charges i.e. the item rates quoted shall be deemed to have taken these Specifications into account.

These are requirements the Contractor shall fulfill after the issue of Letter of Acceptance but before the Date of Commencement.

1.1 Definitions

General:

- **Acceptable/Approved (Approval)** - Acceptable to/approved by the Engineer.
- **Agreed** - Agreed in writing.
- **As detailed** - As detailed on the drawings.
- **Authorized/ordered/rejected** - Authorized/ordered/rejected by the Engineer.
- **Designated** - Shown on the drawings or otherwise specified by the Engineer or, in relation to an item scheduled in the bid documents, descriptive of an item to be priced by a bidder.
- **Indicated** - Indicated in or reasonably to be inferred from the contract, or indicated in writing by the Engineer.
- **Instructed/directed/permitted** - Instructed/directed/ permitted by the Engineer.
- **Satisfactory** - Capable of fulfilling or having fulfilled the intended function.
- **Service** - Any pipeline, cable, duct etc. for conveying or transmitting any fluid or other matter.
- **Submitted** - Submitted with the tender or submitted to the Engineer, as appropriate.

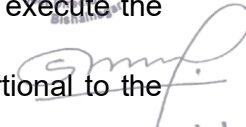
Tolerances:

- **Deviation** - The difference between the actual (i.e., measured) size or position and the specified size or position.
- **Permissible deviation** - The specified limit(s) of deviation.
- **Tolerance** - The range between the limits within which a size or position must lie.

Measurement and Payment:

- **Bill/schedule** - The bill/schedule of quantities.
- **Billed/scheduled rate** - The unit rate or price entered in the bill/schedule at which the Contractor undertakes to execute the particular work or to provide the required material, article or service, or to do any or all of these things, as set out in the item concerned.
- **Billed/scheduled** - Listed in the bill/schedule of quantities.
- **Fixed charge** - A charge for work that is executed without reference to time.
- **Method-related charge** - The sum for an item inserted in the bill by the Contractor when tendering, to cover items of work relating to his intended method of executing the Works.

- **Time-related charge** - A charge for work the cost of which, to the Employer, is varied in proportion to the length of time taken to execute the particular item scheduled.
- **Value-related charge** - A charge that is directly proportional to the value of the contract.


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Project Director

1.2 Contractor's Office & Accommodation

Various works defined under this item are for the provision and maintenance of the Contractor's office, camps, stores, equipment yard, and workshops. The structure of the buildings shall be adequate, rainproof, spacious, airy and hygienic with proper lighting and toilet facilities. The area shall be kept neat and clean. Any garbage or sewage shall be disposed at a location and in a manner approved by the Engineer.

Space allocated for storage of various materials such as cement, reinforcement steel, and petroleum products etc. shall be clearly separated to avoid contamination.

Petroleum products shall be stored and handled in a way that avoids contamination of ground water. Workshops shall be installed with oil and grease traps for the same purpose.

Written information shall be given to and approval taken from the Engineer regarding proper establishment and maintenance of such camps. Failure in compliance with Engineer's instructions in respect of overall standard will lead to reduction or withholding of any payment due to the Contractor.

The Contractor shall provide at his own expense adequate temporary accommodation and toilet facilities for his Workmen and keep the same in good conditions. This may be done to suit Site conditions with the approval of Project Engineer. The above mentioned temporary structures shall be removed on the completion of Works at Contractor's own cost. All materials shall belong to the Contractor.

The Contractor shall make his own arrangement for the supply of electric power and lighting as required for construction purpose.

The Contractor shall make his own arrangement for all internal and external telephones and other communication means deemed necessary for the Works. The Contractor shall make his own arrangement for office equipment and other consumable for his use for the Works.

1.3 Site Office for Engineer

The employer will provide site office to the engineer within the site or nearby area as approved and accepted by engineer with suitable justification.

The Contractor shall maintain the engineer's office for the required period, site offices for the sole use of the Engineer's resident site staff. The offices shall be located near the Contractor's site offices. Basic construction details and dimensions shall generally conform to local building standard or as approved by the Engineer.

The site office may be mobile, semi-mobile or hired permanent building forming a single block. No separate payment shall be made to contractor.



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Project Director

1.4 Safety Measures

The Contractor shall be responsible for safety of all workmen and other persons entering the Works and shall at his own expense; where not stated otherwise take all measures, subject to the Engineer's approval, necessary to ensure their safety. Such measures shall include but not be limited to:

- Provision of safety and emergency regulations for fire, gas, and electric shock prevention, together with rescue operation plan
- Safe control of flowing water
- Provision and maintenance of suitable lighting to provide adequate illumination at place of work with appropriate spares and standby unit
- Provision and maintenance of safe, sound slings, pulleys, ropes, and other lifting device
- Provision of safe access to any part of the works.
- Provision of notices in local dialect temporarily or permanently during construction at locations likely to be used by the public. Placement of such notices shall depend on the existence of the nature of work in the vicinity. These notices shall be in addition to any other statutory requirements demanded of the Contractor

The Contractor shall submit a proposal with detailed safety and emergency measures for the Engineer's approval. When the proposal has been approved, English and Nepali version of the regulations shall be made available to all of his Employees and the Engineer.

The Contractor shall ensure that all his Employees are fully conversant with the regulations, emergency and rescue procedures etc. and shall enforce a rule that will instantly dismiss any employee committing a serious breach of such regulations.

1.5 Notice Boards

The Contractor shall erect notice boards (1.2 m x 1.8 m) at the site giving details of the Contract in the format and wordings directed by the Engineer. These boards shall be erected within 14 days after the Contractor has been given the Possession of Site

The Contractor shall not erect any advertisement sign board on or along the work. The board shall be removed by the Contractor by the end of the Defects Liability Period. The works shall be deemed to be included in other items of the BOQ and shall not be separately paid.



2. Temporary Facilities:

2.1 Provision of Temporary Services

When the rehabilitation or replacement of existing public utilities requires their temporary disconnection, the Contractor shall provide the affected users with temporary services in at least the same standard as the original services. For water supply he may install temporary lines or arrange for regular supply by tankers. When forced to disconnect existing sewers the Contractor shall install temporary pipes of adequate size to carry off sewage from any private sewer facilities cut off by construction work. Connections to temporary pipes shall be made immediately by the Contractor upon cutting off the existing facility. No sewage shall be allowed to flow from any severed facility upon the ground surface or into trench excavation. Pipes used in temporary sewers may be plastic or approved flexible material.

Upon completion of work the Contractor shall replace all severed connections and restore to operating order the existing sanitary facilities. The Contractor without approval of the Engineer shall operate no valve or other controls in public service facilities. All users affected by such operation shall be notified by the Contractor at least one hour before the operation and advised of the probable time when service will be restored.

2.2 Protection of Adjoining Property

2.2.1 Land

The Contractor shall control the movement of his crews and equipment on the working easement including access routes approved by the Engineer to minimize damage to crops and property and shall endeavor to avoid marring the lands. Ruts and scars shall be obliterated and damage to land shall be corrected and the land shall be restored as closely as possible to its original conditions before final taking-over of the Works.

The Contractor shall be responsible directly to the tenant / landowner for any excessive or avoidable damage to crops or lands resulting from his operations whether on lands adjacent to right-of-way or on approved access road and deductions will be made from payment due to the Contractor to cover the amount of such excessive or avoidable damage if adequate compensation is not paid by the Contractor, in the opinion of the Engineer.

2.2.2 Buildings and other Structures

The Contractor shall be responsible and take all measures in order to protect adjoining property including buildings, electrical and telephone poles, underground culverts, retaining walls, compound walls and fences, and other structures.

Prior to the commencement of the activities, the Contractor shall assess the probability and extent of unavoidable damages, if any, to the building and properties and submit his assessment to the Engineer. The Engineer may make his own opinion and if required may order arrangements for protection or repair of such likely unavoidable damage in which event the Contractor shall complete the activities.

2.2.3 MS Sheet Pile for Side Fall Protection

The contractor shall prepare and install MS sheet Pile side protection system using MS110 outer diameter Pipe of wall thickness 4.8mm and length 9m such that 5M will be

penetrated/driven below dredge level and 4M will free stand. The placement of MS pipe has been estimated and installed not more than 0.3M from each other. The back side of the pipe has to be fixed by 3.1mm thick metal sheet welded and overlapped properly above dredge level up to 4m or as per site requirement not exceeding 4M. Necessary shoring has to be provided at frequent interval as per the site condition

The metal pipes and sheet have to be removed after completion of construction up to plinth level and scraped off on contractor's own cost. The scrapped materials shall be the property of contractor and disposed off from the site on own cost.

Measurement:

Sheet piling system shall be measured in Square meter unit as the product of length (Perimeter of Building) multiplied with the height of Dredge level limited to 4m or less whichever is less from the existing ground level to the depth of RCC Footing of the building. The support pipe 5m below the Dredge level shall be considered as the part of supplementary part piling system and no separate measurement and payment shall be made.

Payment

The payment of sheet piling works shall made as per the measured quantity as mentioned in the BoQ and approved rate in the BoQ. The rate shall include all the cost of all material (pipes, sheets), consumables (ropes, welding rods,), equipment's charge (crane, pile rigs etc), false works (plat forms/scaffoldings), wastage, removal and scraping of material after completion of construction up to required level all complete.

2.2.4 Reinstatement upon Completion

Temporary facilities shall be provided by the Contractor, only for as long as required after which he shall dismantle and remove the same from their place of use as speedily as possible. Re-usable components shall be safely stored by the contractor in his yard. The place of use shall be cleared and reinstated immediately to at least the condition existing before the temporary facilities were provided, and to the satisfaction of the Engineer.

2.2.5 Measurement and Payment

All temporary diversions of utilities and temporary services required for execution of the works shall be deemed to be included in other items of the BOQ and shall not be separately paid.

2.3 Publicly and Privately Owned Services

- If any privately owned service for water, electricity, drainage, etc., passing through the site is affected by the works, the Contractor shall provide a satisfactory alternative service in full working order to the satisfaction of the owner of the services and of the Engineer before terminating the existing service.
- Drawing and scheduling the affected services like water pipes, sewers, cables, etc. owned by various authorities including Public Undertakings and Local Authorities included in the contract documents shall be verified by the Contractor for the accuracy of the information prior to the commencement of any work.

- Notwithstanding the fact that the information on affected services may not be exhaustive, the final position of these services within the works shall be supposed to have been indicated based on the information furnished by different bodies and to the extent the bodies are familiar with the final position. The Contractor must also allow for any effect of these services and alternations upon the works and for arranging regular meetings with the various bodies at the commencement of the contract and throughout the period of the works in order to maintain the required co-ordination. During the period of the works, the Contractor shall agree if the public utility bodies vary their decisions in the execution of their proposals in terms of program and construction, provided that, in the opinion of the Engineer, the Contractor has received reasonable notice thereof before the relevant alterations are put in hand.
- No clearance or alterations to the utility shall be carried out unless ordered by the Engineer.
- Any services affected by the works shall be restored immediately by the Contractor who must also take all measures reasonably required by the various bodies to protect their services and property during the progress of the works.
- The Contractor may be required to carry out the removal or shifting of certain services/utilities on specific orders from the Engineer for which payment shall be made to him. Such works shall be taken up by the Contractor only after obtaining clearance from the Engineer and ensuring adequate safety measures.

2.4 Insurance of works

The Contractor shall provide all necessary Insurances, Guarantees and Securities as are required and detailed in the Conditions of Contract, Bill of Quantities or this Specification.

Measurement and payment for Insurances under the Contractor's All Risks (CAR) policy shall be made on Lump Sum basis as provided in the Bill of Quantities in the following sub-headings of the Bill of Quantities:

- a. Insurance cover for Works, Plant and Materials and the Contractor's Equipment
- b. Insurance cover for third party property and persons.

The lump sum price for Insurance under the Contractor's All Risks (CAR) policy includes all expenditures expected in providing and maintaining from Date of Commencement until the end of the Defect Notification Period an insurance of Works, Plant and Materials, the Contractor's Equipment, third party properties and personal injury or death as prescribed in the Contract document, including expenditures resulting from administration work, dealing with and reporting of claims, stamps duties, taxes, etc.

The Contractor shall also require providing insurance of his personnel, employees and labors as prescribed in the Contract document. No separate payment shall be made for the insurance of his personnel, employees and labors and are deemed included in other items of the Bill of Quantities.

No separate payment shall be made for Bank Guarantees and Securities that are required as per the Contract. The costing of such Guarantees and Securities are deemed included in other items of the Bill of Quantities.

In case of any damages to the works for which payment has been made by the Employer, it is the Contractor's obligation to reconstruct the same and claim for the payment from the insurance companies. No payment for the reconstruction of the damaged works shall be made by the Employer.

Measurement of the lump sum payment for item of the Insurance for Contractors All Risk Policy (CAR) shall be made to the Contractor under the relevant items in the Bill of Quantities upon the submission of the acceptable Performance Bond and the insurance policies with the proof of payment of insurance premiums to the insurance company from the date of commencement to the end of Defect Notification Period and after approval by the Engineer.

The payment of the quoted lump sum amount for the provision of insurance shall be made after the Contractor submits and obtains approval from the Engineer of the required insurance policies for the period covering from the date of Commencement to the end of Defect Notification Period and the submission of the proof of the payment of premiums for that period.

The payment shall be made in two installments. First installment 70% of the unit rate quoted in the BOQ shall be made after the approval of the insurance policies by the Engineer. The second installment of remaining 30% of the unit rate quoted in BOQ shall be made at the Completion of the Contract.

The rate quoted by the Contractor for these lump sum items shall deem to cover the full contract period including any Extensions of Time (EOT) as well as Defect Notification Period. No additional payment shall be made for the period of any Extension of Time (EoT).

2.5 Environmental Protection Works

The environment has been defined to mean surrounding area including human and natural resources to be affected by execution and after completion of works.

The Contractor shall take all precautions for safeguarding the environment during the course of the construction of the works. He shall abide by all prevalent laws, rules and regulations governing pollution and environmental protection.

The Contractor shall prohibit employees from unauthorized use of explosives, poaching wildlife and cutting trees. The Contractor shall be responsible for the action of his employees.

The Contractor is expected to arrange and execute the Works in such a way that existing environmental conditions are not deteriorated. Borrow pits and dumping sites used by the contractor shall be reinstated at his own cost by grass and/or tree plantation.

Written instruction/approval must be given to seek from the Engineer regarding protection and reinstatement of environment throughout the Contract period. Failure in compliance with Engineer's instructions in respect of overall standard will lead to reduction or withhold of payment. Further, any serious deterioration in the environment including pollution attributable to Contractor as determined by the Engineer, may result in deduction of actual expenditures incurred in their reinstatement done through separate agency, from any money due to the Contractor.

Environmental protection works, among others, shall also include the following:



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Project Director

2.6 Borrow/Quarry Sites

The Engineer shall have the power to disallow the method of construction and/or the use of any borrow/quarry area, if in his opinion, the stability and safety of the works or any adjacent structure is endangered, or there is undue interference with the natural or artificial drainage, or the method or use of the area will promote undue erosion.

All areas susceptible to erosion shall be protected as soon as possible either by temporary or permanent drainage works. All necessary measures shall be taken to prevent concentration of surface water and to avoid erosion and scouring of slopes and other areas. Any newly formed channels shall be backfilled.

Borrows/quarries shall be located away from the population centers, drinking water intakes, cultivable lands and drainage systems. The cutting of trees shall be minimized. Temporary ditches and/or settling basins shall be dug to prevent erosion. The undesirable ponding of water shall be prevented through temporary drains discharging to natural drainage channels.

Earthworks operations shall be strictly limited to the areas to be occupied by the permanent works and approved borrow areas and quarries unless otherwise permitted by the Engineer. Due provision shall be made for temporary drainage. Erosion and/or instability and/or sediment deposition arising from earthwork operations not in accordance with the Specifications shall be made good immediately by the Contractor.

The Contractor shall obtain the permission of the Engineer before opening up any borrows pits or quarries. Such borrow pits and quarries may be prohibited or restricted in dimensions and depth by the Engineer where:

- (i) They might affect the stability or safety of the works or adjacent property;
- (ii) They might interfere with natural or artificial drainage or irrigation;
- (iii) They may be environmentally unsuitable.

The Contractor shall not purchase or receive any borrow materials from private individuals unless the source of such materials has been approved by the Engineer. At least 14 days before he intends to commence opening up any approved borrow pit or quarry, the Contractor shall submit to the Engineer his intended method of working and restoration. These shall include but not be limited to:

- (i) the location, design and method of construction of any access track;
- (ii) the volume and nature of materials to be removed;
- (iii) the sequence and method of excavation of materials;
- (iv) measures for controlling runoff and sediment from the site during operations;
- (v) Proposals for site restoration including approximate finished levels, drainage, erosion and sediment control, and slope stabilization and re vegetation, including reinstatement of any access track.

Operations of borrow pit or borrow area shall not be permitted until the method of working for that particular pit or area has been approved by the Engineer in writing.

Restoration shall be to the satisfaction of the Engineer.



2.7 Disposal of Spoil and Construction Waste

Materials from excavation and dismantling which are in excess of the requirements for permanent works and unsuitable materials shall be disposed off in locations and in the manner as agreed with the Engineer. The locations of disposal sites shall be such as not to promote instability, destruction of properties and public service systems. Exposed areas of such disposal sites shall be suitably dressed and be planted with suitable vegetation.

The Contractor shall plan his works in such a way that there is no spillage of POL products to the surface or sub-surface water. Those disposal works shall be covered by contractor's liability to maintain the site neat off.

Measurement and Payment

Those items are measured in Cu.m of volume as stipulated in Bill of Quantity and paid as per the rate in the BoQ. The cost shall cover loading, unloading, managing, all equipment, manpower and consumables.

2.8 Provision and Maintenance of Camps, Offices, Stores, Equipment Yards

Various works defined under this item are related to provision and maintenance of camps for work person and employees, Contractor's site offices, stores equipment yards and workshops. These camps must be adequate, rain-proof, spacious, airy and hygienic with proper lighting and materials storage facilities. The area shall be kept neat and clean.

Space allocated for storage of materials such as cement, gabion wire, reinforcing wire etc. shall in general be damp-free, rain-proof and away from petroleum products storage.

Permission may be granted by the Engineer to erect suitable camps within the right of way free of charge, if such establishments do not cause obstructions to traffic, nuisance to works execution and adverse effect to the environment.

Written information must be given to and approval be taken from the Engineer regarding proper establishment and maintenance of such camps.

Failure in compliance with Engineer's instruction in respect of overall standard will lead to reduction or with holding of payment.

2.9 Provision and Maintenance of Toilets

Provision of toilets for labor and employees shall be made to avoid public nuisance as well as pollution of water courses and air. The Contractor shall construct suitable septic tanks and/or soak pits along with room of pit-type latrines. Sufficient water must be provided and maintained in the toilets. Proper methods of sanitation and hygiene should be employed on contractors cost during the whole project duration.

2.10 Provision of Potable Water

The Contractor shall supply potable water along with commencement of work to Contractor's staff and work person both at camps and construction-sites. This arrangement shall be enforced to avoid proliferation and generation of various water borne diseases.

The Contractor shall inform the Engineer regarding sources, installation and operation of supply of potable water within a week after the work is commenced. No separate payment

for such facilities shall be made from employer and shall be considered sole responsibility of contractor.

2.11 Provision of First Aid/Medical Facilities

Provision of first aid/medical facilities shall be made along with commencement of work to provide quick medical service to injured/sick work person, and employees. Services shall also include on-the-way service and other arrangements required for taking them to the nearest hospital in case of emergency.

The scope of work shall include service of at least one part-time experienced health worker/health assistant with a minimum of once a week full time site visit as work assignment. The Contractor shall also supply and provide adequate medicines and facilities required for standard first aid.

The Contractor shall inform the Engineer regarding the medical facility within a week after its establishment and operation.

Measurement and Payment

No separate payment for such facilities shall be made from employer and shall be considered sole responsibility of contractor.

2.12 Hazardous Materials

The Contractor shall not store hazardous materials near water surfaces. The Contractor shall provide protective clothing or appliances when it is necessary to use some hazardous substances.

High concentration of airborne dust resulting in deposition and damage to crops and water resources shall be avoided. The Contractor shall take every precaution to control excessive noise resulting in disruption to wildlife and human population.

Only controlled explosives methods shall be applied and used in construction works.

2.13 Reinstatement of Environment

The Contractor shall arrange and execute works as well as related activities in such a way that environmental conditions are reinstated. He may be required to carry out filling, removal and disposal works along with plantation of grass and trees as directed by the Engineer at his own costs at identified locations to reinstate environment.

Written instruction/approval shall be given by/sought from the Engineer regarding reinstatement of environment both during and after completion of works and up to the end of Defects Liability Period.

Measurement and Payment

No separate measurement and payment shall be made for the works described in this Clause.

2.14 Survey and Setting Out

- During the period of Commencement of works the Contractor shall survey the construction area and confirm the levels. He shall immediately notify the Engineer of any discrepancies and shall agree with the Engineer any amended values to be used



[Signature]
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Project Director

during the contract, including replacements for any stations missing from the original stations.

- The Contractor shall check, replace and supplement as necessary the station points and agree any revised or additional station details with the Engineer.
- All stations and reference points shall be clearly marked and protected to the satisfaction of the Engineer.
- The Contractor shall establish working Bench Marks tied with reference stations soon after taking possession of the site. The coordinates and the elevations of the reference stations shall be obtained from the Engineer. The working Bench Marks shall be near all major/medium structure sites. Regular checking of these Bench Marks shall be made and adjustments, if any, got agreed with the Engineer and recorded.
- The Contractor shall be responsible for the accurate establishment of the center lines based on the Drawing and data supplied. The center lines shall be accurately referenced in a manner satisfactory to the Engineer. A schedule of reference dimensions shall be prepared and supplied by the Contractor to the Engineer.
- The existing profile and cross-sections shall be taken jointly by the Engineer and the Contractor. These shall form the basis for the measurements and payments. If in the opinion of the Engineer, design modifications of the centerlines and/or grade are advisable, the Engineer shall issue detailed instructions to the Contractor and the Contractor shall perform modifications in the field, as required, and modify the levels on the cross-sections accordingly.

2.15 As-Built Drawings

Such approved Working Drawings as have been selected by the Engineer shall be correctly modified for inclusion in the As-Built Drawings incorporating such variations to the Works as have been ordered and executed. Such drawings shall show the actual arrangement of all structures and items of equipment installed under the Contract. The Contractor shall submit 1 (one) reproducible copy and 3 (three) prints of all As-Built Drawings clearly named as such to the Engineer for approval before applying for the Taking-Over Certificate for the respective Section of the Works.

During the course of the Works, the Contractor shall maintain a fully detailed record of all changes from the approval to facilitate easy and accurate preparation of the As-Built Drawing. Irrespective of the other contractual prerequisites no Section of the Works will be considered substantially completed until the Engineer has approved the respective As-Built Drawings.

This job shall be deemed to be included in other items of the BOQ and shall not be separately paid.

2.16 Photographs

The Contractor shall supply digital photographs in soft format and color prints of photographs in hard format, of such portions of the works in progress and completed, as may be directed by the Engineer. The prints shall not be retouched. The digital copy of each photograph shall be the property of the Employer and shall be delivered to the

Engineer with prints. No prints from these digital files shall be supplied to anyone without the written permission of the Engineer.

2.17 Supply of Video Records

The work consists of taking video film of important activities of the work as directed by the Engineer during the contract of playing time between 30 minutes and 180 minutes as directed by the Engineer. It shall contain narration of activities in English and/or Nepali by a competent narrator. The edition of the video and the script shall be approved by the Engineer. The video records shall be of acceptable quality and in acceptable digital format. All the video shall be in color, no effects are suggested.

Measurement and Payment

No separate measurement and payment shall be made for the works described in this Clause. This job shall be deemed to be included in other items of the BOQ and shall not be separately paid.



3. Notes about Measurement and Payment

(a) Measurement

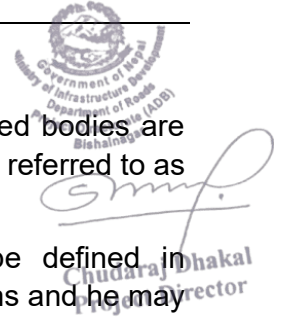
Unless specified, all measurements shall be based on "Principals of Measurement (Int.) for works of constructions." The tolerances specified in these Specifications are for evaluation of accuracies only based on which the work shall be accepted or rejected. However, the measurement of the work performed within the limits of tolerances shall be the measurement of actual work done in place, if their dimensions are less than what have been specified or instructed by the Engineer. If the actual work done in place is more than what has been specified or instructed by the Engineer, but within the limit of tolerances, the measurement shall be the measurement of the work what has been specified or instructed by the Engineer.

(b) Payment

Unless specified in the contract, the contract unit rates and/or prices for items as set out in the Bill of Quantities are the full and the final compensation to the Contractor for:

- Supply of all materials necessary to complete the item as per relevant specifications;
- Use of materials, labors, tools, equipment, machines and other resources as per need;
- All handling, packing charges and transportation;
- Cost of supervision, quality assurance, temporary and ancillary works;
- Site commissioning;
- Maintenance and making good;
- All duties and obligations as set out in the contract
- general works such as setting out, clearance of site before setting out and after completion of works
- the preparation of detailed work program
- providing samples of various materials proposed to be used
- the detailed Design and Drawing of temporary works
- testing of materials
- any other details as required by the contract
- cost of all operations like storing, erection, moving into final position, etc. necessary to complete and protect the work till handing over to the Employer;
- the cost for safeguarding the environment
- All incidental costs, not covered under above stated.

Where the Bill of Quantities does not include the items mentioned in this Section, no separate payment shall be made for such works. The costs in connection with the execution of the works specified herein shall be considered to be included in the related items of other works specified in the Bill of Quantities or shall be considered to be incidental to the works specified. Items specified in this Section and included in the Bill of Quantities shall be paid at the contract unit rates as agreed and shown in the Bill of Quantities.



(c) National Specifications

Certain Specifications issued by various national or other widely recognized bodies are referred to in these Specifications. Such Specifications shall be defined and referred to as National Specifications.

The Contractor may propose that the materials and workmanship be defined in accordance with the requirements of other equivalent National Specifications and he may execute the works in accordance with such National Specifications as may be approved by the Engineer. A copy of the National Specification, together with its translation into the English language if the National Specification is in another language, shall be submitted to the Engineer along with the request for its adoption.

In referring to National Specifications, the following abbreviations are used:

NS	Nepal Bureau of Standards and Metrology
IS	Indian Standards
ASTM	American Society of Testing and Materials
BS	British Standards
BSCP	British Standard Code of Practice
ISO	International Organization for Standardization
EN	European Norm
NFP	French Norm

Along with the commencement of the contract, the Contractor shall provide in his site office at least one complete set of all National Specifications referred to in these Specifications, if they are for the Sections applicable to the works. This set shall be made available for use by the Engineer.

(d) Equivalency of Standards

Wherever reference is made in these Specifications to specific standards and codes to be met by the materials, plant, and other supplies to be furnished, and work to be performed or tested, the provisions of latest current edition or revision of relevant standards and codes in effect shall apply. Other authoritative standards which ensure a substantially equal or higher performance than the specified*, -standards and codes shall be accepted subject to the Engineer's prior review and approval. Differences between the standards specified and the proposed alternative standards shall be fully described by the Contractor and submitted to the Engineer at least 28 days prior to the date when the Contractor desires the Engineer's approval. In the event that the Engineer determines that such proposed deviations do not ensure substantially performance, the Contractor shall comply with the standards and codes specified. No payment shall be made for adoption of higher standards.



(e) Units of Measurement, Abbreviations and Terminology:

• Units of Measurement

The Symbols for units of measurement are used in these Specifications as they are given below.

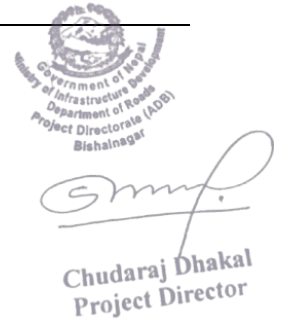
μ	micron = m x 10 ⁻⁶
Mm	millimetre
M	meter
Km	kilometre
sq. mm. or mm ²	square millimetre
sq.m. or m ²	square meter
sq. km. or km ²	square kilometre
Ha	hectare
cu. m. or m ³	cubic meter
lit or l	litre
Rad	radian
°C	degrees Celsius
Kg	kilogram
G	gram = kgx10 ⁻³
Mg	milligram = kg x 10 ⁻⁶
mg/l	milligram per litre
T	ton = kg x 10 ³
kg/m ³	kilogram per cubic meter
t/m ³	ton per cubic meter
N	Newton
N/m ²	Newton per square meter
Lin. M	Linear meter
Max	Maximum
Min	Minimum

Symbols of other units, if not covered above, shall be as per SI system set out in ISO 31/1.

• Abbreviations

The following abbreviations are used in these Specifications.

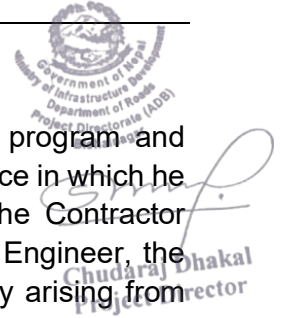
ACV	Aggregate Crushing Value
BOQ	Bill of Quantities
CR	Crushing Ratio
Dia	Diameter
Hr	Hour
LS	Linear Shrinkage
MC	Moisture Content
MDD	Maximum Dry Density



Min	Minute
MS	Mild Steel
No	Number (units), as in 6 no.
OMC	Optimum Moisture Content
OPC	Ordinary Portland Cement
PCC	Plain Cement Concrete
PI	Plasticity Index
PL	Plastic Limit
PM	Plasticity Modulus (PI x % passing 0.425 mm sieve)
POL	Petrol, Oil & Lubricant
RCC	Reinforced Cement Concrete
ROW	Right of Way
SE	Sand Equivalent
Sec	Second
SG	Specific Gravity
SI	International Standard Units of Measurements
SSS	Sodium Sulphate Soundness test, loss on 5 cycles
STV	Standard Tar Viscosity
TS	Tensile Strength
TMT	Thermo Mechanically Treated
UC	Uniformity Coefficient
UCS	Unconfined Compressive Strength
VIM	Voids in Mix
w/c	Water cement ratio
wt	Weight
%	Percent

- **Terminology**

The term "the Specifications" shall be construed as the Standard Specification and the Special Provision all together.



4. Program

The Contractor shall provide all information needed for fulfilment of the program and required in accordance with the Conditions of Contract including the sequence in which he intends to work including implementation of quality assurance plan. If the Contractor requests a change in the sequence and such change is approved by the Engineer, the Contractor shall have no claim as per the Conditions of Contract for delay arising from such revisions to the program.

The program for the construction and completion of the works shall be established using CPM/PERT techniques or equivalent. The program shall be detailed enough to give, in addition to construction activities, detailed network activities for the submission and approval of materials, procurement of critical materials and equipment, fabrication of special products/equipment's if any and their installation and testing, and for all activities of the Engineer that are likely to affect the progress of work. The Contractor shall update all activities in accordance with the Conditions of Contract on the basis of the decision taken at the periodic site review meetings or as directed by the Engineer.

The program shall also include the Contractor's general requirements for any road closures to be agreed in principle with the Engineer. Such agreement shall not relieve the Contractor of his responsibility to obtain specific approval for each closure or series of closures. Any proposal for night working shall also be stated in the program.

5. Quality Control

5.1 Scope

This Section covers the Quality Control System and procedures, Quality Assurance Plan, program of tests, trials, and general procedures for acceptance as well as Laboratory arrangements and related facilities which are required for the selection and control of the quality of materials and workmanship.

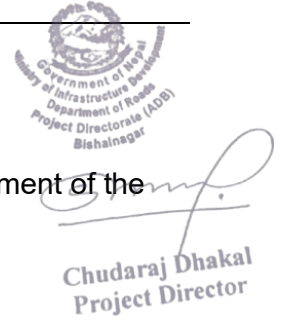
5.2 Contractor Responsible For the Quality of the Works

All materials incorporated and all workmanship performed shall be strictly in conformity with the requirements of the Specifications and the Contractor shall be responsible for the quality of the works in the entire construction within the contract.

The Contractor shall provide, use and maintain on the Site, throughout the period of execution of the contract, a Laboratory with adequate Laboratory equipment operated by competent staff for carrying out tests required for the selection and control of the quality of materials and for the control of workmanship in accordance with these Specifications. The list of Laboratory equipment to be procured and Laboratory facilities to be provided shall be as per sheet G1. The Contractor shall assume that tests shall be required on all materials to be used in the works and on all finished works or part of works.

5.3 Quality Control System

The Quality Control System comprises the methods, procedures and organization for the Quality Control of the works. The Contractor shall implement the Quality Control System in the following sequences:



1. Sequence

- a) Compliant testing for materials including Laboratory trials,
- b) Compliant testing for methods and equipment prior to the commencement of the work, including site trials or trials sections,
- c) Control testing during construction,
- d) Acceptant testing on completed works or parts of the works.

The Contractor shall carry out all necessary tests and shall report to the Engineer the results of such tests before submitting materials and/or finished works or part of works to the Engineer for approval in accordance with this Specification. In certain circumstances, tests may be carried out at the place of manufacture as per the Conditions of Contracts.

For satisfying himself about the quality of the works, quality control tests shall be conducted by the Engineer himself or by any other agencies deemed fit by the Engineer. Additional tests may also be conducted where in the opinion of the Engineer such tests are needed.

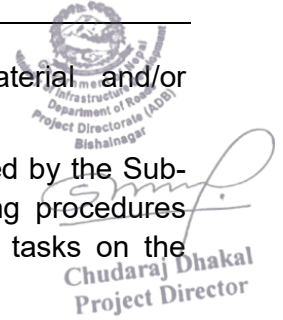
Before commencement of the work, the Contractor shall demonstrate a trial run of all construction equipment for establishing their capability to achieve the laid down Specifications and tolerances to the satisfaction of the Engineer.

2. The supply, testing and monitoring shall be in compliance with a Quality Assurance Plan and the provisions in the contract.

5.4 Quality Assurance Plan

The Contractor shall submit Quality Assurance Plan (QAP) to the Engineer for his approval. The Quality Assurance Plan (QAP) which shall be based on the detailed Program of the Works. The Quality Assurance Plan shall include the following:

- (1) The Quality Control Schedule Comprising of:
 - a) The recapitulative test schedule and testing program detailing the list of tests for compliance, Laboratory trials, site trials and trials Sections, construction control tests and their frequencies, tests for acceptance of the completed works with their dates.
 - b) Recapitulative list of "critical" acceptance testing procedures, for equipment or parts of the works which corresponds to the tasks on the Critical Path according to the construction Program.
 - c) Estimate of the number of tests to be carried out, list and number of appropriate equipment to conduct them, list of tests to be conducted outside the site Laboratory, if any, identification of the outside Laboratory where proposed to carry out the test.
 - d) List of staff assigned to the Laboratory, their position and responsibilities in the quality control procedures, their qualification and experience, general description and detailed organization of the Laboratory activities.
- (2) The list of sources of materials and/or of manufactured articles, their main characteristics, their identification mode as provided by the supplier when



required; the program of supply and procurement of material and/or manufactured articles in accordance with the Program.

- (3) The list of tests and quality control procedures to be implemented by the Sub-contractors, if any, pointing out the "critical" acceptance testing procedures relating to the Sub-contracted works, which correspond to the tasks on the Critical Path included in the Sub-contracted works.

The Contractor shall implement the Quality Control in compliance with the approved QAP.

The Engineer's approval of the QAP shall not relieve the Contractor from his responsibility of the quality of the Works as per the Conditions of Contract and these Specifications nor shall the Engineer's approval of the QAP exempt the Contractor of any procedure to inform the Engineer in writing or request for the Engineer's approval or re-approval as specified in the Conditions of Contract and/or in these Specifications

The Contractor shall monitor and update the QAP on the basis of the decisions taken at the periodic review meetings or as directed by the Engineer and in accordance with the program of the works and the Conditions of Contract.

5.5 Testing Procedures and Set of Tests

For ensuring the quality of the work, the materials and the workmanship shall be subjected to testing in accordance with procedures, sets of tests and frequencies as specified in respective Sections of these Specifications. The specified testing frequencies are not restrictive. The Engineer shall direct for the tests to be carried out as frequently as deemed necessary that the materials and workmanship comply with their Specifications.

Where no specific testing procedure is mentioned in the Specifications, the tests shall be carried out as per the prevalent accepted engineering practice or directions of the Engineer.

5.6 Laboratory Trials to Confirm Compliance with Specifications Concrete

Laboratory trials for concrete mixes shall be carried out by the Contractor to demonstrate that the composition of the mixes proposed for the concrete meets the requirements of the Specifications.

The compositions of concrete mixes which meet the specified requirements and are accepted by the Engineer shall be then used in the site trials carried out.

5.7 Site Trials or Trials Sections

5.7.1 Concrete

Site trials for concrete mixes shall be carried out by the Contractor to demonstrate the suitability of his mixing equipment. During the site trials, compliance with the Specifications for weighing equipment, storage of ingredients, means of transport for concrete, placing, compaction and curing shall be checked by the Engineer.

During the site trial a full-scale sequence including placing and compaction of concrete shall be carried out on a part of the works which will represent particular difficulties due to the presence of reinforcement, obstructions or others.

The Contractor shall allow in his program for conducting the site trials and for carrying out the appropriate tests, including the time required to obtain compressive strength test

results at 28 days. The Contractor shall inform in writing the Engineer at least two weeks before the date he proposes to use the concrete mixes in the site trials with all relevant data including the trial program, the results of the Laboratory trial tests for the proposed concrete mixes and compliance tests results of all constituents i.e. cement, aggregates, water and admixtures, if any.

5.7.2 Other Works and Equipment

Site trials for Pre-stressed Concrete Works, Painting of Structural Steelwork etc. are detailed in the relevant Sections of these Specifications.

Approval of the Engineer to a set of data recorded in a site trial shall not relieve the Contractor of his responsibilities to comply with the requirements of these Specifications

5.8 Control Testing During Construction

Quality Control procedure are detailed in the relevant Sections of these Specifications

5.9 Acceptance Tests for Completed Works or Part of Works

Acceptance tests for other works and equipment are detailed in the relevant Sections of these Specifications.

5.10 Recapitulative Schedule of Tests

The tests to be carried out and their frequency for the quality control of the works are detailed in the relevant Sections of these Specifications.

The following Table recapitulates the testing schedule for the main types of works.

Table 1: Testing Schedule

Part or component of the works	Tests	Frequency
Concrete Materials	• Cement: Acceptance tests	• Conservative samples for each supply and not less than every 200t or part of it.
	• Control tests: chemical composition physical properties	• testing in case of noncompliance of the mixes or storage on site for longer than 1 month

Part or component of the works	Tests	Frequency
	Aggregates: Acceptance tests: Control tests: - Grading - Silt & clay content - Organic impurities - Chloride content, sulphate content, Alkali reactivity, water, Admixtures Concrete ✓ lab. Trials ✓ site trials ✓ control tests ✓ compressive strength	- each delivery and every 100 t or part of it for fine aggregate and 250 t or part of it for coarse aggregate - As frequently as required. - Early works: every 6 m3 of each class. When compliance is established: every 20 m3 or part of it.
	Reinforcement:	
Brick works for Structures Materials Mortar	- quality of bricks - quality of cement and sand - control tests - compressive strength of mortar	Compressive strength 25N/mm^2 – 40N/mm^2 is required. Compressive Strength, $C = (W/A)$ Where, W + Calibrated maximum load A + Average of the gross area of brick sample Every 10 m3 of brick work or part of it.
Masonry for Structures materials Mortar	- quality of cement and sand - control tests - compressive strength of mortar - dismantling of masonry (1 m_1 m)	- As required - Every 10m3 of masonry of part of it - every 30m3 of masonry or part of it

5.11 Contractor's Laboratory

(1) Laboratory Building

The Contractor shall on his own make provide and maintain a site Laboratory. Such Laboratory shall have a minimum total area of 30 m2 appropriately partitioned to house various Laboratory instruments/equipment, office and store. It shall have adequate electrical connections (power plugs, switches) necessary to operate the equipment in the Laboratory. The Laboratory shall either be any existing building at site, rented and modified to suit the purpose or shall be a shed constructed of GI sheets and pipes/angles. The floor of the Laboratory shall however be of 100 mm M15/20 concrete and the minimum height 2.7 m. The Contractor shall submit the design of the GI shed for approval of the Engineer prior to its construction.

Alternatively, it may also be constructed from shipping containers modified suitably to the Engineer's satisfaction for the purpose.

This Laboratory shall be part of the Temporary Works and will be the property of the Contractor on completion of the Works.

(2) Measurement

Measurement for the provision of site Laboratory will be on a monthly basis.

(3) Payment

Payment for work will be made on Lump Sum basis for each month as indicated in the contract BOQ. Payment for the works shall be full and final compensation for all routine in house test of material, manpower, reagents, equipment and consumables as indicated in the clause 5.12 herein after (including land/building rent if any) to complete the works as specified.

5.12 Laboratory Equipment at Site

Laboratory Equipment at Site

The equipment for the site Laboratory and field control tests shall be provided, installed, operated and maintained by the Contractor. The equipment, material, chemical reagents may also be used by the Engineer to conduct tests according to his Quality Check Plan. Testing frequency (both Laboratory and field control) shall be developed in the Quality Assurance Plan of the Contractor and Quality Check Plan of the Engineer. After the completion of the Works, the Laboratory equipment shall become the property of the Contractor. Laboratory and field control equipment anticipated for the Works are listed in table at Appendix 4 of this volume.

Test apparatus are the assets of the contractor and no separate measurement and payment shall be made for the works described in this Clause.

5.13 Sampling and Testing of Material away From Site

Some tests on construction material shall be conducted periodically off the site at reputable institutions in Kathmandu as directed by the Engineer.

The frequency of tests shall be developed in the Quality Assurance Plan that shall also prescribe test results and reporting formats. However, some details on the tests are listed tentatively below.

5.14 List of Tests to Be Conducted Off-Site Tests

(Locations subject to the approval of the Engineer)

S.No.	Description of Tests	
1.	UTM Tensile Test for Re-bar	As per CL.6.3.1 of IS 1786-2008
2.	Zinc Coating and Tensile test of GI wire	As per CI 1.3 of IS 4826-1979
3.	Los Angeles Abrasion Test for Aggregate	As per IS 2386 Part-4 (1963)
4.	UTM tensile Test for Anchor Bar	As per IS 11309 (1985)
5.	Specific Gravity of Aggregates	As Per IS 2386-3 (1963)

The tests listed above are subject to the Contractor's Quality Assurance Plan approved by the Engineer. The Engineer shall also determine the number of tests while executing the Works. The limits for test results are as per the latest version of IS code for relevant tests.

The Contractor shall keep records of all tests in a format approved by the Engineer. Two copies of any test results shall be forwarded to the Engineer.

Measurement

Measurement of work under this Clause shall be in number of tests fully executed to the satisfaction of the Engineer.

Payment

Payment will be made from the Provisional Sum set aside for the purpose and shall be full and final compensation for all material, labor, and equipment to complete the works as specified.

5.15 Use of the Contractor's Temporary Works

Unless otherwise specified under the Contract, the Contractor shall allow the Employer, the Engineer or the Nominated Subcontractor the use of temporary access, crossings and other Temporary Works at site insofar that such use is related with the Works.

5.16 Day work

Day work shall mean provisional sum payable to the Contractor for works executed on a daily or hourly basis as instructed in writing by the Engineer. This item is categorized in three groups namely:

- (i) Labor
- (ii) Equipment
- (iii) Material

The Engineer however shall have the right to obtain further information on the rates and if appropriate to negotiate changes in the rates or demand new prices for additional equipment, staff, or material before or after the award of the Contract.

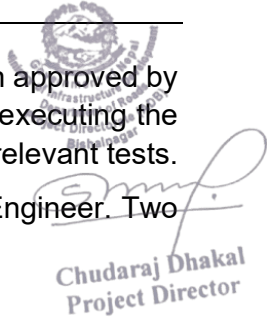
The Engineer shall have the right to calculate new prices for Day work on the basis of rate analysis.

The hourly or daily rates of labor or equipment and the unit price for material submitted by the Contractor shall deem to cover all expenses and shall be inclusive of overhead, taxes, and profit.

Non-working hours or idle time/down time of labor and equipment respectively shall not be considered for payment.

5.17 Reports

The Contractor shall prepare and submit four copies of Progress Report on a monthly basis. The Reports shall highlight the targeted and achieved progress, problems at site, and brief description of the claims during the month and the Engineer's response, and other information relevant to the Project. It shall be supplemented with necessary charts, tables, data, and at least 36 photographs.



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Project Director

On completion of the Works, the Contractor shall prepare and submit a Completion Report that shall deal comprehensively on all aspects covered in the Monthly Report. Additional information such as improvement in construction methods/techniques, lessons learnt from the Project, important considerations for maintenance, etc. should also be highlighted.

5.18 . Site Diary

The Contractor shall keep Site Diaries wherein full details of the work carried out during each day shall be fully recorded. The diaries shall be available for inspection by the Engineer any time during normal office hours. The Site Diaries shall include:

- Weather Conditions, rainfall/snowfall, and river water level
- Description, quantity, and location of work performed
- Shifts and working hours
- Number and category of workers working at site
- Plant in use and idle, or broken down
- Test carried out and results
- Inspection carried out by the Engineer
- Site instructions
- Visitors
- Accidents

5.19 Measurement and Payment

The cost items from 5.17 to 5.20 inclusive as mentioned in the above sections shall be covered by the Contractor's overhead.



6. Materials and Testing of Materials

6.1 Quality of Materials

The materials supplied and used in the works shall comply with the requirements of these Specifications. They shall be new, except as provided elsewhere in the contract or permitted by the Engineer in writing. The materials shall be manufactured, handled and used skillfully to ensure completed works to comply with the contract.

6.2 Sources of Materials

The use of any one kind or class of material from more than one source is prohibited, except by written permission of the Engineer. Such permission, if granted, shall set forth the conditions under which the change may be made. The sources or kinds of material shall not be changed without written permission of the Engineer. If the product of any source proves unacceptable, the Contractor shall make necessary arrangements for the supply of acceptable material. Any claims for compensation associated with such arrangements or changes shall not be considered, unless the source of the unacceptable material is designated in the contract as a source of material.

When any manufactured product, either new or used, is to be furnished by the Employer, the location at which such material shall be delivered to the Contractor shall be designated in the contract. In such cases, the Contractor shall haul the materials from the designated delivery point to the point of use. The compensation for such hauling shall be included in the contract unit rate for placing the materials in the finished work.

6.3 Inspection and Acceptance of Materials

Final inspection and acceptance of materials shall be made only at the site of the work. The Engineer reserves the right to sample, inspect, and test the materials throughout the duration of the works and to reject any materials which are found to be unsatisfactory.

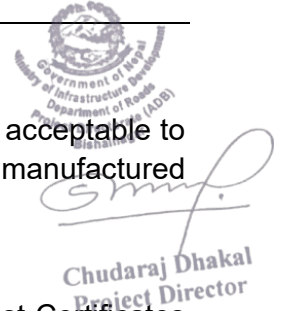
A preliminary inspection of materials may be made at the source for the convenience and accommodation of the Contractor, but the presence of a representative of the Engineer shall not relieve the Contractor of the responsibility of furnishing materials complying with their Specifications.

The representative of the Engineer shall have free entry at all times to those parts of any plant which concern production of the materials ordered.

6.4 Materials and Manufactured Articles

(1) Order for Materials and Manufactured Articles

The Contractor shall, before placing any order for materials and manufactured articles for incorporation in the Works, submit to the Engineer the names of the firms from whom he proposes to obtain such materials and manufactured articles, giving for each firm a description of the materials and manufactured articles to be supplied, their origin, the manufacturer's specification, quality, weight, strength and other relevant details. The Contractor shall submit the samples of such materials and manufactured articles when requested by the Engineer and when appropriate, manufacturer's certificates of recent test carried out on similar materials and manufactured articles shall also be submitted.



(2) Storage

All materials and manufactured articles shall be stored on site in a manner acceptable to the Engineer. The Contractor shall carefully protect all work, materials and manufactured articles from the weather and vermin.

(3) Test Certificates

When instructed by the Engineer, the Contractor shall submit to him all Test Certificates from the suppliers/manufacturers of the materials and/or manufactured articles to be used for the contract. Such certificates shall certify that the materials and/or manufactured articles concerned have been tested in accordance with the requirements of these Specifications. All Test results shall be enclosed along with such certificates. The Contractor shall provide adequate means of identifying the materials and/or manufactured articles delivered on the site with the corresponding certificates.

6.5 Defective Materials

All materials not conforming to the requirements of the contract shall be rejected whether in place or not. They shall be removed immediately from the site unless otherwise permitted by the Engineer. Even after rectification of the defects no rejected material shall be used in the work unless approved by the Engineer in writing. Upon failure of the Contractor to comply promptly with any order of the Engineer given under this Clause, the Engineer shall have authority to cause the removal and replacement of rejected material and to deduct the cost thereof from any monies due to the Contractor.

6.6 Trade Names and Alternatives

For convenience in designation in the contract, certain articles or materials to be incorporated in the work may be designated under a trade name or the name of a manufacturer and his catalogue information. The use of an alternative article or material which is of equal or better quality and of the required characteristics for the purpose intended shall be permitted, subject to the following requirements:

- (1) The proof as to the quality and suitability of alternatives shall be submitted by the Contractor. He shall also furnish all information necessary as required by the Engineer. The Engineer shall be the sole judge as to the quality and suitability of alternative articles or materials and his decision shall be the final and binding upon the Contractor.
- (2) Whenever the specifications permit the substitution of a similar or equivalent material or article, no tests or action relating to the approval of such substitute material shall be made until the request for substitution is made in writing by the Contractor accompanied by complete data as to the equality of the material or article proposed. Such request shall be made well in advance to permit approval without delaying the work.

6.7 Foreign Materials

Materials which are manufactured, produced or fabricated outside Nepal shall be delivered at a point in Nepal as specified in the contract where they shall be retained for a sufficient time to permit inspection, sampling, and testing. The Contractor shall not be entitled to an extension of time for acts or events occurring outside Nepal and it shall be the Contractor's responsibility to deliver materials obtained from outside Nepal to the point of delivery in

Nepal. The Contractor shall supply the facilities and arrange for testing required at his own cost. All testing by the Contractor shall be subject to witnessing by the Engineer.

The Contractor shall furnish to the Engineer a "Certificate of Compliance" with the specifications from the manufacturer, producer or fabricator of foreign material where required. In addition, certified mill test reports clearly identifiable to the lot of material shall be furnished where required in these Specifications or otherwise requested by the Engineer. Where structural materials requiring mill test reports are obtained from foreign manufacturers, such materials shall be furnished only from those foreign manufacturers who have previously established, to the satisfaction of the Engineer, the sufficiency of their in-plant quality control, as deemed necessary by the Engineer or his representative, to give satisfactory assurance of their ability to furnish material uniformly and consistently in conformance with their Specifications. At the option of the Engineer, such sufficiency shall be established whether by submission of detailed written proof thereof or through in-plant inspection by the Engineer or his representative.

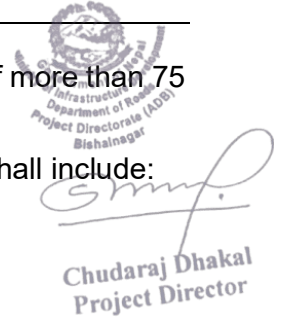
If the welding of steel for structural steel members or the casting and pre-stressing of pre-cast pre-stressed concrete members is to be performed outside of Nepal, the following requirements shall apply:

- (1) Such fabrication shall be performed only within the plants and by fabricators who have previously established, to the satisfaction of the Engineer, that they have the experience, knowledge, trained manpower, quality control, equipment and other facilities required to produce the quality and quantity of the work required. At the option of the Engineer, prequalification of the plant and fabricator shall be established either by the submission of detailed written proof thereof or through in-plant inspection by the Engineer or his representative, or both.
- (2) The Contractor shall make written application to the Engineer for approval for such foreign fabrication at the earliest possible time and in no case later than 60 calendar days in advance of the planned start of fabrication. The application shall list the specific units or portion of a work which shall be fabricated outside of Nepal.
- (3) The Contractor shall advise the Engineer, in writing, at least 20 calendar days in advance of the actual start of any such foreign fabrication.
- (4) All documents pertaining to the contract, including but not limited to, correspondence, tender documents, working drawings and data shall be written in the English/Nepali language and all numerical data shall use the metric system of units of measurement.

6.8 Definition of General Types of Materials

The following definitions shall apply to materials in this Section and other relevant Sections.

- (1) "Topsoil" shall mean the top layer of soil that can support vegetation. It shall include all turf acceptable for turfing.
- (2) "Suitable Material" shall comprise all that is acceptable in accordance with the contract for use in the works {and which is capable of being compacted to form a stable fill having side slopes as indicated in the Drawing. The material used in fill



- (except rock fill) shall not contain rock fragments with dimensions of more than 75 mm.}
- (3) "Unsuitable Material" shall mean other than suitable material and shall include:
- (a) Material from swamps, marshes or bogs;
 - (b) Peat, logs, stumps, perishable material, organic clays;
 - (c) Material susceptible to spontaneous combustion;
 - (d) Material in a frozen condition;
 - (e) Clay of liquid limit exceeding 70 and/or plasticity index exceeding 45.
 - (f) Materials stated above in d), if otherwise suitable shall be classified suitable when unfrozen.
- (4) "Well Graded Granular Material" consisting of gravel and/or sand shall conform to relevant Clause.
- (5) "Rock fall", coarse alluvial material shall be loose soils such as moraines, debris, or alluvial material containing large blocks or large boulders. Individual blocks or boulders of hard materials greater than 0.3m³ each in volume, shall be classified as hard material.
- (6) "Hard Material" shall mean any material which conform to the requirements of relevant Sub-clause.

6.9 Sieves

IS sieves shall be used for all tests. Based on IS-460 the standard sieves series shall be as follows:

125; 90; 75; 63; 50; 45; 40; 37.5; 31.5; 25; 22.4; 20; 19; 16; 12.5; 11.2; 10; 9.5; 8; 6.3; 5.6; 4.75; 4.00; 2.8; 2.36; 2; 1.7; 1.4; 1.18; 1; 0.85; 0.71; 0.6; 0.5; 0.425; 0.400; 0.300; 0.250; 0.212; 0.180; 0.150; 0.125; 0.090; 0.075 mm.

6.10 Soils and Gravels

6.10.1 Sampling and Samples

Sampling of soils and gravels shall be carried out as specified or as directed by the Engineer.

Samples shall be prepared for testing as indicated in IS 2720 part I, except that:

- a) The mass (in g) of a sample required for sieve analysis is about 400D, D being the maximum particle size (mm).
- b) Sample containing particles larger than 19 mm size shall be prepared for compaction and CBR tests as described hereunder, provided the proportion in weight of such particles is less than 30%.

An adequate quantity of representative material shall be sieved over the 50 mm and 19 mm sieve. The material passing the 50 mm sieve and retained on the 19 mm sieve shall be weighed and replaced with an equal mass of material passing the 19 mm sieve and retained on the 4.75 mm sieve. The material for replacement shall be taken from the remaining portion of the main sample.

When preparing gravel samples, the aggregations of particles shall be broken with a wooden or rubber hammer or pestle. Care shall be taken that no individual particles are crushed in the operation.

6.10.2 Standard Methods of Testing

Tests on soils and gravels shall be performed in accordance with the standard methods given in Table below:

Table 2: Tests Procedures Applicable to Disturbed/Undistributed Samples of Soils and Gravels

	Tests		Test procedure
S.NO	Determination of:		
i)	Moisture Content	IS 2720	Part 2 (Oven-drying method)
ii)	Liquid Limit	IS 2720	Part 5 (Cone Penetrometer or by Casagrande Apparatus)
iii)	Plastic limit	IS 2720	Part 5
iv)	Plasticity Index	IS 2720	Part 5
v)	Linear Shrinkage	IS 2720	Part 20
vi)	Specific Gravity of Particles	IS 2720	Part 3
vii)	Particle Size Distribution	IS 2720	Part 4
viii)	Organic Matter Content	IS 2720	Part 22 '
ix)	Total Sulphate Content	IS 2720	Part 27
x)	pH Value	IS 2720	Part 26 (Electrometric Method)
xi)	Mica Content	-	Manual mineralogical counting
xii)	Density-Moisture Content relationship (2.5 kg rammer)	IS 2720	Part 7
xiii)	Density-Moisture Content relationship (4.9 kg rammer)	IS 2720	Part 8
xiv)	California Bearing Ratio	IS 2720	Part 16
xv)	Sand Equivalent	IS 2720	Part 37 (Mechanical Shaker or Manual Shaker method)
xvi)	Field Dry Density	IS 2720	Part 28/Part 29
xvii)	Unconfined compression test	IS2720	Part 10
xviii)	Consolidation test	IS2720	Part 15
xix)	Direct shear test	1S2720	Part 13
xx)	Triaxial Test	IS2720	Part 11,12
xxi)	Hydrometer Analysis	IS 2720	Part 4
xxii)	Vane shear test	IS 2720	Part 30

It is further specified that:

- a) Wherever in the text of these Specifications and the Special Specification the term "x% of the MDD (IS 2720 Part 27 or IS 2720 Part 28) is used it shall mean that a standard of compaction shall be achieved such that the dry density of the compacted material is x% of the maximum dry density determined from the respective tests mentioned in Table 2. Samples for the compaction tests shall be taken before compaction of the layers begins unless in the opinion of the Engineer the compactive effort proposed or applied by the Contractor is such that the material characteristics have changed in which case the samples for the tests shall be taken after all compaction is complete.
- b) Compaction tests: when the material is susceptible to crushing during compaction, a separate and new sample shall be used in the determination of each point on the moisture/density curve.
- c) The dry density of material placed in the works shall be determined by the Sand Replacement Method unless the Engineer directs to use a nuclear method or other method. In the case of nuclear method, tests shall be done at least at the same frequency required when using the Sand Replacement Method, but at each nuclear densometer test location the average of three readings taken at positions rotated by 90° shall be used. A check/comparison test using the Sand Replacement Method shall be carried out at 10 test intervals.

Initial calibration of the nuclear density testing equipment shall be done by carrying out at least fifty tests in parallel with the Sand Replacement Method for each different material encountered. The check tests shall be used to update the initial calibration of the nuclear density testing equipment.

6.11 Stone, Aggregate, Sand and Fillers

(1) Sampling and Preparation of Samples

Sampling shall be carried out as per ASTM-D75 and the samples shall be prepared in accordance with IS 2386 or according to sampling procedures specified for the Standard Methods of testing given in following Table.'

(2) Standards Methods of Testing

Tests on stone, aggregate, sand and filler shall be performed in accordance with the standard procedures given in the following tables.

Table 3:Tests Procedures Applicable to Stone Aggregate and Fillers'

Tests		Test Procedure	
Determination of:			
i)	Particle Size Distribution (Gradation)	IS 2386	Part I
ii)	Clay, Silt, Dust in Aggregates	IS 2386	Part 2
iii)	Flakiness index	IS 2386	Part
iv)	Specific Gravity	IS 2386	Part 3
v)	Moisture Content	IS 2386	Part 3

Tests		Test Procedure	
Determination of:			
vi)	Bulk Density, Voids & Bulking	IS 2386	Part 3
vii)	Soluble Chloride Content	BS812	Part 117
viii)	Mica Content	Manual mineralogical counting	
ix)	Water Absorption	IS2386	Part 3
x)	Crushing Ratio	Manual counting weighing	
xi)	Los Angeles Abrasion	IS 2386	Part 4
xii)	AIV - ACV	IS 2386	Part 4
xiii)	Polished Stone Value	IS 2386	Part 4
xiv)	Degradability Test	NFP94-067	
xv)	Sodium Sulphate Soundness	IS 2386	Part 5
xvi)	Alkali Aggregate Reactivity Test	IS 2386	Part 7
xvii)	Deleterious Substances	IS 2386	Part 2
xviii)	Sand Equivalent	IS 2720	Part 37
xix)	Crushing Strength of stone	IS 2386	Part 4


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 Ministry of Infrastructure Development
 Department of Roads
 Project Directorate (ADB)
 Bishalnagar
 Chudaraj Dhakal
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6.12 Cement

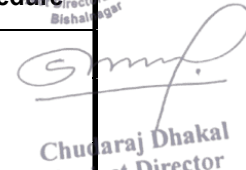
Ordinary and High Strength Portland Cement (OPC and HSPC), Portland Slag Cement (PSC), Portland Pozzolana Cement (PPC) shall be sampled according to IS 3535 and tested according to IS 4031.

Chemical and physical requirements for Ordinary Portland Cement, High Strength Portland Cement, Portland Slag Cement and Portland Pozzolana Cement shall be in accordance with IS 269, IS 8112, IS 12269, IS 455, IS 1489 respectively.

The requirements on their physical characteristics shall be:

Table 4: Requirements on the Physical Characteristics of Cement

S.N.	Physical characteristics	OPC/PSC	HSPC	Test Procedure
i)	Fineness, m2/kg: (by Blaine's Air Permeability method)	225	225	IS-4031 Part 2
ii)	Setting Time:			IS 4031 Part 5
	(a) Minimum Initial Setting Time (minutes)	45	45	
	(b) Maximum Final Setting Time (minutes)	600	600	
iii)	Soundness by Lechatelier method, mm, maximum	10	10	IS 4031 Part 3
iv)	Compressive Strength:			IS 4031 Part 6
	Minimum Average Compressive Strength of three			

S.N.	Physical characteristics	OPC/PSC	HSPC	Test Procedure
	mortar cube(N/mm2)			 Chudaraj Dhakal Project Director
	(a) 3 days	22	27	
	(b) 7 days	29	37	
	(c) 28 days	43	53	

6.13 Lime

Limes shall be sampled and tested in accordance with BS 890 and shall comply with all requirements specified therein.

Lime for treatment shall be Hydrated Calcium Lime or Quicklime and, unless otherwise specified, shall comply with the requirements given in Table below:

Table 5: Requirements of Lime for Treatment

S. No.	Characteristics	Hydrated lime	Quicklime
i)	Fineness		
	Residue on 0.212 mm sieve - Maximum	1%	10%
	Residue on 0.075 mm sieve – Maximum	10%	50%
ii)	Chemical requirements		
	Free lime content. Minimum -	50%	60%
	Hydrated lime content, Maximum		5%

6.13.1 Lime Treated Materials

(1) Sampling

Sampling and preparation of samples of lime treated material shall be carried out as specified or as instructed by the Engineer except that:

Samples containing particles larger than 19 mm shall be prepared for compaction and CBR tests. (The fraction coarser than 19 mm shall be replaced by an equal weight of material passing through 19mm sieve and retained on 4.75 sieves).

(2) Standard Methods of Testing

The tests on lime treated materials shall be performed in accordance with the Standard methods:

Table 6: Additional Tests Procedures Applicable to Lime Treated Materials

Tests	Test Procedure
Determination of:	
(i) Unconfined Compressive Strength (UCS)	BS1924-Part2
(ii) Effect of immersion on UCS	BS 1924 -Part 2
(iii) Lime Content	BS 1924-Part 2 or IS:1514-1990

6.14 Concrete

Sampling and testing on concrete shall be carried out in accordance with the standard methods given:

Table 7: Tests Procedures Applicable to Concrete

S.No.	Tests	Test Procedures
	Determination of:	
(i)	Air contents of fresh concrete	BS 1881-106 or IS 1199-1959
(ii)	Density of hardened concrete	BS 1881-114 or IS 1199-1959
(iii)	Compressive strength of concrete cubes	BS 1881-116 or IS 516-1959
(iv)	Tensile splitting strength	BS 1881-117 or IS 5816-1999
(v)	Flexural strength	BS 1881-118 or IS 516 – 2002
(vi)	Compressive strength of concrete cores	BS 1881-120 or IS: 1199-1959
(vii)	Water absorption	BS 1881-122 or IS:1124-1974
(viii)	Mixing and sampling fresh concrete in laboratory	BS 1881-125 or IS:1199-1959
(ix)	Normal curing of test specimens (20° C method)	BS 1881-111 or IS:9013-1978
(x)	Accelerated curing of test specimens	BS 1881-112 or IS:9013-1978
(xi)	Making test cubes from fresh concrete	BS 1881-108 or IS:1199-1959

Table 8:Non-destructive Tests Applicable to Concrete

S.No.	Tests	References to Test Procedures
(i)	Method of testing hardened concrete for other than strength	BS 1881-5 or IS: 516-1959
(ii)	Guide to the use of non-destructive methods of test for hardened concrete	BS 1881-201 or IS:13311-1 & 2 -1992
(iii)	Recommendation for surface hardened testing by rebound hammer	BS 1881-202 or IS:13311-1 & 2 -1992
(iv)	Recommendation for measurement of velocity of ultrasonic pulses in concrete	BS 1881-203 or IS:13311-1 & 2 -1992
(v)	Recommendation on the use of electromagnetic cover meters	BS 1881-204
(vi)	Recommendation for the assessment of concrete Strength by near to surface tests.	BS 1881-207

The test specimens shall be cured at a temperature of $27^{\circ}\text{C} \pm 2^{\circ}\text{C}$.

Water to be used in concrete shall be tested as specified in BS 3148.

The total chloride content, expressed as chloride ion, arising from all ingredients in a mix including cement, water and admixtures shall not exceed the following limits, expressed as a percentage of the weight of cement in the mix:

For pre-stressed concrete, steam cured concrete or concrete containing sulphate resisting or super-sulphated cement:	-0.1 per cent
For any other reinforced concrete	- 0.4 per cent

The total sulphate content expressed as SO_3 of all the ingredients in a mix including cement, water and admixtures shall not exceed 0.4 percent by weight of the aggregates or 4.0 percent of the weight of the cement in the mix, whichever is the lesser.

6.15 Reinforcing Steel

All reinforcement for use in the Works shall be tested in a Laboratory acceptable to the Engineer and two copies of each test certificate shall be supplied to the Engineer. The sampling and frequency of testing shall be as set out in the NS 84-2042 and NS 191-2045. In addition to the testing requirements described above, the Contractor shall carry out additional testing as instructed by the Engineer.

6.15.1 Testing of Welds

(1) The tests shall be carried out by the methods described in BS 709. The following requirements shall also be met with.

(a) General

In any respect the test results of welded joints shall not be inferior to the British Standard test requirements for the parent material.



(b) Procedure Trials

(i) Tensile and Bend Test

Should any one of the weld joint pieces selected for transverse tensile and transverse and longitudinal bend test fail to comply with the requirements applicable to the parent metal of the joint, 2 additional test pieces shall be taken from the joint material represented by the test. Both the test pieces shall comply with the requirements in order to qualify for the acceptance.

(ii) Charpy V-notch Tests

Should the average impact value obtained from any set of 3 Charpy V-notch tests on specimens fail to comply with the requirements, 3 additional test pieces from the same sample shall be tested. The average of the 6 test results shall comply with the test requirements in order to qualify for acceptance.

(iii) Revised Procedures

In the event of failure to meet the requirements, the Contractor shall carry out further trials, using revised procedures, and further tests to the satisfaction of the Engineer.

(c) Production Tests

(i) Tensile and Bend Tests

Should any one of the weld joint test pieces selected for transverse tensile and transverse bend tests fail to comply with the test requirements applicable to parent metal of the joint represented by the test, additional specimens shall be taken from the same production test plates and the test shall be repeated. Should any of the additional tests fail to comply with the requirements, the joint shall be rejected.

(ii) Charpy V-notch Tests

Should the average impact value obtained from any set of 3 Charpy V-notch specimens selected fail to comply with the test requirements, 3 additional test pieces from the same production test plates shall be tested. Should the average of the 6 results fail to comply with the test requirements the joint shall be rejected.

(iii) Re-welding and Re-Testing

In the event of failure to meet the test requirements the welded joint represented by the tests shall be completely cut out. The joint shall then be re-welded and the test repeated.

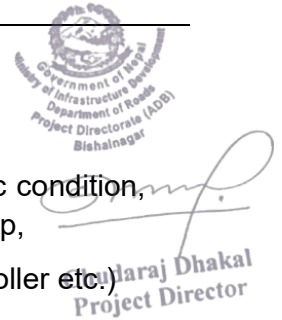
(iv) Non-destructive Testing

A method of non-destructive testing agreed with the Engineer shall be used for the examination of butt welds in tension members.

6.16 Paints for Structural Steelwork

The Contractor shall submit the proposal to the Engineer about the paint system to be used in the Works.

The system shall be defined at least by the following information, supported by the paint manufacturer's data sheets:



- Type of system, composition of each component,
- Minimum thickness of each coat,
- Drying time at 10°C and 20°C within a range a relevant hygrometric condition, including handling conditions, minimum and maximum time of overlap,
- Type of painting method and thinner content, (airless spray, brush, roller etc.)
- Thinner type,
- Blending ratio,
- Maximum time limit of use, by 75% of relative humidity and for a relevant range of temperature and hygrometric conditions,
- Ripening time for a relevant range of temperatures and at least for 20°C and 30°C.
- Weather conditions constraint for painting and drying, including minimum and maximum ambient temperature and temperature of surfaces to be painted.

6.17 Bricks

Bricks shall conform to NS-1-2035 with the exceptions specified

The specification and properties of the masonry brick shall conform to the Nepal Standard Brick Masonry NS: 1/2035. Its size is given below:

Dimensions of Nepal Standard Brick (mm)				
Length	Breadth	Height	Vertical Mortar Joint	Remark
240	115	57	10	For 10 mm mortar joint

Table: Dimensions of a Nepal Standard Brick

Note: Length of Brick = 2 x Width of Brick + 1 Vertical Mortar Joint

Tolerances for First and Second Class bricks are as given in Table:

Individual Brick Size (Nominal Dimensions) (mm)				Length of 20 Bricks (mm)	
Class	Length	Breadth	Height	Minimum	Maximum
A	240 --	- 115 -	--57	4700 2240 1170	4860 2360 1270

Table: Individual Brick Size and Length of 20 Bricks (Class A)

Classification of Bricks and Brickwork

• First Class Brickwork

All the bricks used for masonry construction shall be thoroughly burnt, deep cherry red or copper in color, regular in standard shape and size, free from cracks, emit a clear ringing sound on tapping with a steel trowel and have a crushing strength as per the Nepal Standard Brick Masonry NS: 1/2035. A brick shall not absorb more water than 15 % of its weight after 24 hours of soaking in water at normal

temperatures. However, hand-made bricks with keys may have water absorption up to 25 % of their weight. For first class brickwork, the corresponding mortar types should be H1 and H2.

- **Limitation**

- Masonry units that have been previously used should not be re-used in brick work or brickwork construction unless they have been thoroughly cleaned and shown to conform to the Nepal Standard Brick Masonry NS: 1/2035.

Test on Bricks

S.N.	Test Description	Relevant standard
1	Porosity and water absorption	IS 5454: 1976
2	Compressive strength	IS 5454: 1976

6.18 Mortar

Mortar shall comply with relevant Sub-clause.

6.19 Reinforced Concrete Pipes

Reinforced concrete pipes shall comply with the requirements of NS 80-2042/IS 458:1988.

6.20 Geotextiles

Geotextiles used shall be made of polyethylene or polypropylene or polyester or similar fibers, either woven or non-woven. Unless otherwise shown on the Drawing, the geotextiles shall:

- (1) sustain a load of not less than 10 kN/m at break and have a minimum failure strain of 10 percent when determined in accordance with BS: 6906 or shall have a grab tensile strength more than 0.4 kN/m and grab elongation corresponding to this limit in accordance with ASTM D4632.
- (2) have apparent opening size as shown on the Drawing. If no size is shown on the Drawing, then the apparent size shall be 0.1 mm.
- (3) allow water to flow through it at right angles to its principal plane, in either direction at a rate of not less than 50 liters/sq.m./sec. under a constant head of 100 mm, determined in accordance with BS: 6906 (Part 3) or ASTM D4491, unless otherwise shown on the Drawing. The flow rate determined in the test shall be corrected to that applicable to a temperature of 15°C using data on variation in viscosity of water with temperature
- (4) have a minimum puncture resistance of 200 N when determined in accordance with ASTM D 4833.
- (5) have a minimum tear resistance of 350 N when determined in accordance with ASTM D 4533. Geo textiles used for drilled sub-surface drains shall be as specified



7 Concrete Work

7.1 Definitions

Structural concrete is any class of concrete which is used in reinforced, pre-stressed or un-reinforced concrete construction which is subject to stress.

Non-structural concrete is composed of materials complying with the Specification but for which no strength requirements are specified and which is used only for filling voids, blinding foundations and similar purposes where it is not subjected to significant stress.

A pour refers to the operation of placing concrete into any mould, bay or formwork, etc. and also to the volume which has to be filled. Pours in vertical succession are referred to as lifts.

7.2 Materials for Concrete

(1) General

The Contractor shall submit to the Engineer full details of all materials which he proposes to use for making concrete. No concrete shall be placed in the works until the Engineer has approved the materials of which it is composed. Approved materials shall not thereafter be altered or substituted by other materials without the consent of the Engineer.

(2) Cement

Cement shall be free flowing and free of lumps. It shall be supplied in the manufacturer's sealed unbroken bags or in bulk. Bagged cement shall be transported in vehicles provided with effective means of ensuring that it is protected from the weather.

Bulk cement shall be transported in vehicles or in containers built and equipped for the purpose.

Cement in bags shall be stored in a suitable weatherproof structure of which the interior shall be dry and well ventilated at all times. The floor shall be raised above the surrounding ground level not less than 30cm and shall be so constructed that no moisture rises through it.

Each delivery of cement in bags shall be stacked together in one place. The bags shall be closely stacked so as to reduce air circulation with min gap of 500mm from outside wall. If pallets are used, they shall be constructed so that bags are not damaged during handling and stacking. Stack of cement bags shall not exceed 8 bags in height. Different types of cement in bags shall be clearly distinguished by visible markings and shall be stored in separate stacks.

Cement from broken bags shall not be used in the works. Cement in bags shall be used in the order in which it is delivered.

Bulk cement shall be stored in weather proof silos which shall bear a clear indication of the type of cement contained in them. Different types of cement shall not be mixed in the same silo.

The Contractor shall provide sufficient storage capacity on site to ensure that his anticipated program of work is not interrupted due to lack of cement.

Cement which has become hardened or lumpy or fails to comply with the Specification in any way shall be removed from the Site.

All cement for any one structure shall be from the same source as far as possible.

All cement used in the works shall be tested by the manufacturer. The manufacturer shall provide the results of tests as given in following tables for each supply and for the last six months of his production. The Contractor shall supply two copies of each certificate to the Engineer.

Table 9: Test Results for Chemical Composition of Cement

Compounds %		Mean	Min	Max.	Standard deviation
Lime	CaO				
Silica	SiO ₂				
Alumina	Al ₂ O ₃				
Iron Oxide	Fe ₂ O ₃				
Magnesia	MgO				
Sulphur	So ₃				
Trioxide					
Soda, Potash	Na ₂ O,K ₂ O				

Table 10: Test Results for Physical Properties of Cement

Characteristics	Requirements	Nominal	Mean	Min	Max	St. Dev.
Fineness, M2/KG: (by Blaine's Air Permeability Method)	225					
Minimum Setting time (initial), min	45					
Maximum Setting time (final), min	600					
Soundness (by. Le Chatelie method) mm, maximum	10					
Minimum Average Compressive Strength of three mortar Cubes, (N/mm2)						
3 days	27*					
7 days	37*					
28 days	53*					

*denotes the requirements of High Strength Portland cement.

Each set of tests carried out by the manufacturer on samples taken from cement which is subsequently delivered to site shall relate to no more than one day's output of each cement plant.

The Contractor shall constitute, from each delivery and each type of cement and not less than one samples for every 200 tons or part of it, representative samples to be tested when instructed by the Engineer in a laboratory acceptable to him, in case of the concrete mixes do not comply with the requirements of this Specification.

Cement which is stored on site for longer than one month shall be tested in such laboratory for every 200 tons or part thereof and at monthly intervals thereafter.

The Contractor shall keep full records of all data relevant to the manufacture, delivery; testing and the cement used in the works and shall provide the Engineer with two copies thereof.

(3) Fine Aggregate

Fine aggregate shall be clean hard and durable and shall be natural sand, crushed gravel sand or crushed rock sand complying with IS 383. AH the material shall pass through a 4.75 mm IS sieve and the grading shall be in accordance with IS 383.

In order to achieve an acceptable grading, it may be necessary to blend materials from more than one source. The deviation from the initial fineness modulus shall be no more than ± 0.30 for ordinary concrete and ± 0.20 for high quality concrete.

However, in respect of the presence of deleterious materials the fine aggregate shall not contain iron pyrites, iron oxides, mica, shale, coal or other laminar soft or porous materials or organic matter unless the Contractor can show by comparative tests on finished concrete as per the direction of the Engineer, that the presence of such materials does not affect the properties of the concrete.

(4) Coarse Aggregate

Coarse aggregate shall be clean hard and durable crushed rock, crushed gravel or natural gravel corresponding to the following classes:

Class A: Aggregate shall consist of crushed igneous or quartzite rock from an approved source.

Class B: Aggregate shall consist of crushed quarry rock other than Class A from an approved source.

Class C: Aggregate shall consist of natural or partly crushed gravel, pebbles obtained from an approved gravel deposit. It may contain a quantity of material obtained from crushing the oversize stone in the deposit provided such material is uniformly mixed with the natural uncrushed particles.

Class D: Aggregate shall consist entirely of crushed gravel. The crushed gravel shall be produced from material retained on a standard sieve having an opening at least twice as large as the maximum size of aggregate particle specified.

Class E: Aggregate shall consist of an artificial mixture of any of the above classes of aggregate. The use of Class E aggregate and the relative proportions of the constituent materials shall be approved by the Engineer.

Coarse aggregate shall be supplied in the nominal size called for in the contract and shall be of the grading as single sized aggregate or graded aggregate of nominal size 40 mm, 20 mm, 12.5 mm and 10 mm in accordance with IS 383.

Other properties shall be as set out below:

Flakiness Index: When tested in accordance with IS 2386 Part 1, the Flakiness Index of the coarse aggregate shall be as set out hereunder:

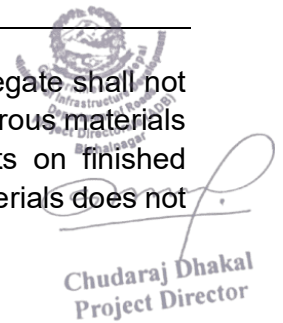
For ordinary concrete : not more than 25

For high quality concrete : not more than 15

If the Flakiness Index of the coarse aggregate varies by more than five units from the average value of the aggregate used in the approved trial mix, then a new set of trial mixes shall be carried out if the workability of the mixes has been adversely affected by such variation.

Water Absorption: The aggregate shall not have water absorption of more than 2 percent when tested as set out in IS 2386 Part 3.

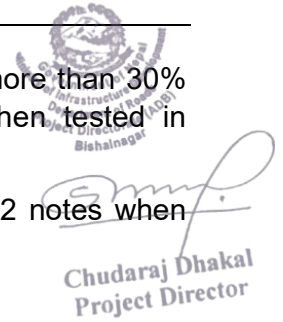
Los Angeles Abrasion (LAA): The aggregate shall have LAA not more than 45% for ordinary concrete, and not more than 35% for high quality concrete, when tested in accordance with IS 2386 Part 4.



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Aggregate Crushing Value (ACV): The aggregate shall have ACV not more than 30% for pavement structure and not more than 45% for other structure when tested in accordance with IS 2386 Part 4.

Alkali Aggregate Reactivity: The aggregate shall comply with IS 383/3.2 notes when tested in accordance with IS 2386 Part 7.



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(5) Testing Aggregates

(a) Acceptance Testing

The Contractor shall deliver to the Engineer samples containing not less than 50 kg of any aggregate which he proposed to use in the works and shall supply such further samples as the Engineer may require. Each sample shall be clearly labelled to show its origin and shall be accompanied by all information called for in IS 2386 Part 1 to 8.

Tests to determine compliance of the aggregates shall be carried out by the Contractor in a laboratory acceptable to the Engineer. If the tested materials fail to comply with the Specification, further tests shall be made in the presence of the Contractor and the Engineer. Acceptance of the material shall be based on the results of such tests.

All the materials shall be accepted if the results of not less than three consecutive sets of tests executed in accordance with IS 2386 (Part 1-8) show compliance.

(b) Compliance Testing/Process Control Testing

The Contractor shall carry out routine testing of aggregates for compliance with the Specification during the period that concrete is being produced for the works. The tests set out below shall be performed on aggregates from each separate source on the basis of one set of tests for each day on which aggregates are delivered to site provided that the set of tests shall represent not more than 100 tons of fine aggregate and not more than 250 tons of coarse aggregate, and provided also that the aggregates are of uniform quality.

Grading: IS 2386 Part 1

Silt, Clay Contents and Organic Impurities: IS 2386 Part 2

If the aggregate from any source is variable, the frequency of testing shall be increased as instructed by the Engineer.

In addition to the above routine tests, the Contractor shall carry out the following tests at the stated frequencies:

Chloride Content: As frequently as may be required to ensure that the proportion of chlorides in the aggregates does not exceed the limit stated in the Specification.

Sulphate Content and Alkali Aggregate Reactivity: As frequently as may be required according to the variability of sulphate content and alkali reactivity assessed from the laboratory tests carried out during the concrete mix design.

(6) Delivery and Storage of Aggregates

Aggregates shall be delivered to site in clean and suitable vehicles. Different type or sizes of aggregates shall not be delivered in one vehicle.

Each type or size of aggregate shall be stored in a separate bin or compartment having a base such that the contamination of aggregate is prevented. Dividing walls between bins shall be substantial and continuous so that no mixing of types or sizes occurs.

The storage of aggregates shall be arranged in such a way that drying out in hot weather is prevented in order to avoid sudden fluctuations in water content. Storage of fine aggregates shall be arranged in such way that they can drain sufficiently before use in order to prevent fluctuations in water content of the concrete.

(7) Water for Concrete and Mortar

Water shall be clean and free from harmful matter and shall comply with the requirements of IS 456.

Brackish water containing more than 1000 ppm chloride ion or 2000 ppm sulphate ion shall not be used for mixing or curing concrete.

The Contractor shall carry out tests in compliance with IS 456 to establish compliance with Specifications.

(8) Admixtures

(a) General

The use of admixtures in concrete may be required under the contract to promote special properties in the finished concrete or may be proposed by the Contractor to assist him in compliance with the Specification.

In all cases the Contractor shall submit to the Engineer full details of the admixture he proposes to use and the manner in which he proposes to add it in the mix. The information provided shall include:

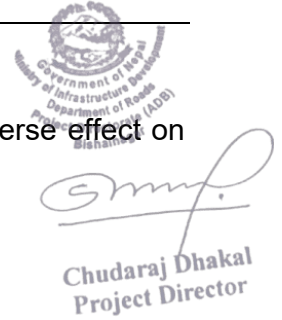
- (i) The typical dosage, the method of dosing, and the detrimental effects of an excess or deficiency in the dosage.
- (ii) The chemical names of the main active ingredients in the admixture.
- (iii) Whether or not the admixture contains chlorides, and if so the chloride ion content expressed as a percentage by weight of admixture.
- (iv) Whether the admixture leads to the entrainment of air when used at the manufacturer's recommended dosage, and if so the extent to which it does so.
- (v) Details of previous uses of the admixture in Nepal.

The chloride ion content of any admixture shall not exceed 1 per cent by weight of the admixture nor 0.02 per cent by weight of the cement in the mix.

Admixtures shall not be mixed together without the consent of the Engineer.

Calcium chloride or admixtures containing calcium chloride shall not be used in pre-stressed concrete.

Admixtures may be supplied as liquid or as powder. They shall be stored in sealed and undamaged containers in a dry, cool place. Admixtures shall be dispensed in liquid form and dispensers shall be of sufficient capacity to measure at one time the full quantity required for each batch.



(b) Workability Agents

Workability agents shall comply with BS 5075 and shall not have any adverse effect on the properties of the concrete.

7.3 The Design of Concrete Mixes

(1) Classes of Concrete

The classes of structural concrete to be used in the works shall be as shown on the Drawing and designated in following Table, in which the class designation includes two figures. The First figures indicate the characteristic strength F_{ck} at 28 days expressed in MPa (N/mm²) and the second figure is the maximal nominal size of aggregate in the mix expressed in millimeters. Letter M in the class designation stands for Mix, letters SM stand for Special Mix.

Consistence of the mix, assessed through the Slump Test where the slump is measured in millimeters, is designated as follows:

S: Stiff consistence, for slump < 40

P: Plastic consistence, for slump > 40 and < 90

VP: Very Plastic consistence, for slump >90 and < 150

F: Flowing consistence for slump > 150

Table 11: Concrete Classes and Strength

Grade	Preliminary Test at 7 days (Minimum)	Work Test at 28 days (Minimum)
M 15	12 N/mm ²	15 + 3 N/mm ²
M 20	16 N/mm ²	20 + 4 N/mm ²
M 25	20 N/mm ²	25 + 4 N/mm ²
M 30	23 N/mm ²	30 + 4 N/mm ²

(2) Design of Proposed Mixes

Concrete mixes shall comply with relevant Clause.

The Contractor shall design all the concrete mixes called for in the Drawing using the ingredients which have been approved by the Engineer in compliance with the following requirements:

- The aggregate portion shall be well graded from the nominal maximum size of stone down to the 150-micron size.
- The cement content shall be such to achieve the strength called for but, in any case, not less than the minimum necessary as shown in following Tables
- The workability shall be consistent with ease of placing and proper compaction having regard to the presence of reinforcement and other obstructions.

- (d) The water/cement ratio shall be the minimum consistent with adequate workability but in any case, not greater than 0.5 for classes of concrete from M20 to M50 taking due account of any water contained in the aggregates. The Contractor shall take into account that this requirement may in certain cases require the inclusion of a workability agent in the mix.

Table 12: Minimum Cement Content

Classes of concrete	Minimum cement content in kg per m concrete of compacted		
	Moderate exposure	Intermediate exposure	Severe exposure
M15/40, M15/20	150	200	225
M20/40, M20/20	250	300	325
M25/20, M25/40	300	325	350
M30/20, M30/40	360	360	400

Note:

The minimum cement contents shown in the above table are required in order to achieve impermeability and durability. In order to meet the strength requirements in the Specification higher contents may be required.

The categories applicable to the works are based on the factors listed hereunder:

Moderate exposure : Surface sheltered from severe rain, buried concrete.

Intermediate exposure : Surface exposed to severe rain; alternate wetting and drying; traffic; corrosive fumes; heavy condensation.

Severe exposure : Surface exposed to water having a pH of 4.5 or less, groundwater containing sulphate.

(3) Laboratory Trial Mixes

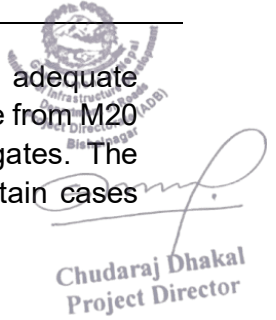
For each mix of concrete for which the Contractor has proposed a design, he shall prepare the number of concrete batches specified hereunder:

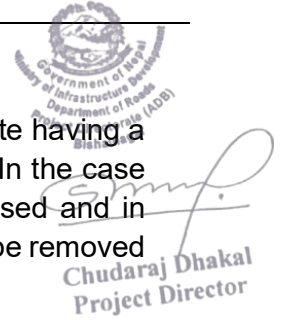
Nominal composition : 3 separate batches

Modified compositions, the quantities of other constituents being unchanged:

Water	:	+10%	1 batch
Water	:	-10%	1 batch
Cement	:	+15%	1 batch
Cement	:	-15%	1 batch

Samples shall be taken from each batch and the following action taken, all in accordance with BS 1881:


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- (a) The slump of the concrete shall be determined.
- (b) Six tests cubes shall be cast from each batch. In the case of concrete having a maximum aggregate size of 20 mm, 150 mm cubes shall be used. In the case of concrete containing larger aggregate, 200 mm cubes shall be used and in addition any pieces of aggregate retained on a 50 mm IS sieve shall be removed from the mixed concrete before casting the cubes.
- (c) The density of all the cubes shall be determined before the strength tests are carried out.
- (d) All faces shall be perpendicular to each other.
- (e) Three cubes from each batch shall be tested for compressive strength at seven days and the remaining three at 28 days.

A "result" being the average strength of the three cubes from one batch, the average of the three results from tests at 28 days for the nominal composition shall not be less than the Minimal Target Strength shown in the Table.

One result from the modified compositions shall not be less than the nominal strength as shown on Table above.

(4) Site Trials

At least six weeks before commencing placement of concrete in the permanent works, site trials shall be prepared for each class of concrete specified.

For each mix of concrete for which the Contractor has proposed a design and successfully tested in Laboratory, he shall prepare three separate batches specified hereunder using the materials which have been approved for use in the works and the mixing plant which he proposes to use for the works. The volume of each batch shall be the capacity of the concrete mixer proposed for full production.

Samples shall be taken from each batch and the action taken.

The average of the three results of tests at 28 days shall not be less than the Minimal Target Strength.

The Contractor shall also carry out tests to determine the drying shrinkage of the concrete unless otherwise directed by the Engineer.

Based on the results of the tests on the Laboratory trial and site trial mixes, the Contractor shall submit full details of his proposals for mix design to the Engineer, including the type and source of each ingredient, and the results of the tests on the trial mixes.

If the Engineer does not agree to a proposed concrete mix for any reason, the Contractor shall amend his proposals and carry out further trial mixes. No mix shall be used in the works without the written consent of the Engineer.

(5) Quality Control of Concrete Production

(a) Sampling

For each class of concrete in production at each plant for use in the works, samples of concrete shall be taken at the point of mixing or of deposition as instructed by the Engineer,

all in accordance with the sampling procedures described in BS 1881 and with the further requirements set out below.

Six 150 mm or 200 mm cubes as appropriate shall be made from each sample and shall be cured and tested in accordance with BS 1881 three at seven days and the other three at 28 days. Where information samples are required, such as for post-tensioning operations, three additional cubes shall be made.

The minimum frequency of sampling of concrete of each grade shall be as following:

For 1-5 m3 quantity of work	-	1 no. of sample
For 5-20 m3 quantity of work	-	2 no. of sample
For 20 m3 and more quantity of work	-	3 no. of sample plus one additional for each 20m3 or part thereof.

At least one set of samples shall be taken from each shifts of work.

Until compliance with the Specification has been established the frequency of sampling shall be three times that stated above and not less than 3 samples/day for each class of concrete in production at each plant or such lower frequency as may be instructed by the Engineer.

(b) Testing

- (i) The slump of the concrete shall be determined for each batch from which samples are taken and in addition for other batches at the point of production and deposition or at the frequency instructed by the Engineer.

The slump of concrete in any batch shall not differ from the value established by the trial mixes by more than 25 mm or one third of the value whichever is the less.

- (ii) The air content of air entrained concrete in any batch shall be within 1.5 times of the required value and the average value of four consecutive measurements shall be within the required value expressed as a percentage of the volume of freshly mixed concrete

- (iii) Early Works: Until such time as sufficient test results are available to apply the method of control described in (iv) below, the compressive strength of the concrete at 28 days shall be such that no single result (average of 3 cubes) is less than the characteristic strength f_{ck} as shown in Table under the Heading "early works test cubes" and also that the average of three consecutive results is not less than $f_{ck}+4$ as shown in Table under the same heading.

The 7-day cube result may be used as an early strength indicator, at the discretion of the Engineer.

- (iv) When at least 20 consecutive results on tested batches are available for any class of concrete mixed in any one plant, no single result shall be less than $f_{ck}+4$ (N/mm²) and also the average of any group of three consecutive results shall not be less than $f_{ck}+4$ (N/mm²).

In addition, the Coefficient of Variation shall be less than the figure given below:

Number of batches	Maximum coefficient of variation	
	Ordinary concrete	High quality concrete
After 20 tested batches	18%	15%
After 50 tested batches	15%	12%



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Where the Coefficient of Variation = (Standard Deviation of the results/Average value of the result)

(v) Failure to comply with Requirements:

If any one result in a group of three consecutive results is less than $f_{ck}-4$ (N/mm²), but the other results of group satisfy the strength requirement, then only the batch from which the failed result was obtained shall be deemed not to comply with the Specification.

If the average strength of the group is less than the strength requirement then all the batches between those represented by the first and the last result shall be deemed not to comply with the Specification, and the Contractor shall immediately adjust the production procedure or the mix design subject to the agreement of the Engineer to restore compliance with the Specification.

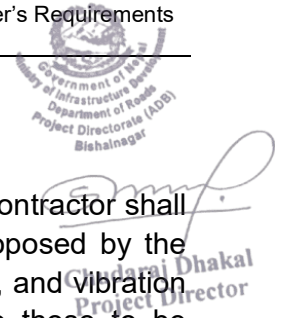
The Contractor shall take necessary action to remedy concrete which does not comply with this Specification. Such action may include but not necessarily confined to the following:

- Increasing the frequency of sampling until control is again established.
- Carrying out non-destructive testing such as ultrasonic measurements, load tests or other appropriate methods,
- Cutting test scores from the concrete and testing in accordance with BS 1881
- Carrying out strengthening or other remedial work to the concrete where possible or appropriate.
- Removing the concrete.
- Accepting as sub standard

Measurement and Payment

In calculating the contents of any R.C.C. member, for measurement proposes the dimensions adopted shall be structural concrete members exclusive of any finish.

It shall be measured in "cubic meters (Cu. M)" of work done as per drawing. Unless specified otherwise, nothing extra shall be paid for any shape, size and position. The cost shall cover all raw materials, concrete additives, manpower, machineries like concrete pump set up, tower cranes and false work for rendering the works as design and drawings. Every class of concrete shall be paid as per respective contract unit rate.



100. Site Clearance

101.1 Dismantling works

Before moving equipment onto the Site and commencing operations the Contractor shall establish to the Engineer's satisfaction that the method of demolition proposed by the Contractor is such that he can keep any nuisance arising from dust, noise, and vibration to an acceptable level and ensure the safety of structures adjacent to those to be demolished. The contractor shall demolish all the RCC, PCC, brick masonry, metal works, wood works and CGI roofing as existed at the site from foundation to the top Storey of all the existing buildings, sheds, boundary wall and underground structures. All the non-serviceable materials obtained from dismantling shall become the property of the Contractor.

Brick work shall dismantle carefully in order to extract minimum 60% useable bricks. Those bricks shall be cleaned off removing mortar and stacked properly at the directed location. Those bricks obtained from dismantle work will be the property of employer. Contractor should use those bricks for brick masonry works and brick soling works. The rates of brick soling and brick masonry work shall be referred as stipulated in BoQ. Serviceable materials shall be stacked neatly in such a manner as to avoid deterioration at site or at other places. All type of Non-serviceable materials shall be disposed off by the Contractor without causing any inconvenience. Dismantling of reinforced concrete structures shall be carried out using approved methods and in accordance with any safety regulations of the local municipality on Kathmandu Valley Physical Development Board or relevant thereto. The Contractor should note that a Building Permit may be required for demolition work.

All rubbish shall be cleared off the site and the Ground let clean and clear and rubbish and non-serviceable materials shall be carted away in a manner acceptable to the local municipality up to a distance of 10kms as directed by the Engineer.

Underground structures shall be broken out to a depth of 1meter below original ground level as directed by the Engineer. Dismantling of walls, tanks, plates inside building to be rehabilitated will be performed with the required care, without damaging the stability of the structure where required or directed by the Engineer, the existing structure will be temporary reinforced to assure the stability. The Contractor will submit for the Engineer's approval for the methods to be applied for demolishing and the proposed temporary safety measures. The Engineer's approval shall not relieve the Contractor any of his responsibilities under the Contract.

Measurement and Payment

The measurement of entire dismantle work under this clause shall be referred as Lump Sum unit. The payment shall be made as per the contract Lump Sum value as indicated in BoQ. The rate shall be the final compensation to all manpower, machine, and haulage of non-serviceable material to the lead about 10Km all complete as per instruction of engineer.

101.2 Clearing and Grubbing

1) Scope:

The Section covers the clearing and grubbing necessary for the construction of the works covered by the contract. Conservation of the top soil and flora is also covered under this Section.

2) Description of Work

a) Clearing

Clearing shall consist of the cutting, removing and disposal of all tree, bushes, shrubs, grass, weeds, other vegetation, anthills, rubbish, fences, top organic soil not exceeding 150 mm in thickness and all other objectionable material, resulting from the clearing and grubbing. It shall also include the removal and disposal of structures that obstruct, encroach upon or otherwise obstruct the work.

The moving of a certain amount of soil or gravel material may be inherent to or unavoidable during the process of clearing and no extra payment shall be made for this. Clearing shall include the removal of all rocks and boulders of up to 0.15 m³ in size exposed or lying on the surface.

b) Grubbing

In the site all trees up to 300 mm girth, stumps and roots shall be removed to a depth of not less than 900 mm below the finished level and a minimum of 500 mm below the original ground level whichever is lower.

Except in borrow areas the cavities resulting from the grubbing shall be backfilled with approved material and compacted to a density not less than the density of the surrounding ground

c) Conservation of Top Soil

Where suitable topsoil exists within the limits of the area to be cleared and grubbed, the Contractor shall, if ordered by the Engineer, remove the topsoil together with any grass and other suitable vegetation. If not used immediately, the topsoil shall be transported and deposited in stockpiles for later use.

d) Conservation of Flora

Where provided for in the contract, certain designated flora encountered in the road reserve and borrow areas shall be carefully protected by the Contractor. In his tendered rate for Site Clearance, he shall include for the careful removal and planting of the flora in a protected and fenced-off area and, on completion of the road, for the replanting of the flora in suitable positions in the road reserve in accordance with the Engineer's instructions.

3) Execution of Work

a) Areas to be Cleared and Grubbed

Stumps, embedded logs, roots and all other vegetation growth and accumulated rubbish of whatsoever nature and all other objectionable material shall be completely removed to a specified depth. Normally the portions of the road reserve that fall within the limits of the road prism, as well as certain borrow areas shall be cleared and/or grubbed. Where the



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road reserve is to remain unfenced, the full width of the road reserve shall be cleared and/or grubbed except for such trees designated by the Engineer to be left standing and uninjured.

The Contractor shall mark the boundaries of the area for clearing and grubbing and seek the approval of the Engineer before commencement of the work. The Engineer shall designate in detail the exact areas to be cleared and grubbed and the time at which it shall be done.

b) Cutting of Trees

The Contractor shall take the necessary precautions to prevent damage to structures and other private or public property. If necessary, trees shall be cut in sections from the top downwards. The branches of trees to be left standing shall be trimmed so as not to intrude into a space of 7 m above the roadway.

Such individual trees as the Engineer may designate and mark in white paint shall be left standing and uninjured. In order to minimize damage to trees that are to be left standing, trees shall be felled towards the center of the area being cleared, if so required by the Engineer.

Permission for cutting trees must be obtained from the competent authority that may require that trees be numbered, measured and marked in the presence of officials from that authority. Cutting of such trees shall then be carried out by the Contractor and the timber stored at designated locations within the Right of Way.

Felling and cutting of trees on the site and piling them off the site shall conform to the requirements of the competent authority.

All tree trunks and branches in excess of 150 mm in diameter shall be cleaned off, secondary branches cut into suitable length and stacked at sites indicated by the Engineer. Such timber shall not be used by the Contractor for any purpose and shall remain the property of the Employer.

All timber except such timber as can be used and all brush, stumps, roots, rotten wood and other refuse from the clearing and grubbing operations shall be completely removed from site.

c) Dealing with Anthills

Where directed by the Engineer, the area covered by anthills shall be treated, after excavation and before backfilling of cavities, with an approved ant control chemical.

d) Disposal of Material

Material obtained from clearing and grubbing shall be disposed off in borrow pits or other suitable places and be covered up with soil or gravel as directed by the Engineer. The burning of combustible material shall not, normally, be permitted and may only be done with the prior written approval of the Engineer.

Where fences have to be taken down, fencing wire shall be neatly wound into reels and all such wire, together with all fence posts and other serviceable material from structures, etc., shall be stacked at sites indicated by the Engineer.

All material from site clearance shall be the property of the Employer and depending on its nature shall, as directed by the Engineer, be either:

- a. Stockpiled for future reuse.
- b. disposed by controlled burning.
- c. disposed by tipping or side casting with all lift within 30m.

e) Re-clearing of Vegetation

When portions of the road reserve, borrow or other areas have been cleared in accordance with the Specifications, but in the course of time, vegetation grows again during construction, the Engineer may, if he considers it necessary, order that the area be re-cleared.

Before the bottom layer of the embankment is made, the Contractor shall grub up and remove any vegetation that may in the meantime have grown on the surfaces previously cleared and grubbed.

Such re-clearing of areas previously cleared includes the removal and disposal of grass, shrubs and other vegetation in the same manner as for the first clearing operation. No separate payment shall be made for re-clearing of vegetation.

Where directed by the Engineer, the area covered by anthills shall be treated, after excavation and before backfilling of cavities, with an approved ant control chemical.

In the site all trees up to 300 mm girth, stumps and roots shall be removed to a depth of not less than 900 mm below the finished level and a minimum of 500 mm below the original ground level whichever is lower.

Except in borrow areas the cavities resulting from the grubbing shall be backfilled with approved material and compacted to a density not less than the density of the surrounding ground.

4) Measurement

Clearing and grubbing executed as per this Specification shall be measured in square meter.

Cutting trees including removal of stumps and their roots and backfilling to required compaction shall be measured in number according to the sizes given below:

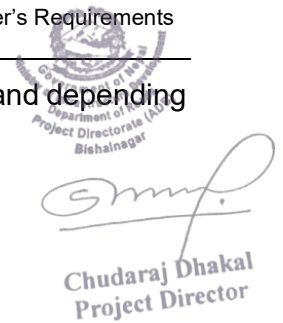
- Above 300 mm to 600 mm
- Above 601 mm to 1200mm
- Above 1201mm to 1800 mm
- Above 1801 mm to 2500 mm
- Above 2501mm to 3000 mm
- Above 3000 mm

For this purpose, girth shall be measured at a height 1 meter aboveground.

Cutting of trees up to 300 mm girth including removal of stumps and roots and backfilling of holes with compaction shall not be measured separately.

5) Payment

Clearing and grubbing and cutting trees shall be paid at their respective contract unit rates which shall be the full and the final compensation to the Contractor. The contract unit rate



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for cutting of trees of girth above 300 mm shall also include handling, salvaging, piling and disposing off the cleared materials with all leads and lifts.

101.3 Turfing:

The area from where the grass roots are to be obtained shall be specified by the Engineer-in-Charge at the time of execution of the work and no royalty shall be charged on this account from the contractor.

The soil shall be suitably moistened and then the operation of planting grass shall be commenced. The grass shall be dibbled at 10 cm, 7.5 cm, 5 cm apart in any direction or other spacing as described in the item. Dead grass and weeded shall not be planted. The contractor shall be responsible for watering and maintenance of levels and the lawn for 30 days or till the grass forms a thick lawn free from weeded and fit for moving whichever is later. Generally planting in other direction at 15 cm, 10 cm, spacing is done in the case of large open spaces, at 7.5 cm spacing in residential lawn and at 5cm spacing for Tennis Court and sports ground lawn.

During the maintenance period, any irregularities arising in ground levels due to watering or due to trampling by labor, or due to cattle straying thereon, shall be constantly made up to the proper levels with earth as available or brought from outside as necessary, Constant watch shall be maintained to ensure that dead patches are replanted and weeds are removed.

Measurements

Length, breadth of the lawn grassed shall be measured and the area shall be calculated in sqm. correct to two places of decimal.

Rate

The rate shall include of all the labor and material involved in all the operations described above.

101.4 Tree planting inclusive tree guards:

In ordinary soil, including refilling earth after mixing with oil cake, manure and watering. Holes of circular shape in ordinary soil shall be excavated to the dimensions described in the items and excavate soil broken to clods of size not exceeding 75 mm in any direction, shall be stacked outside the hole, stones, brick bats, unsuitable earth and other rubbish, all roots and other undesirable growth met with during excavation shall be separated out and unserviceable material removed from the size as directed. Useful material, if any, shall be stacked properly and separately. Good earth in quantities as required to replace such discarded stuff shall be brought and stacked at site by the contractor.

The tree holes shall be manured with powdered Neam/castor oil cake at the specified rate along with farm yard manure over sludge shall be uniformly mixed with the excavated soil after the manure has been broken down to powder, (size of particle not be exceeded 6 mm in any direction) in the specified proportion, the mixture shall be filled in to the hole up to the level of adjoining ground and then profusely watered and enable the soil to subside the refilled soil shall then be dressed evenly with its surface about 50 to 75 mm below the adjoining ground level or as directed by the Engineer-in-charge.

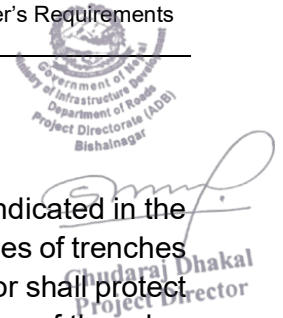
Tree Guard

The tree guard shall be 450 mm in diameter and 1 meter high above ground level and 25 cm in below ground level. The tree guard shall be framed of 4 nos. 20 x 3 mm MS Flat welded to 50x50 wire mesh. The entire tree guard shall be given two coats of synthetic enamel paint of approved brand and manufacturer of required shade and manufacturer of required shade over a priming coat of ready mixed steel primer of approved brand and manufacturer.

Measurement: The tree guard shall be enumerated.

Rate: The rate shall include the cost of all the labor and material involved in all the operations described above.

FOR WEBSITE



102. Soil and Sand Works

102.1 Excavation:

Foundation trench shall be dug to the exact width and depth and levels as indicated in the drawings or to such lesser or greater extent as the Engineer may advise. Sides of trenches shall be vertical. In case the soil does not permit vertical sides, the Contractor shall protect side with timber shoring. Excavated earth shall not be placed within 1.5 meter of the edge of the trench. The Project Engineer may direct the Contractor to place excavated earth at a particular site as instructed by engineer. The bottom of the trench shall be perfectly levelled both longitudinally and transversely. The bed shall be lightly watered and well-rammed. Excess digging if done through mistake shall be filled with 1:4:8 concrete. Water, if any accumulated in the trench, shall be bailed out and all necessary precaution taken to prevent surface water from entering the trench. Soft and defective spot in the trench shall be dug out and removed and filled with concrete or materials prescribed by the Project Engineer. If rocks or boulders are found during excavation, they should be removed and the bed trench shall be levelled and made hard by consolidating the earth, at no extra cost. Above mentioned items or any variation thereof from the Bills of Quantities shall be measured and valued by the Engineer as a variation. After the completion of foundation masonry, the remaining portion of the trench not filled by masonry shall be filled up with earth in layers of 15cm, watered and well-rammed. Such filling shall be free from rubbish, refuse matters and clods, surplus earth, if any shall be removed and site shall be levelled and dressed.

Trenches shall be measured as per drawings and rate shall be for complete Work including trench filling, including all tools and plants required for the completion of the work, removal of boulders, side shoring, pumping, and filling in voids by mass concrete (1:4:8).

No excavation or foundation work shall be filled in or covered up before the inspection and approval of the Project Engineer.

The starting level for excavation shall be deemed to be ground level or such level as may be specified by the Project Engineer, before the commencement of the Work.

Measurement

Measurement of all works will be made in m³.

Measurement for payment under the contract will be limited to the lines, grades, slopes and dimensions shown on the Drawings or as determined by the Engineer as the work proceeds on the basis of his evaluation of the soil/rock characteristics and site-conditions set forth in the Clause.

All required and accepted excavation shall be measured from its original position. The volume shall be determined in cubic meters by average area method to be computed from the original and final cross-sections of the completed works as per the drawings or as directed by the Engineer. Where it is not practicable to use the above method of measurement, the Engineer may use volumetric method or any other method that in his opinion is best suited for accurate assessment.

Any over-excavation shall be reinstated at the risk and cost of the Contractor as directed by the Engineer.

Payment:

Payment for work under these clauses will be made on the basis of contract unit price indicated in the BOQ.

The payment will be full and final compensation for all material, labor, equipment to complete excavation, dewatering, loading, unloading and safe disposal of excavated materials to the lead of about 10Km all complete as specified and instruction of engineer.

102.2 Backfill:

This work is related to all types of structures that require filling with specified material in the remaining volume or space of excavation left unoccupied by any permanent construction. Activities involved are collection and transportation of suitable material from local borrow pits or hill side excavation, placing the specified backfill material in layers, removal of foreign material if any, watering, compacting to required density, lines and levels as indicated in the drawings or as directed by the Engineer. Compaction shall proceed after the Contractor together with the Engineer identify the optimum thickness of each layer of suitable material, its optimum moisture content, and the corresponding number of passes required for a roller to arrive at the corresponding OMC. Prior to the start of works, the contractor shall prepare a trial stretch to establish the above parameters and shall repeat it as often as necessary due to change in layer thickness, borrow pits, and /or change in equipment.

Backfill, classified according to their nature, are presented in the following Sub-Clauses.

Backfill in Plinth of Building and Parking:

This work shall consist of filling for construction of embankment for plinth of building, road works and parking area and includes furnishing, placing, watering, compacting and shaping suitable material obtained from approved sources in accordance to lines, levels, grades, dimensions shown on the drawings and or as required by the Engineer. Fill material used shall not exceed 150 mm and 75 mm within the 300 mm and 150 mm of formation level respectively. Fill material shall not have organic content value exceeding 5% and soaked CBR value less than 6% unless otherwise approved by the Engineer. Activities involved shall be preparation of surface, scarifying, supply, and laying of suitable material in layers. Except where material is laid close to the formation level, each layer shall not exceed 300 mm in thickness before compaction. Each layer of material shall then be watered and compacted to 95% dry density at optimum moisture content. Testing shall be carried out by sand cone using relevant BS or ASTM Standards.

The top level of such fill executed shall be regarded as the formation level.

Common Backfill in Structures:

Common backfill includes stacked suitable material recovered from excavations or material transported from outside. This may include granular material passing through 75 mm sieve or sandy soil. The backfill material shall be spread uniformly in layers, levelled, watered and then compacted to 95% of its optimum density in layers not exceeding 200 mm for buildings works and 250 mm for others. Compaction may be done manually or with mechanical means. Manual compaction in each layer will be done using 2 to 5 kg rammers made of cast-iron or wood. Mechanical compaction shall be executed with either plate compactors, earth rammers, depending on site conditions.

Compaction tests shall be conducted with sand cones using relevant BS or ASTM standards.

103. Masonry Works:

103.1 General:

Mortar:

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 meter and sand shall be proportioned by volume after making due allowance for bulking.

Mixing:

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 color. 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.

Soaking of Bricks:

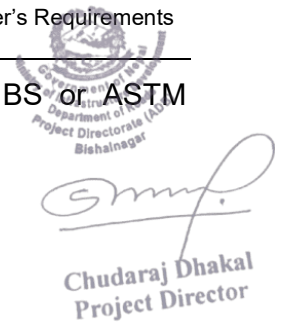
Bricks shall be soaked in water for a minimum period of one hour before use. When bricks are soaked, they shall be removed from the tank sufficiently in advance so that at the time of laying they are skin dry. Such soaked bricks shall be stacked on a clean place where they are not spoilt by dirt, earth, etc.

Laying Brickwork:

The brick shall be built in English bond with upwards facing frog in case of 230mm thick brickwork (for chimney made and fair faced machine made bricks both).

The brick shall be built in running stretcher bond with upwards facing frog in case of half brick wall (for chimney made, traditional dachi appa brickwork and machine made both).

Each brick shall be set with bed and vertical joints filled thoroughly with mortar. Selected bricks shall be used for the exposed brickwork as specified under 7.1.2. The walls shall be taken up truly plumb. All courses shall be laid truly horizontal and vertical joints shall be truly vertical. Vertical joints in alternate course shall come directly over the other. The thickness of brick courses shall be kept uniform and for this purpose wooden straight edge



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with graduation giving thickness of each brick course including joint shall be used. Necessary tools comprising of wooden straight edge, mason's spirit level, square, foot rule, plumb, line and pins etc. shall be frequently and fully used by the masons to ensure that the walls are taken up true to plumb, line and levels.

Both the faces of walls of thickness greater than 23cm shall be kept in proper plane. All the connected brickwork shall be carried up nearly at one level and no partition of work shall be raised more than one meter above the rest of the work. Any dislodged brick shall be removed and reset in fresh mortar.

Before commencing any brickwork, the Contractor shall confer with other trades to ensure that all pipes, conduits, drains, sleeves, bolts, hangers, or any other materials necessary to be installed in the brickwork at the time it is built, have been fixed or provided for.

Joints:

Bricks shall be laid that all joints are full of mortar. The thickness of joints shall be not more than 10mm. The face joints shall be raked to a minimum depth of 7mm by a raking tool during the progress of the work when the mortar is still green, so as to provide proper key for the plaster or pointing to be done. Where plastering pointing is not to be done, the joints shall be struck flush and finished at the time of laying. The face of brickwork shall be kept cleaned and mortar dropping removed.

Jointing With Existing Structures

When fresh masonry is to be placed against existing surface of structures, the surface shall be cleaned of all loose materials, roughened and wetted as directed by the Engineer so as to affect a good bond with the new work.

Openings:

Openings in brickwork for air conditioning ducts, exhaust fans, grills pipes etc. shall be provided at the time of laying brickwork without any extra cost.

After installation of piping, conduits, grills, etc. all openings left around pipes, conduits, grills etc. shall be checked and caulked with cement mortar to render the whole work vermin proof and tidily finished.

The rates quoted are deemed to be inclusive of closing such pre-determined openings including erection and dismantling of scaffolding if required, the placing of inserts, collars, grills etc. to be paid separately under respective items.

Curing:

Green work shall be protected from rain by suitable covering. Masonry work in cement mortar shall be kept constantly moist on all faces for a minimum period of seven days. The top of the masonry work shall be left flooded with water so as not to disturb or washout the green mortar.

During hot weather, all finished or partly completed work shall be covered or wetted in such a manner as to prevent rapid drying of the brick work.

Scaffolding:

The scaffolding shall be sound and strong to withstand all loads likely to come upon it. The holes which provide resting space for horizontal members shall not be left in masonry under one meter in width or immediately near the skew backs of arches. The holes left in the masonry work for supporting the scaffolding shall be filled and made good.

Condition of Equipment:

All equipment used for mixing or transporting mortar and bricks shall be clean and free from set mortar, dirt or other injurious foreign substances.

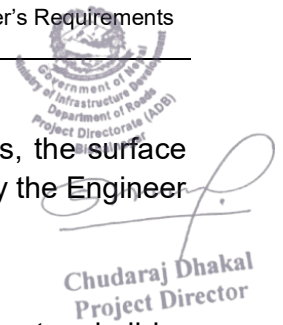
Walling Building:

Bricks shall be wetted before being laid and the top of walling where left off shall be wetted before re-commencing building. Walls to be kept wet three days after building.

Bricks shall be well buttered with mortar before being laid and the brickwork carried up evenly course so that no part is allowed to be carried up more than 90cm higher at any time than any other part.

Cavity Walling Building:

The two layers of half brick wall with half brick cavity is cavity walling of the building. Bricks shall be wetted before being laid and the top of walling where left off shall be wetted before re-commencing building. Each left brick wall shall be connected by 10G GI links made as per design at every five courses vertically and at the 60cm spacing horizontally or as per


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drawing. The two courses below sill will be solid wall. One or both half brick wall will be laid in fair face in stretcher bond. The walls are to be kept wet three days after building.

Bricks shall be well buttered with mortar before being laid and the brickwork carried up evenly course-by-course so that no part is allowed to be carried up more than 90cm higher at any time than any other part.

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Setting out Walling:

The contractor shall provide proper setting - out rods and set out all work on it for corners, openings, heights, etc. And shall build the walls and piers etc. To the width, depth and height indicated on the drawings and as directed and approved by the Engineer in-charge.

Bonding Walls:

Load bearing brickwork generally shall be of Quota bond (nominal thickness 350mm) and reinforced as shown on the detailed drawings. One brick wall (nominal thickness 230mm) shall be in English bond and half brick walls (nominal thickness 115mm) in Stretcher bond. No broken bricks or bats shall be used unless required to from bond.

All propounds, quoins, reveals and other angles of walls shall be built strictly true and square.

Cement & sand shall be as before specified.

Lime shall be freshly burnt lime slaked at least one month before being used by drenching with water, well broken up and mixed and the slurry passed through a 3mm mesh screen to remove all lumps and impurities.

Filling for Brick work:

Where brickwork cavities are specified to contain reinforcing bars, they shall be filled with concrete mix as previously described. The filling shall be placed and consolidated in section not exceeding 90cm in height. Cavities that are to be filled shall be kept free of all mortar dropping.

Brick Lintels:

Lintels over doors and under openings except where in concrete, shall be formed in brick work by reinforcing the three concrete immediately above the opening with steel wire reinforcement projecting 45cm at either end of the opening and the rates are to include for any necessary centering.

Putlog Holes

All putlog holes shall be not less than one course deep and carefully filled with bricks cut to fit size of opening with beds and joints filled with mortar well tamped in after scaffolding is removed.

Keeping Clean

The contractor shall allow in his rates for keeping the fair-faced brickwork free from mortar at all times and for cleaning the work at completion.

Construction Joints between Walls

Where Construction joints indicated on the drawings should be filled by 25*100m flexible jute carpet coated with bitumen and covered by 16G galvanized steel sheet in exposed faces. All the construction debris shall be removed before placing it.

Reinforced Brickwork

All brickwork shall be reinforced with Tor steel or equivalent reinforcement both horizontally and vertically, as per drawing and instruction of engineer. The reinforcement cleaned of rust and loose flakes with a wire brush, shall be embedded thoroughly in cement mortar at every fourth course. It shall be cast in or securely fixed to adjoining columns or walls, in a manner approved by the Engineer.

Jointing

In jointing, the face joints of the mortar shall be worked out while still green to give a finished surface flush with the face of the brick-work. The faces of brick-work shall be cleaned to remove any splashes of mortar during the course of raising the brick-work. The measurement of brickwork both 230mm (above 230mm, if any) and 115mm thick shall be the product of the length, height and thickness i.e. in cubic meter for chimney made and fair faced machine made brickwork. Deduction for doors, windows and other openings including lintels shall be made to arrive at the net quantity of work. Nothing shall be paid extra for forming such openings. However, no deductions shall be made for areas less than 0.1 sqm. overall, bearing of lintels, beams, girders and hold fasts blocks but nothing extra like formwork shall be paid for embedding these. Similarly, no deductions shall be made for chimney flue left in the walls, but nothing extra shall be allowed for rendering for flue openings as specified. Unless otherwise specified nothing extra shall be admissible for cutting shape other than straight or any cutting necessary for shaping the walls to the structural design. Rate shall be inclusive of all necessary scaffolding, watering, cutting of bricks, curing, vertical & horizontal reinforcement within brickwork, materials and labor.

103.2 Machine made Bricks:

Bricks shall be of uniform deep red or copper color, thoroughly burnt without being vitrified, regular in shape and size and shall have sharp and square sides and edges and parallel faces to ensure uniformity in the thickness of the courses of brickwork. The Brick shall be first class machine made bricks of quality approved by the Engineer and free from grit and other impurities such as lime, iron and other deleterious salts, conforming NS 1 2035/ IS code (latest revision). These shall be well-burnt, sound,

and hard with sharp edges and shall emit ringing sound when struck with a mallet. These shall be of uniform size. The size of the bricks shall be 24.0cm x 11.2cm x 5.7cm unless otherwise specified, with a tolerance of ± 3 mm in each direction. The compressive strength should be more than 3.5N/mm².

103.3 Chimney made Bricks:

The Brick shall be first class chimney made bricks of quality approved by the Engineer and free from grit and other impurities such as lime, iron and other deleterious salts, conforming NS 12035 / IS code (latest revision). These shall be well burnt, sound, and hard with sharp edges and shall emit ringing sound when struck with a mallet. These shall be of uniform size. The size of the bricks shall be 22.9cm x 11.2cm x 5.5cm unless otherwise specified, with a tolerance of ± 3 mm in each direction.

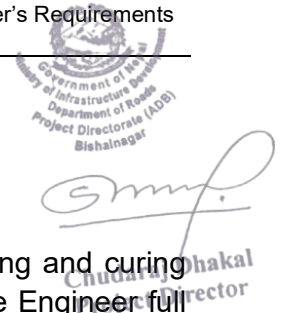
The compressive strength should be 3.5N/mm^2 . The bricks shall be provided with frogs.

Measurements

The measurements of work shall be the product of the length height and thickness. Deductions for doors, windows and other openings including lintels shall be made to arrive at the net quantity of work. Nothing shall be paid extra for forming such openings. However, no deductions shall be made for areas less than 0.1 Sq. m. overall, bearing of lintels, beams, girders and holdfast blocks but nothing extra like formwork shall be paid for embedding these. Unless otherwise specified nothing extra shall be admissible for cutting in brickwork or brick to suit RCC structures, walls in any shape other than straight or any cutting necessary for shaping the walls to the structural design. Rate shall be inclusive of all necessary scaffolding, watering, cutting of bricks, curing, materials and labor.

Payments

The brick works, plastering and pointing shall be paid at their respective contract unit rate which shall be the full and the final compensation to the Contractor as per Clause to complete the work as per these Specifications.



104. Concrete Works

104.1 General:

- **Mixing Concrete**

Before any batching, mixing, transporting, placing, compacting and finishing and curing the concrete ordered or delivered to site, the Contractor shall submit to the Engineer full details including Drawing of all the plant which he proposes to use and the arrangements he proposes to make.

Concrete for the works shall be batched and mixed in one or more plants or concrete mixer unless the Engineer agrees to some other arrangement. If concrete mixers are used, there shall be sufficient number of mixtures including stand by mixers.

Batching and mixing plants shall be complying with the requirements of IS 1791 and capable of producing a uniform distribution of the ingredients throughout the mass. Truck mixers shall comply with the requirements of IS 4925 and shall only be used with the prior approval of the Engineer. If the plant proposed by the Contractor does not fall within the scope of IS 1791 it shall have been tested in accordance with IS 4634 and shall have a mixing performance within the limits of IS 1791.

All mixing operations shall be under the control of an experienced supervisor.

The aggregate storage bins shall be provided with drainage facilities arranged so that the drainage water is not discharged to the weigh hoppers. Each bin shall be drawn down at least once per week and any accumulations of mud or silt shall be removed.

If bulk cement is used, the scale and weight hopper for cement shall be distinct from the scale and weight hopper for aggregates.

Cement and aggregates shall be batched by weight. Water may be measured by weight or volume.

The weighing and water dispensing mechanisms shall be maintained in good order. Their accuracy shall be maintained within the tolerances described in IS 1791 and not more than plus or minus one percent, and checked against accurate weights and volumes when required by the Engineer.

The weights of cement and of each size of aggregate and the weight or volume of water as indicated by the mechanism employed shall be within a tolerance of plus or minus three per cent of the respective weight per batch agreed by the Engineer.

The Contractor shall provide standard test weights at least equivalent to the maximum working load used on the most heavily loaded scale and other auxiliary equipment required for checking the satisfactory operation of each scale or measuring device. Tests shall be made by the Contractor in the presence of the Engineer during the site trials described in Sub-clause 604 (4) and then at intervals to be determined by the Engineer but not less than once per three months. The Contractor shall furnish the Engineer with copies of the complete results of all check tests and shall make any adjustments, repairs or replacements necessary to ensure satisfactory performance.

The nominal drum or pan capacity of the mixer shall not be exceeded. The turning speed and the mixing time shall be as recommended by the manufacturer, but in addition, when

water is the last ingredient to be added, mixing shall continue for at least one minute after all the water has been added to the drum or the pan.

The blades of pan mixers shall be maintained within the tolerances specified by the manufacturer of the mixer and the blades shall be replaced when it is no longer possible to maintain the tolerances by adjustment.

Mixers shall be fitted with an automatic recorder registering the number of batches discharged.

The water to be added to the mix shall be reduced by the amount of free water contained in the coarse and fine aggregates. This amount shall be determined by the Contractor by a method agreed by the Engineer immediately before mixing begins each day and thereafter at least once per hour and for each delivery of aggregates during concreting. When the correct quantity of water, determined as set out in the Specification, has been added to the mix, no further water shall be added, either during mixing or subsequently.

Mixers which have been out of use for more than 30 minutes shall be thoroughly cleaned before any fresh concrete is mixed. Mixers shall be cleaned out before changing to another type of cement.

- **Transportation of Concrete:**

The concrete shall be discharged from the mixer and transported to the works by means which shall prevent adulteration, segregation or loss of ingredients, and shall ensure that the concrete is of the required workability at the point and time of placing. The loss of slump between discharge from the mixer and placing shall be within the tolerances.

The capacity of the means of transport shall not be less than the full volume of a batch.

The time elapsing between mixing transporting placing and compaction altogether of a batch of concrete shall not be longer than the initial setting time of the concrete. If the placing of any batch of concrete is delayed beyond this period, the concrete shall not be placed in the works.

- **Placing of Concrete**

Consent for Placing

Concrete shall not be placed until the Engineer's consent has been given in writing. The Contractor shall give the Engineer at least two full working day notice of his intention to place concrete.

If concrete placing is not commenced within 24 hours of the Engineer's consent the Contractor shall again request consent as specified above.

Preparation of Surface to Receive Concrete

Excavated surfaces on which concrete is to be deposited shall be prepared as set out in relevant Section Existing concrete surfaces shall be prepared before deposition of further concrete, they shall be clean, hard and sound and shall be wet but without any free-standing water.

Any flow of water into an excavation shall be diverted through proper side drains to a sump or be removed by other suitable method which will prevent washing away the freshly deposited concrete or any of its constituents. Any under drain constructed for this purpose

shall be completely grouted up when they are no longer required by a method agreed by the Engineer.

Unless otherwise instructed by the Engineer surfaces against which concrete is to be placed shall receive prior coating of cement slurry or mortar mixed in the proportions similar to those of the fines portion in the concrete to be placed. The mortar shall be kept ahead of the concrete. The mortar shall be placed into all parts of the excavated surface and shall not be less than 5 mm thick.

If any fissures have been cleaned out, they shall be filled with mortar or with concrete as instructed by the Engineer.

The amount of mortar placed at one time shall be limited so that it does not dry out or set before being covered with concrete.

Placing Procedures

The concrete shall be deposited as nearly as possible in its final position. It shall be placed so as to avoid segregation of the concrete and displacement of the reinforcement, other embedded items or formwork. It shall be brought up in layers approximately parallel to the construction joint planes and not exceeding 300 mm in compacted thickness unless otherwise permitted or directed by the Engineer, but the layers shall not be thinner than four times the maximum nominal size of aggregate.

When placing on a nearly horizontal surface, placing shall start at the lower end of the surface to avoid de-compaction of concrete.

Layers shall not be placed so that they form feather edges nor shall they be placed on a previous layer which has taken its initial set. In order to comply with this requirement, another layer may be started before initial set of the preceding layer.

All the concrete in a single bay or pour shall be placed as a continuous operation. It shall be carefully worked round all obstructions, irregularities in the foundations and the like so that all parts are completely full of compacted concrete with no segregation or honey combing. It shall also be carefully worked round and between water stops, reinforcement, embedded steelwork and similar items which protrude above the surface of the completed pour. All work shall be completed on each batch of concrete before its initial set commences and thereafter the concrete shall not be disturbed before it has set hard. No concrete that has partially hardened during transit shall be used in the works and the transport of concrete from the mixer to the point of placing shall be such that this requirement can be complied with.

Concrete shall not be placed during rain which is sufficiently heavy or prolonged to wash mortar from coarse aggregate on the exposed faces of fresh concrete. Means shall be provided to remove any water accumulating on the surface of the placed concrete. Concrete shall not be deposited into such accumulations of water.

In dry weather, covers shall be provided for all fresh concrete surfaces which are not being worked on. Water shall not be added to concrete for any reason.

When concrete is discharged from the place above its final deposition, segregation shall be prevented by the use of chutes, down pipes, trunking, baffles or other appropriate devices.

Forms for walls shall be provided with openings or other devices that will permit the concrete to be placed in a manner that will prevent segregation and accumulations of hardened concrete on the formwork or reinforcement above the level of the placed concrete.

When it is necessary to place concrete under water the Contractor shall submit to the Engineer his proposals for the method and equipment to be employed. The concrete shall be deposited either by bottom- discharging watertight containers or through funnel-shaped tremies which are kept continuously full with concrete in order to reduce to a minimum the contact of the concrete with the water. Special care shall be taken to avoid segregation.

If the level of concrete in a tremie pipe is allowed to fall to such extent that the water enters the pipe, the latter shall be removed from the pour and filled with concrete before being again lowered into the placing position. During and after concreting under water, pumping or de-watering in the immediate vicinity shall be suspended if there is any danger that such work will disturb the freshly placed concrete.

Interruptions to Placing

If the concrete placing is interrupted for any reason and the duration of the interruption cannot be forecast or is likely to be prolonged, the Contractor shall immediately take the necessary action to form a construction joint so as to eliminate as far as possible feather edges and sloping top surfaces and shall thoroughly compact the concrete. All work on the concrete shall be completed before elapse of initial setting time and it shall not thereafter be disturbed until it is hard enough to resist damage. Plant and materials to comply with this requirement shall be readily available at all time during concrete placing.

Before concreting is resumed after such an interruption the Contractor shall cut out and remedy all damaged or un-compacted concrete, feather edges or any undesirable features and shall leave a clean sound surface against which the fresh concrete may be placed.

If it becomes possible to resume concrete placing without contravening the Specification and the Engineer consents to resumption, the new concrete shall be thoroughly worked in and compacted against the existing concrete so as to eliminate any cold joints.

In case of long interruption concrete shall be resumed as directed by Engineer.

Dimensions of Pours

Unless otherwise agreed by the Engineer, pours shall not be more than two meters high and shall as far as possibly have a uniform thickness over the plan area of the pour. Concrete shall be placed to the full planned height of all pours except in the circumstances described. The Contractor shall plan the dimensions and sequence of pours in such a way that cracking of the concrete does not take place due to thermal or shrinkage stresses.

Placing Sequence

The Contractor shall arrange that the intervals between successive lifts of concrete in one Section of the works are of equal duration. This duration shall not be less than three days or not more than seven days under temperate weather conditions unless otherwise agreed by the Engineer.

Where required by the Engineer to limit the opening of construction joints due to shrinkage, concrete shall not be placed against adjacent concrete which is less than 21 days old.

Contraction gaps in concrete shall be of the widths and in the locations as shown on the Drawing and they shall not be filled until the full-time interval shown on the Drawing has elapsed.

Compaction of Concrete

Concrete shall be fully compacted throughout the full extent of the placed layer. It shall be thoroughly worked against the formwork and around any reinforcement and other embedded item, without displacing them. Care shall be taken at arises or other confined spaces. Successive layers of the same pour shall be thoroughly worked together.

Concrete shall be compacted with the assistance of mechanical immersion vibrators, unless the Engineer agrees another method. Immersion and surface vibrators shall operate at a frequency of between 70 and 200 hertz. The Contractor shall ensure that vibrators are operated at pressures and voltages not less than those recommended by the manufacturer in order that the compactive effort is not reduced.

A sufficient number of vibrators shall be operated to enable the entire quantity of concrete being placed to be vibrated for the necessary period and, in addition, stand-by vibrators shall be available for instant use at each place where concrete is being placed.

Vibration shall be continued at each point until the concrete ceases to contract, air bubbles have ceased to appear, and a thin layer of mortar has appeared on the surface. Vibrators shall not be used to move concrete laterally and shall be withdrawn slowly to prevent the formation of voids.

The vibrators shall be inserted vertically into the concrete to penetrate the layer underneath at regular spacing which shall not exceed the distance from the vibrator over which vibration is visibly effective and some extent of vibration is overlapped.

Vibration shall not be applied by way of reinforcement nor shall the vibrators be allowed to touch reinforcement, sheathing ducts or other embedded items.

Tests

Regular Slump test should be carried out to control the addition of water and to maintain required consistency.

Curing of Concrete

General

Concrete shall be protected during the first stage of hardening from loss of moisture and from the development of temperatures differentials within the concrete sufficient to cause cracking. The methods used for curing shall not cause damage of any kind to the concrete.

Curing shall be continued for as long as may be necessary to achieve the above objectives but not less than seven days or until the concrete is covered by successive construction whichever is the shorter period.

The above objectives shall be dealt with but nothing shall prevent both objectives being achieved by a single method where circumstances permit.

The curing process shall commence as soon as the concrete is hard enough to resist damage from the process. In the case of large areas or continuous pours, it shall commence on the completed Section of the pour before the rest of the pour is finished.

Loss of Moisture

Exposed concrete surfaces shall be closely covered with impermeable sheeting, properly secured to prevent its removal by wind and the development of air spaces beneath it. Joints in the sheeting shall be lapped by at least 300 mm.

If it is not possible to use impermeable sheeting, the Contractor shall keep the exposed surfaces continuously wet by means of water spray or by covering with a water absorbent material which shall be kept wet, unless this method conflicts with provisions of relevant Sub-clause.

Water used for curing shall be of the same quality as that used for mixing.

Formed surfaces may be cured by retaining the formwork in place for the required curing period.

If instructed by the Engineer, the Contractor shall, in addition to the curing provisions set out above provide a suitable form of shading to prevent the direct rays of the sun reaching the concrete surfaces for at least the first four days of the curing period.

Limitation of Temperature Differentials

The Contractor shall limit the development of temperature differentials in concrete after placing by any means appropriate to the circumstances including the following:

Limiting concrete temperatures at placing);

Use of low heat cement for mass concreting, subject to the agreement of the Engineer;

Leaving formwork in place during the curing period. Steel forms shall be suitably insulated on the outside;

Preventing rapid dissipation of heat from surfaces by shielding from wind.

Protection of Fresh Concrete

Freshly placed concrete shall be protected from rainfall and from water running over the surface until it is sufficiently hard to resist damage from these causes.

Concrete placed in the works shall not be subjected to any loading including traffic until it has attained at least its characteristic strength.



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Concreting in Hot Weather

General

The Contractor shall prevent damage to concrete arising from exposure to extreme temperatures, and shall maintain in good working order all plant and equipment required for this purpose.

In the event that conditions become such that even with the use of equipment the requirements cannot be met, concrete placing shall immediately cease until such time as the requirements can again be met.

Concrete Placing in Hot Weather

During hot weather the Contractor shall take all measures necessary to ensure that the temperature of concrete at the time of placing in the works does not exceed 30°C and that the concrete does not lose any moisture during transporting and placing.

Such measures may include but are not necessarily limited to the following:-

Shielding aggregates from direct sunshine.

Use of a mist water spray on aggregates.

Sun shields on mixing plants and transporting equipment.

Surfaces in which concrete is to be placed shall be shielded from direct sunshine and surfaces shall be thoroughly wetted to reduce absorption of water from the concrete placed on or against them.

After concrete has been placed, the selected curing process shall be commenced as soon as possible. If any interval occurs between completion of placing and start of curing, the concrete shall be closely covered during the interval with polythene sheet to prevent loss of moisture.

Construction Joints

Whenever concrete is to be bonded to other concrete which has hardened, the surface of contact between the Sections shall be deemed a construction joint.

Where construction joints are shown in the Drawing, the Contractor shall form such joints in such positions. The location of joints which the Contractor requires to make for the purpose of construction shall be subject to the approval of the Engineer. Construction joints shall be in vertical or horizontal planes except in sloping slabs where they shall be normal to the exposed surface or elsewhere where the Drawing requires a different arrangement.

Construction joints shall be arranged as to reduce to a minimum the effects of shrinkage in the concrete after placing, and shall be placed in the most advantageous positions with regard to stresses in the structures and the desirability of staggering joints.

Feather edges of concrete at joints shall be avoided. Any feather edges which may have formed where reinforcing bars project through a joint shall be cut back until sound concrete has been reached.

The intersections of horizontal and near horizontal joints and exposed faces of concrete shall appear as straight lines produced by use of a guide strip fixed to the formwork at the top of the concrete lift, or by other means acceptable to the Engineer.

Construction joints formed as free surfaces shall not exceed a slope of 20 per cent from the horizontal.

The surface of the fresh concrete in horizontal or near horizontal joints shall be thoroughly cleaned and roughened by means of high-pressure water, and air jets or wire brush, when the concrete is hard enough to withstand the treatment without the leaching of cement. The surface of vertical or near vertical joints shall be similarly treated if circumstances permit the removal of formwork at a suitable time.

Where concrete has become too hard for the above treatment to be successful, the surface whether formed or free shall be thoroughly scrubbed by mechanical means, manually or wet sand blasted and then washed with clean water. The indentations produced by scrubbing shall not be less than 10 mm deep and shall be away from the finished face by 40mm.

If instructed by the Engineer the surface of the concrete shall be thoroughly brushed with a thin layer of mortar composed of one part of cement to two parts of sand by weight immediately prior to the deposition of fresh concrete. The mortar shall be kept just ahead of the fresh concrete being placed and the fresh layer of concrete shall be thoroughly and systematically vibrated to full depth to ensure complete bond with the adjacent layer. No mortar or concrete shall be placed until the joint has been inspected and approved by the Engineer.

Records of Concrete Placing

Records of the details of every pour of concrete placed in the works shall be kept by the Contractor in a form agreed by the Engineer. These records shall include class of concrete, location of pour, date and duration of pour, ambient temperature and concrete temperature at time of placing and all relevant meteorological information such as rain, wind etc., moisture contents of the aggregates, details of mixes, batch numbers, cement batch number, results of all tests undertaken, part of the structure and place where test cube samples are taken from.

The Contractor shall supply to the Engineer four copies of these records each week covering work carried out the preceding week. In addition, he shall supply to the Engineer monthly histograms of all 28-day cubes strength results together with cumulative and monthly standard deviations, Coefficient of Variation, and any other information which the Engineer may require concerning the concrete placed in the works.

No Fines Concrete

No Fines concrete (NF concrete) is intended for use where a porous concrete is required and shall only be used where shown on the Drawing or instructed by the Engineer.

The mix shall consist of Ordinary Portland cement and aggregate complying with this Specification. The aggregate size shall be 40 mm to 10 mm only. The weight of cement mixed with 0.3 cubic meters of aggregate shall not be less than 50 kg. The quantity of water shall not exceed that required to produce a smooth cement paste which will coat evenly the whole of the aggregate.

Hand Mixed Concrete

Concrete for structural purposes shall not be mixed by hand. Where non-structural concrete is required, hand mixing may be carried out subject to approval of the Engineer.

For making hand mixed concrete, cement, sand and aggregate shall be batched separately by volume or by weight as applicable. Mixing shall be done in masonry platform or sheet iron tray. Then cement and sand shall be mixed dry to uniform color. The aggregate shall be stacked in a proper shape upon which cement sand mix shall be spread and whole mix shall be turned up and down to have uniform mix of all ingredients. Then water shall be added and shall be mixed to uniform consistency.

For hand mixed concrete the specified quantities of cement shall be increased by 10% and not more than 0.25 cubic meters shall be mixed at one time. During windy weather precautions shall be taken to prevent cement from being blown away in the process of gauging and mixing.

Early Loading

No load shall be applied to any part of a structure until the specified curing period has expired, and thereafter loading shall be allowed after approval by the Engineer. The Engineer's decision shall be based on the type of load to be applied, the age of concrete, the magnitude of stress induced and the propping of the structure.

No structure shall be opened to traffic until test cubes have attained the specified minimum 28 days strength.

Measurement

Concrete laid in place as specified in the Drawing or directed by the Engineer shall be measured in cubic meter separately for each class. No deduction shall be made in the measurement for: bolt holes, pockets, box outs and cast-in components provided that the volume of each is less than 0.15 cubic meters; mortar beds, fillets, drips, rebates, recesses, grooves, chamfers and the like of 100 mm total width or less; reinforcement.

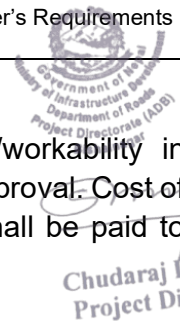
Blinking Concrete/Non-Structural Concrete

Blinking concrete laid in place shall be measured in cubic meter. No deduction shall be made for openings provided that the area of each is less than 0.5 square meters. Blinking concrete over hard material shall be measured as the volume used provided that the maximum thickness of 150 mm allowed for over break is not exceeded. Admixtures, Workability and Hardening Agents Measurement of these items shall be carried out as specified in the contract.

Payment

Every class of concrete shall be paid as per respective contract unit rate. The respective rate shall also include the cost of:

- Admixtures and workability agents including submission of details unless specified.
- Class of UF1, 2 or 3 surface finish.
- Laying to sloping surfaces not exceeding 15° from the horizontal and to falls.
- Formwork to lean concrete.
- Placing and compacting against excavated surfaces where required including any additional concrete to fill over break and working space.



Admixtures, Workability and Hardening Agents

If any admixtures are required to achieve specified property/strength/workability in concrete, the contractor shall dose approved brand/type admixtures with approval. Cost of those material are covered by the cost of concrete. No extra payment shall be paid to contractor by client.

104.2 Non-structural Concrete

Non-structural concrete (NS concrete) shall be used only for non-structural purposes where shown on the Drawing. NS concrete shall be compound of ordinary Portland cement and aggregates complying with this Specification. The weight of cement mixed with 0.3 cubic meters of combined aggregate shall not be less than 50 kg. The mix shall be proportioned by weight or by volume. The maximum aggregate size shall be 40 mm nominal.

The concrete shall be mixed by machine or by hand to a uniform color and consistency before placing. The quantity of water used shall not exceed that required to produce a concrete with sufficient workability to be placed and compacted where required. The concrete shall be compacted by hand towels or rammers or by mechanical vibration.

104.3 Reinforcement:

Reinforcement as plain bars and deformed bars and steel fabric shall comply with the following Indian Standards.

- IS 1786 for high strength deformed steel bars and wires.
- IS 1566 for steel mesh fabric.
- IS 432 mild steel and medium tensile steel bars.

All reinforcement shall be from an approved manufacturer and, if required by the Engineer, the Contractor shall submit the ISI certification mark or other test certificate from the manufacturer acceptable to the Engineer. The Contractor shall furnish all information as manufacturer's certificate, invoice, and other relevant details to ensure the quality of steel.

The reinforcements shall have no crack, scale or rust or foreign particles that will destroy or reduce the bond. The bars shall be accurately bent and formed to the dimension indicated in the Drawings. The Contractor shall prepare bending schedules for each structure and calculate the weight of the reinforcement. The schedule of bars and the calculations shall be submitted to the Engineer for approval.

Binding wire used to bind reinforcements shall be annealed galvanized binding wire of 20 gauges.

The sampling and frequency of testing shall be as set out in the NS 84-2042 and NS 191-2045. All reinforcement not complying with the Specification shall be removed from site.

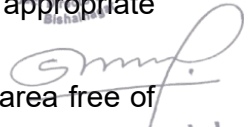
Storage of Reinforcement

All reinforcement shall be delivered to site either in straight lengths or cut and bent. No reinforcement shall be accepted in long lengths which have been transported bent over double.

Any reinforcement which is likely to remain in storage for a long period shall be protected from the weather so as to avoid corrosion and pitting. All reinforcement which has become

corroded or pitted to an extent which, in the opinion of the Engineer, will affect its properties shall either be removed from site or may be tested for compliance with the appropriate Indian Standard at the Contractor expense.

Reinforcement shall be stored at least 150mm above the ground on a clean area free of mud and dirt and sorted out according to category, quality and diameter.


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Project Director

Bending Reinforcement

Unless otherwise shown on the Drawing, bending and cutting shall comply with IS 2502.

The Contractor shall satisfy himself as to the accuracy of any bar bending schedules supplied and shall be responsible for cutting, bending, and fixing the reinforcement in accordance with the Drawing. Bars shall be bent mechanically using appropriate bar benders. Bars shall be bent cold by the application of slow steady pressure. At temperatures below 5°C the rate of bending shall be reduced if necessary to prevent fracture in the steel.

Bending reinforcement inside the forms shall not be permitted except for mild steel bars of diameter less or equal to 12 mm, when it is absolutely necessary. After bending, bars shall be securely tied together in bundles or groups and legibly labeled as set out in IS 2502.

Fixing Reinforcement

Reinforcement shall be thoroughly cleaned. All dirt, scale, loose rust, oil and other contaminants shall be removed before placing it in position. If the reinforcement is contaminated with concrete from previous operations, it shall be cleaned before concreting in that Section.

Reinforcement shall be securely placed and fixed in position as shown in the drawing or directed by the Engineer. Unless otherwise agreed by the Engineer, all intersecting bars shall be either tied together with not less than 1.6 mm diameter soft annealed iron wire and the end of the wire turned into the body of the concrete, or shall be secured with a wire clip of a type agreed by the Engineer.

Spacer blocks shall be used for ensuring that the correct cover is maintained on the reinforcement. Blocks shall be as small as practicable and of a shape agreed by the Engineer. They shall be made of mortar mixed in the proportions of one part of cement to two parts of sand by weight. Wires cast into the block for tying in to the reinforcement shall have not less than 1.6 mm diameter and shall be soft annealed iron.

Alternatively, another type of spacer block may be used subject to the Engineer's approval. All reinforcement shall be checked of shape, size, diameter and number where necessary. Reinforcement shall be rigidly fixed so that it remains intact during placing of concrete. Any fixers Made to the formwork shall not remain within the space to be occupied by the concrete being placed.

No splices shall be made in the reinforcement except where shown on the Drawing or agreed by the Engineer. Splice lengths shall be as shown on the Drawing or directed by the Engineer.

Reinforcement shall not be welded except where required by the contract or agreed by the Engineer. If welding is employed, all welded splices shall be full penetration butt welds complying with the procedures set out in IS 2751 or IS 9417 as applicable. Mechanical

splices shall not be used unless the Engineer agrees otherwise. Acceptance for welded or mechanical splices of approved design shall be based on qualification tests to be carried out by the Contractor prior to start of the work. Construction control testing as instructed by the Engineer shall be also carried out.

The Contractor shall ensure that reinforcement left exposed in the works shall not suffer distortion, displacement or other damage. When it is necessary to bend protruding reinforcement aside temporarily, the radius of the bend shall not be less than four times the bar diameter for mild steel bars or six times the bar diameter for high yield bars. Such bends shall be carefully straightened without leaving residual kinks or damaging the concrete round them before concrete placing. In no circumstances heating and bending of high yield bars shall be permitted.

Bars complying with IS 1786 or other high tensile bars shall not be bent after placing in the works.

Measurement

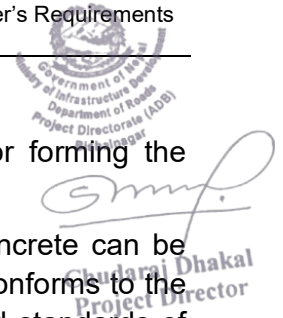
The measurement of Reinforcement shall be in accordance with the provided approved design and drawing. The exact quantity shall be verified by joint field measurement by a team of contractor and engineer. Exact length of laps, bending, hooking, and provision and fixing of chairs of at least 12 mm dia. shall be separately measured for payment.

Payment

The reinforcement shall be paid at contract unit rate. The provide rate shall also include compensation for the cost of providing, cutting to length, cleaning, spacer blocks, waste incurred by cutting, welding, fixing the reinforcement in position including the provision of wire or other material for supporting and tying the reinforcement in place, bending reinforcement aside temporarily, and straightening, placing and compacting concrete around reinforcement and. Exact length of laps, bending, hooking, and provision and fixing of chairs of at least 12 mm dia. shall be separately measured for payment.

Fabric Reinforcement

The fabric reinforcement shall be paid at contract unit rate which shall be also inclusive of compensation for wastage and laps.



105. Formworks and Waling

Form works shall include all temporary or permanent forms required for forming the concrete together with all temporary construction for their support.

Form works shall be designed and erected by the Contractor so that concrete can be properly placed and compacted in a manner that the hardened concrete conforms to the required shape, position, and level subject to the specified tolerances and standards of finish. It shall be assembled with adequate nails and /or nuts and bolts. It shall consist of wooden boards, sheet metals, and any other suitable material that prevent loss of grout when the concrete is vibrated.

Special care shall be taken to maintain the stability of the form works and the tightness of the joints particularly during concrete vibrating operations.

The formworks shall be as specified in the BOQ with adequate ribs for the beam, column and slabs. The Engineer shall approve the material and position of any ties passing through the concrete. The whole or part of the tie shall be capable of being removed such that any remaining part shall be embedded in the concrete by at least the specified thickness for reinforcement cover. Any holes formed by removal of ties shall be filled with concrete or mortar of approved composition.

Form works at top shall be provided where the slope of the formed surface exceeds one in four. Before each concrete operation commences, form works shall be cleaned of all rubbish and other foreign particles.

Concrete operations shall not commence until the erected form works has been inspected and approved. The Contractor shall give at least 48 hours' notice for such inspection. On rejection for any reason, the Engineer shall require another 48 hours to inspect the rectified errors. The inside surface of forms shall be coated with an approved material to prevent the adhesion of concrete. Such material shall be applied strictly in accordance with the manufacturer's instructions and shall not come in contact with the reinforcement or anchors.

Construction of Formwork

Joints in formwork for exposed faces shall, unless otherwise specified, be evenly spaced and horizontal or vertical and shall be continuous in a regular pattern.

All joints in formwork shall be water tight. Where reinforcement projects through formwork, the form shall fit closely round the bars. Formwork shall be so designed that it may be easily removed from the work without damage to the faces of the concrete. It shall also incorporate provisions for making minor adjustments in position, if required, to ensure the correct location of concrete faces. Due allowance shall be made in the position of all formwork for movement and settlement under the weight of fresh concrete.

Surfaces at slopes less than 20° may be formed by screeding. Surfaces at slopes between 20° and 30° shall generally be formed if the Contractor can demonstrate to the satisfaction of the Engineer that such slopes can be screeded with the use of special screed boards to hold the concrete in place during vibration.

Horizontal or inclined formwork to the upper surface of concrete shall be adequately secured against uplift due to the pressure of fresh concrete. Formwork shall also be tied down or otherwise secured against floating within the body of the concrete.

The internal and external angles on concrete surfaces shall be formed with fillets and chamfers of the sizes shown on the Drawing unless otherwise instructed by the Engineer.

Supports for formwork may be bolted to previously placed concrete provided the type of bolt used is acceptable to the Engineer. If metal ties through the concrete are used in conjunction with bolts, the metal left in shall not be close to the face of the concrete by less than 50mm.

Formwork shall not be re-used after it has suffered damage which is sufficient to impair the finished surfaces of the concrete.

Where circumstances prevent easy access within the form, temporary openings shall be provided through the formwork for cleaning and inspection.

Shear keys of the size and shape as indicated on the Drawing shall be provided in all construction joints.

Where pre-cast concrete elements are specified for use as permanent formwork, or proposed by the Contractor and agreed by the Engineer, they shall comply with the requirements of formwork as specified in the Specifications in respect of surface finish, strength and rigidity. Such elements shall be set true to line and level within the tolerances prescribed for the appropriate class of finish and fixed so that they cannot move when concrete is placed against them.

Preparation of Formwork

Before any reinforcement is placed into position within formwork, the latter shall be thoroughly cleaned and then dressed with a release agent. The agent shall be either suitable oil incorporating a wetting agent, an emulsion of water suspended in oil or low viscosity oil containing chemical agents. The Contractor shall not use an emulsion of oil suspended in water nor any release agent which causes staining or discolorations of the concrete, air holes on the concrete surface, or retards the set of the concrete or affects the strength of concrete.

In order to avoid color differences on adjacent concrete surfaces, only one type of release agent shall be used in any one section of the works.

In cases where it is necessary to fix reinforcement before placing formwork, all surface preparation of formwork shall be carried out before it is placed into position. The Contractor shall not allow reinforcement or pre-stressing tendons to be contaminated with formwork release agent.

Before placing concrete all dirt, construction debris and other foreign matter shall be removed completely from within the placing area. Before concrete placing commences, all wedges and other adjusting devices shall be secured against movement during concrete placing and the Contractor shall maintain a watch on the formwork during placing to ensure that no movement occurs. If any movement noticed, the formwork shall be set right immediately.

Removal of Formwork

The Contractor shall give 24 hours' notice of his intentions to strike any form works. Forms shall be removed without shock vibrations or other damage to the concrete.

Formwork shall be carefully removed without shock or disturbance to the concrete. No formwork shall be removed until the concrete has gained sufficient strength to withstand any stresses safely to which it may thereby be subjected.

The minimum periods which shall elapse between completion of placing concrete and removal of forms are given in Table and apply to ambient temperatures higher than 10°C. At lower temperatures or if cement other than ordinary Portland are involved, the Engineer may instruct longer periods.

Alternatively, formwork may be removed when the concrete has attained the strength set out in Table provided that the attained strength is determined by making test cubes and curing them under the same conditions as the concrete to which they refer.

Compliance with these requirements shall not relieve the Contractor of his obligation to delay removal of formwork until the removal can be completed without damage to the concrete. If the Contractor wishes to strip formwork from the underside of arches, beams and slabs before the expiry of the period for supports set out above, it shall be designed so that it can be removed without disturbing the supports. The Contractor shall not remove supports temporarily for the purpose of stripping formwork and subsequently replace them. As soon as the formwork has been removed, bolt holes in concrete faces other than construction joints which are not required for subsequent operations shall be completely filled with mortar sufficiently dry to prevent any slumping at the face. The mortar shall be mixed in the same proportions as the fine aggregate and cement in the surrounding concrete and with the same materials and shall be finished flush with the face of the concrete.

After removal of the formwork, the date of casting of concrete shall be marked on the surface of related concrete by water proof paint/marker for estimation of curing time.

Minimum Time for Form works

Form work	Normal weather (days)	Cold weather (days)	Strength to be attained
1. Vertical or near vertical	24 hours	near	0.2 fck
2. Beam sides, walls and unloaded columns	48 Hours	1.5 days	0.3 fck
3. Soffit of slabs and beams			
4. Spans p to 3m	4 Days	7 days	fck
5. Spans over 3m up to 6m	11Days	17 days	fck

Measurement

Except as stated below, formwork shall be measured in square meter of formwork actually in contact with the finished face of the concrete. No deduction shall be made in the measurement for openings, pipes, ducts and the like, provided that the area of each is less than 0.50 square meters. Unless otherwise stated, if the volume or area of concrete has

not been deducted when measuring the concrete, formwork to form box or the void shall not be measured.

Formwork required for lean concrete, to form construction joints and shear keys for future concrete and other construction surfaces shall not be measured and the costs shall be included in the rates for other work.

Formwork to contraction and expansion joints shall be measured in square meter on one face only. The rates shall include for the costs stated below and for forming recesses for sealant and channels for grout.

The measurement of formwork is inclusive of the measurement for formwork finished surface, shoring, staging, scaffolding and other accessories required for erection and removal of the formwork.

Payment

The formwork shall be paid as per the contract unit rate. The rates for formwork shall include the cost of submission of details, transportation and use of all materials for formwork, erection including provision of supports, fillets and chamfers 75 mm and less in width, bolts, ties, fixings, cutting to waste, drilling or notching the formwork for reinforcement where required, working around pipes, ducts, conduits and waterstops, temporary openings, cleaning, dressing, removal of formwork, filling bolt holes and any remedial work including all incidental works required to complete the work as per Specification.

The payment for unformed surfaces of concrete shall be deemed included in the contract unit rate of the relevant concrete.

106. Aluminum Doors and Windows

These shall be fabricated from 15 micron natural or color anodized Aluminium profiles conforming to IS: 733-1983. The glazing glass shall be clear IAG float glass or equivalent without any distortion. The window shall be made out of extruded Aluminium section (Al. Mg.Si.) and shall conform to IS – 63400, AA-6063 unless otherwise directed. Aluminium sections shall be anodized and the anodic film shall be 12-15 microns. The colors shall be as directed by engineer. The 2-3 tracks on outer frame of standard size otherwise directed shall be fixed in the position by using heavy duty plastic grips with necessary plugs and fillers. All the sliding shutters shall be provided with two ball bearing rollers and ratting pieces/guides one each at the top and bottom, weather strips all around. Openable window shall be double weather stripped, one strip shall be provided in outer frame and outer shall be in the shutter frame. The hinges or stay hinges of open able window shall be strong. Pin of the hinges shall be of non-corroding materials, preferably nylon/steel. All the joints shall be mechanically fixed. All the window shutter shall be provided with special locking arrangement. Glass shall be fixed in the shutter by means of rubber gaskets.

Construction Procedures:

The sliding window frames are of two-track design and the shutters are to be joined by special cleats for extra strength. Rollers mounted on ball bearings are to be fitted to obtain smooth operation. The sliding shutters shall have provisions for grooves for weather strips to exclude wind, water or dust ingress. The shutters are glazed with 5mm thick approved quality and clear transparent glass using gaskets of ethylene- propylene or PVC (EPDM/

PVC). The doorframe shall be made of aluminum extrusion as per design. The ventilator frames with fixed glass shall be of same dimension as the sliding two-track frame.

The frames and shutters are to be fabricated by using the crimping method of corner jointing. Corners of frames are to be miter cut on high speed TCT saw machines to give burr free corners. Sturdy corner cleats should hold the frames with only a hairline corner joint visible and the frames should be square/ rectangular and free from distortions. The frames shall be firmly secured to the walls in line and level. Only aluminum screws shall be used for joining and no welding will be allowed. The joint between the frame and the plaster on walls, sill and lintel beam shall be filled with silicon sealant. The aluminum windows/ ventilators/ doors shall be free from scratches and other visible defects. The frames are fixed to the wall with plastic grips and steel screws of suitable color.

Standard Sizes, Tolerances and Designations

The overall sizes of aluminum doors, windows and ventilators are derived after allowing 1.25 mm clearances on all the four sides for the purpose of fitting the doors, windows and ventilators into modular openings.

Tolerances

The sizes for doors, windows and ventilators frames shall not vary by more than ± 1.5 mm.

Glass Panes

Glass panes shall weigh at least 7.5 kg/m² and shall be free from flaws, specks or bubbles. All panes shall have properly squared corners and straight edges.

Stainless Steel Friction Stay

The stainless-steel friction stays of make approved by the Engineer-in-Charge shall be used.

Lockable Handles

The lockable handle shall be of make approved by the Engineer-in-Charge and of required color to match the color of powder coated/anodized Aluminium window sections.

Tubular Handle

The tubular handle bar shall be Aluminium polyester powder coated minimum 50 micron to the required color/anodized AC 15. Outer dia. of tube shall be 32 mm, tube thickness 3.0 mm and center to center length 2115 mm + 5 mm.

The fly Mesh net:

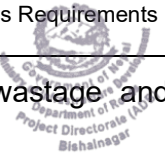
If applicable, shall be stainless steel jail (fly mesh net) or as approved by the engineer. The mesh shall be fitted neatly and cleanly in the window shutter and shall be tight and plain throughout the shutter. Any damage during fitting or delivery will not be accepted. The contractor shall replace fly mesh immediately at no additional cost if any mesh shutter found to be damaged after fitting and fixing in position till the defect liability period as stipulated in the conditions of contract.

Measurement

Measurement of works will be made in m² of works as specified.

Payment

Rate shall include full and final compensation for all material, labor, wastage and equipment to complete the works as specified.



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Project Director

FOR WEBSITE



107. Flooring Works

107.1 Concrete flooring/Screeding

Materials:

Cement: Portland cement as per specification under "Concrete Work" Aggregate of 12mm nominal gauge shall be properly gauged. Sieving may be insisted upon in which case the contractor shall provide/ supply necessary sieves and labor at his own cost.

Sand shall be clean inner bed. Grain distribution shall be same as described under 'Plastering'.

Proportion:

The concrete shall be either 1:2:4 mix or 1:4:8 mix or as specified in the drawing. All mix shall be batched by volume except cement, which shall be proportioned by weight and as specified.

Mixing:

Mixing shall be done on a watertight platform. Material shall be dry mixed after accurately gauging different materials in wooden boxes. The dry mixture shall be turned over thrice (at least) till the color is uniform and then twice while wet. Water shall be added gradually and no more than necessary to sufficiently wet the materials. Only that much concrete shall be mixed which can be used within half an hour. Each stock of dry mix shall not be larger than consuming one bag of cement. In case of machine mixing IS. Code shall be strictly followed and the mixing done under the supervision of the site In-charge.

Preparation of Sub-grade:

The sub-grade shall be cleared of all loose earth, rubbish, and other foreign matter by cleaning with wire brushes. Cleaned sub-grade shall then be wetted with water thoroughly, but no water pool shall be allowed. Necessary slope shall be given in the sub-grade itself. If the sub-grade is of lean concrete the flooring shall be commenced within 48 hours.

Placing

Concrete shall be laid in horizontal layers and gently rammed.

Finishing

It shall be compacted first with wood float. The blows shall be fairly heavy but as consolidation takes place, light rapid strokes shall be given. Beating shall continue till all hollows in concrete are filled with mortar paste. Then the surface shall be trawled till the moisture disappears. The surface shall be checked with straight edge. The surface must be uniform in color. Immediately after trawling, well-mixed neat cement slurry mixed integrally with hardening liquid 2 liters. to 50kg of cement shall be sprinkled in a uniform layer at the rate of 2.2 kg. per sq.m. The cement slurry shall be trawled smooth with a steel float several times till approved finish is achieved. The surface shall be without the float marks or air holes. Sample of workmanship shall be got to approved prior to work.

Curing

Curing shall not be commenced until the top layer has hardened. Hardened concrete shall be kept wet for 15 days. Covering with empty cement gunnies shall be avoided as the color is likely to be bleached with the remnants of cement matter from the bags.

Measurement

It shall be measured in square meter for specified thickness measured from wall to wall exclusive of any finishing or as per instructions of Engineer.

Unless otherwise stated in the schedule of quantities, nothing extra shall be admissible for small areas and corners and work in any shape. No deductions shall however, be made for protruding or independent columns occurring in the floors, door frames embedded in floor or any other part out when the area does not exceed 0.1 m² for each. However, nothing extra shall be allowed for the cutting involved at such places.

Payment

Payment shall be made as per the BoQ. Rate shall include full and final compensation for all material, labor, wastage, support works and equipment to complete the works as specified in BoQ.

107.2 Mosaic/ Terrazzo Tile Flooring

Marble Chips: Marble chips shall be of 3 mm gauge having maximum size 3mm and minimum size of 1.5 mm and shall be of good quality. The color shall be as per the instruction of engineer or drawings. Sample of marble stone to be used shall be submitted to the Project manager and his approval should be taken before the bulk purchase. All the marble chips supplied shall conform to the approved sample in all respect.

Proportion and Mixing

Base course

For cement concrete base course, all mix (as per specified proportion) shall be batched by volume except cement, which shall be proportioned by weight and as specified. Mixing shall be done on a watertight platform. Material shall be dry mixed after accurately gauging different materials in wooden boxes. The dry mixture shall be turned over thrice (at least) till the color is uniform and then twice while wet. Water shall be added gradually and no more than necessary to sufficiently wet the materials. Only that much concrete shall be mixed which can be used within half an hour. Each stock of dry mix shall not be larger than consuming one bag of cement. In case of machine mixing IS. Code shall be strictly followed and the mixing done under the supervision of the site In-charge.

For cement sand Base Course: 1 part cement; 2 parts sand and mixing shall be done as per specification for mortar mixing of brick masonry work

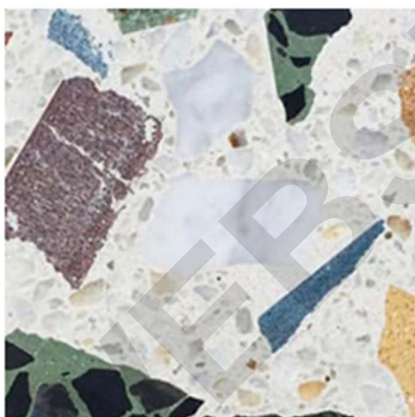
Top course:

The marble chips and cement shall be mixed by measuring with boxes to have the required proportion first dry mixed, and then thoroughly mixed by adding water gradually to have a uniform plastic mix. Within two hours of laying of the bottom layer of cement concrete, the upper layer of marble chips and cement shall be laid, and the surface tamped lightly and finished perfectly level with straight edge float and trowel. After about 2 hours of laying, the surface shall be covered with wet bags and kept wet and left undisturbed for two days. The surface shall then be cut or ground by rubbing with sand stone blocks and all the

cement in the surface removed. A neat cement wash shall then be given in the surface and left undisturbed for six days and then the surface shall be ground (or rubbed) with carborundum stones of different grades starting with coarse one and successively with finer ones, and the rubbing continued until the entire surface shows a uniform granular appearance. The surface should be kept wet during all these days. After final rubbing the surface shall be thoroughly cleaned by washing with soap water and then with clean water.

Laying

The base shall be made rough and watered and given a cement wash and then the mortar shall be laid in 20 mm. thick layers as per instruction of Engineer. After laying mortar, it should be levelled with wooden floats. Proper slope for draining wash water shall be provided as per instruction of the Engineer. And over this, marble stone should be laid; the joints should not be more than 3 mm. The joints should be painted with white cement slurry.



Curing

After about two hours of laying, the surface shall be covered with wet bags and kept wet and left undisturbed for two days.

Finish

Finally, when the surface is absolutely dry, oxalic acid powder shall be rubbed well on the surface with grinding machine with water, and this operation shall be repeated until the surface becomes perfectly smooth and glossy. The surface shall be rubbed with wax to give a glazing surface. White cement or color cement shall be used in joint to have the required color as per specified or as per instruction of Engineer. Care shall be taken that the floor is not left slippery and that ordinary wax is not used under any circumstances.

The grinding and polishing shall be done by grinding machine in 3 operations, first grinding with machine fitted with coarse Carborundum stone, second grinding with medium grade Carborundum stone and final grinding with fine grade Carborundum stone.

Measurement

Measurement shall be in square meter of exact length and breadth (length and height in dado) of the floor.

Payment

Payment shall be made on the basis of BoQ Rates. The Rate shall include materials, mixing, laying, curing, finishing, grinding, polishing and labor etc., all complete.

107.3 Tiling

Tiles: The tile material for Glazed/Non-glazed Vitrified Porcelain (Granite Viglacera-Vietnam, Portebello- Brazil or equivalent make) /Glazed/Non-glazed Ceramic tiles (Somany, Kajaria or equivalent make), shall conform to IS:777 (respective IS standards) or Equivalent approved by the Engineer.

The tiles shall be of approved color, size and shape or as shown in the drawing and shall be laid to the pattern approved by the Engineer. The tiles shall be of uniform color, true to size and shape and free from cracks, twists, uneven edges, crazing and other defects. The size and thickness of the tiles shall be as specified. The contractor shall submit samples of tile for selection and approval by the Engineer In-charge and all tiles delivered to the site shall conform to the approved samples with regard to size, quality, texture and color.

Mixing:

Mixing shall be done as per specification for mortar mixing of brick masonry work

Preparation of Surface and installation

Wall surfaces shall be brushed cleaned and wetted. Prior to installing any tile, the Contractor shall inspect surface and conditions in areas to receive tile work and shall notify the Engineer of any serious defects or conditions that will interfere with or prevent a satisfactory tile installation and shall coordinate with other traders of work.

Approximately 12 mm thick level and plumb, scratch coat of cement mortar 1:4 or as specified by site engineer shall be applied. The scratch coat shall be moist cured for at least 24 hours before application of floating coat.

Before applying floating coat, the scratch coat shall be thoroughly wetted. The floating coat, plastic mix of neat cement of approximately 3 mm thickness shall be applied even with screeds to true plane. Floating coat shall be applied over areas no larger than can be covered with tile while the mortar is still plastic (half set).

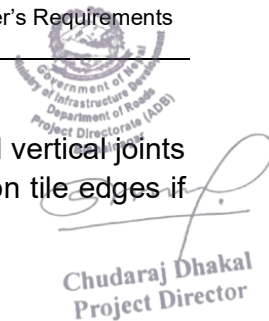
Glazed tile shall be soaked, completely immersed in clean water at least 30 minutes and drained. Individual tile that exhibits drying along edges shall be allowed to remain on the backs of tile at the time of setting.

Tiles shall be installed by applying a skin coat of a plastic mix of neat cement to backs of tile and firmly pressing tile into the floating coat to true plane and position. White cement shall be used for the skin coat where white joints are required.

During the process of setting tiles, continuous horizontal and vertical cuts every 40cm to 60 cm shall be made through the floating coat while plastic, using the point of a trowel turned edge wise, Care shall be taken to prevent cutting into the scratch coat.

Where full size tile cannot be laid, it shall be cut (sawn) to required size and edges rubbed smooth to ensure a true and straight joint.

All tile work finishing shall be adequately protected from damage during the progress of construction and any damage shall be repaired to the satisfaction of the Engineer at the Contractor's expense.



Joints in Tile Work

Joints in tile work shall be accurately aligned with horizontal joints level and vertical joints plumb. Joints shall be maintained uniformly wide by aligning spacer lugs on tile edges if tiles are so manufactured or by use of wetted strings.

Tile Layout

Tiles shall be laid out in such a way that no tile less than half size occurs. Where tile must be cut at edges or penetrated the cut edges shall be carefully filed and neatly ground. Chipped, cracked or broken tile shall not be used and all defective work shall be replaced and repaired to the satisfaction of the Engineer at the Contractor's expense.

Grouting the Tile Joints

After tiles have been set firm and strings removed, the tiles shall be dampened and joints grouted full with a plastic mix of neat cement by trowel, brush or finger application. Unless otherwise directed, grout shall be white cement. During grouting all excess grout shall be cleaned off the tile surface with damp cloth sponges.

The finished floor surface shall be true to required levels. All tile work finishing shall be adequately protected from damage during the progress of construction till completion and any damage shall be repaired to the satisfaction of the Engineer at the Contractor's expense. Upon completion prior to final inspection and acceptance, the Contractor shall clean all tile work. Acids or agents liable to damage the work shall be avoided. If tile surface show mass scratches, crack or other imperfections, which cannot be removed by cleaning; the Contractor shall remove the defective material and replace with new material at no additional expense. Sample of workmanship and tile grout proposed (silicone) shall be approved prior to execution of work.

Measurement

The measurement shall be in square meters of the work done including the setting mortar. The rate shall be for the material and labor, all complete.

Payment

Payment shall be made on the basis of rates in the BoQ. The Rate shall include materials, wastes, laying, Pasting, Cutting/sizing, finishing, Protecting surface scratches and labor etc., all complete.

107.4 Flat Brick Soling

The flat brick soling shall be made in foundation and floor. The brick laying/ soling shall be done over the 5cm sand filling in line and level. Each brick shall be laid separately and tamped firmly in place in the sand bed. Joints between bricks shall be filled with dry sand. On completion the surface shall be true to line and level with no part deviating from true line and level by more than 20mm. No mud on sand filling shall be allowed when level is not maintained in excavation.

Measurement

The measurement shall be in square meters of the work done. The rate shall be for the material and labor, all complete. However, sand filling will be measured separately.

Payment

Payment shall be made on the basis of rates in the BoQ. The Rate shall include materials, wastes, laying, levelling, compacting and labor etc., all complete.

107.5 Stone soling:

Soling should be laid in one layer of 230mm or 150mm depth or specified thickness of soling with a tolerance of 25mm. After packing the stones properly in position, the interstices between them should be carefully filled with quarry spoils or stone chips of larger size possible to obtain a hard, compact surface.

Measurement

The measurement shall be in product of length, breadth and thickness of the work done. The rate shall be for the material and labor, all complete. However, the thickness of the sand filling has limited to 50mm only.

Payment

Payment shall be made on the basis of rates in the BoQ. The Rate shall include materials, wastes, laying, levelling, compacting and labor etc., all complete

107.6 Sand filling:

Sand filling in floor shall be done with proper ramming in 23mm layers, after sprinkling with water and consolidating. Sand shall be free from rubbish, organic materials etc. Particular care shall be exercised not to dump sand in space between foundation trench and inside face of the masonry.

Measurement

Measurement shall be in cu.m. of consolidated actual Work. It is the product of length, breadth and thickness of the work done. The rate shall be for the material and labor, all complete. However, the thickness of the sand filling has limited to 50mm only.

Payment

Payment shall be made on the basis of rates in the BoQ. The Rate shall include materials, wastes, laying, levelling, compacting and labor etc., all complete.

107.7 Granite flooring:

Materials

Cement: Portland cement (white as well) as per specification under "Concrete Work"

Sand: As per specification under "Concrete Work"

Granite: Granite shall be of good quality, 16 ± 2 mm thick, having smooth, hard polished surface, regular in shape, size and of uniform thickness, of good appearance, and of sharp and square edges. It shall be free from cracks and other defects. The color and size shall be as per the instruction of the engineer and drawing. Sample of granite stone to be used shall be submitted to the engineer and his approval should be taken before the bulk purchase. All the granite stone supplied shall conform to the approved sample in all respect.

Proportion

Base Course: 1 part cement; 2 parts sand and mixing shall be done as per specification for mortar mixing of brick masonry work.

Dressing

Each granite stone slab shall be machine cut to required size and shape as specified in the drawings. All angles and edges of the granite slabs shall be true and square and free from chippings and the surface shall be true and plane. The thickness of the stone shall be as specified in the drawings. No tolerance shall be allowed for thickness. The granite slabs shall be mirror polished. All granite stones shall be brought pre-polished to the site. The contractor shall prepare samples and obtain approval of the Engineers before proceeding with the work. The contractor shall ensure that no chisel marks are visible on the surface of the stone before fixing. Stones with chisel marks or broken edges shall be rejected.

Laying

The base shall be made rough and watered and given a cement wash and then the mortar shall be laid in 19-20 mm. thick layers as per instruction of Engineer. After laying mortar, it should be leveled with wooden floats. Proper slope for draining wash water shall be provided as per instruction of the Engineer. And over this, granite stone should be laid; the joints should not be more than 1.5 mm. The joints should be painted with approved colored cement slurry.

Curing

After about 2 hours of laying, the surface shall be covered with wet bags and kept wet and left undisturbed for 2 days.

Finish

Finally, when the surface is absolutely dry, the surface shall be rubbed with wax to give a glazing surface, as per instruction of Engineer. Care shall be taken that the floor is not left slippery and that ordinary wax is not used under any circumstances.

Measurement

Measurement shall be in square meter of exact length and breadth of the floor.

Payment

Payment shall be made on the basis of rates in the BoQ. Rate shall include materials, mixing, laying, curing, finishing and labor etc. all complete

107.8 Marble flooring:

Marble stone: Marble shall be of good quality having smooth, hard surface, regular in shape, size and of uniform thickness, of good appearance, and of sharp and square edges. It shall be free from cracks and other defects. Marble stone of uniform size with more than 45cm and the minimum length of 1200mm to fit in the counter and floor, may be from Godavari Marble factory (polished of minimum size 600mmx600mm) or Rajasthani (Indian) Marble equivalent conforming to IS 1130 – latest Revision or BS specification or as approved by the engineer. No small marble will be allowed except in the thin wall or skirting or the edges or unless specified by engineer. The marble must be backed with the nylon grip net. The marble shall be of minimum thickness of 20mm. The color shall be as

per the instruction of engineer or drawings. Sample of marble stone to be used shall be submitted to the Project manager and his approval should be taken before the bulk purchase. All the marble stone supplied shall conform to the approved sample in all respect.

Proportion

Base Course: 1 part cement; 2 parts sand and mixing shall be done as per specification for mortar mixing of brick masonry work

Dressing

Each marble stone slab shall be machine cut to required size and shape as specified in the drawing and as instructed by engineer. All angles and edges of the marble slabs shall be true and square and free from chippings and the surface shall be true and plane. The thickness of the stone shall be as specified in the drawing. No tolerance shall be allowed for thickness.

For flooring, the marble slabs shall be machine cut with good finish at edges and corners. The contractor shall ensure that no chisel marks are visible on the surface of the stone before fixing. Marbles with chisel marks or broken edges shall be rejected.

Laying

The base shall be made rough and watered and given a cement wash and then the mortar shall be laid in 20 mm. thick layers as per instruction of Engineer. After laying mortar, it should be levelled with wooden floats. Proper slope for draining wash water shall be provided as per instruction of the Engineer. And over this, marble stone should be laid; the joints should not be more than 3 mm. The joints should be painted with white cement slurry.

Curing

After about two hours of laying, the surface shall be covered with wet bags and kept wet and left undisturbed for two days.

Finish

Finally, when the surface is absolutely dry, oxalic acid powder shall be rubbed well on the surface with grinding machine with water, and this operation shall be repeated until the surface becomes perfectly smooth and glossy. The surface shall be rubbed with wax to give a glazing surface. White cement or color cement shall be used in joint to have the required color as per specified or as per instruction of Engineer. Care shall be taken that the floor is not left slippery and that ordinary wax is not used under any circumstances

If required by the Engineer, the grinding and polishing shall be done by grinding machine in 3 operations, first grinding with machine fitted with coarse Carborundum stone, second grinding with medium grade Carborundum stone and final grinding with fine grade Carborundum stone.

Measurement

Measurement shall be in square meter of exact length and breadth (length and height in dado) of the floor

Payment

Payment shall be made on the basis of rates in the BoQ. Rate shall include materials, mixing, laying, curing, finishing and labor etc. all complete

107.9 Kota stone flooring

Materials

Kota stone is fine grained naturally riven lime stone and is available in the form of tiles and slabs. The Classification of the Kota stone tiles and slab are based upon size as mentioned below.

Item	Length (mm)	Width (mm)	Thickness (mm)
Slabs	700 to 2500	300 to 1000	20 to 150
Tiles	100 to 600	100 to 600 1	8 to 25

The tiles/slabs are to be cut into sizes as per requirement of the work. The tiles/slab shall be selected from stone of good quality, hard, sound, dense and homogeneous in texture, free from cracks, decay, weathering and flaws. These shall be hand or machine cut to the requisite thickness. The tiles/slabs shall have the top (exposed) face polished before being brought to site. 2.2 Size and Thickness

- (i) The size of the Kota stone tiles/slabs shall not be less than 550 mm x 550 mm for platforms, concourse and other public areas whereas for buildings the minimum size will be 280 mm x 280 mm.
- (ii) The thickness of Kota stone for building floor shall be 20mm and for platform/concourse etc it shall be 25 mm.
- (iii) In staircase size of the slab should be so selected that there should not be any joint up to 1.20m width, One joint up to 2.4 m width and 2 joints up to 3.6 m width of staircase.
- (iv) Tolerances allowed on size of the kota stone shall be as under:
 - a) Length and width of tiles/slab = (+) / (-) 5 mm
 - b) Thickness = (+) / (-) 2 mm.

Acceptance Criteria

Before starting the work, the contractor shall get the samples of slabs/tiles approved by the AEN in charge of the work. The tiles/slab procured from the organized sector industries of Ramganj Mandi Area of Rajasthan shall only be used. The physical properties of the Kota Stones shall conform to the following standard.

Properties Test Methods Acceptance Limit (Kota Blue)

Water Absorption (%)

ASTM C 97-02 or IS:1237-1980, < 1%

Hardness (Moh's Scale) IS:13630(Part-13) 3 to 4

Minimum Compressive strength (In wet condition) ASTM C 170-06 or IS:1237-1980

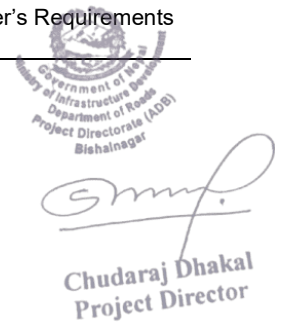
- Parallel to rift- 70 N/mm²
- Perpendicular to rift-126 N/mm²

Modulus of Rupture (In wet condition)

- ASTM C 99-87 or
- IS:1237-1980, 28-39 N/mm²

Abrasion Resistance IS: 1237-1980

- Average wear 2.2 mm to max
- wear on individual specimen 2.5mm



Workmanship

Each slab/tile shall be cut to the required size and shape and fine chisel dressed at all the edges to full depth. The sides thus dressed shall have a full contact if a straight edge is laid along. The sides shall be table rubbed with coarse sand or machine rubbed before paving. All angles and edges of the tiles/slabs shall be True Square and free from chippings giving a plane surface.

Preparation of surface

(a) Sub-Base- In order to ensure stability of the floor structure a sub-base is required to be provided over well-compacted earth filling of plinths for Kota Stone floorings. For building floors, one layer of well burnt bricks over 100mm thick compacted sand layer is to be provided as sub base. In case of floorings of Platform/Concourse/Pathway etc sub base will consists of 75 mm thick stone ballast over one layer of well burnt brick over 100 mm thick compacted sand layer. The required slope in floor topping to be given at the sub base stage itself.

(b) Base Course- Kota Stone floorings when laid on ground floor, a base course of lean concrete mix 1:4:8 (Cement, Coarse Sand, Stone Aggregate 40mm nominal size) is to be provided between flooring and well compacted sub-base. The minimum thickness of Base-Course will be 100 mm for floors of buildings/ Platform/Concourse/Pathway etc.

(c) Cushioning Layer- In RCC Slab of upper floors in order to provide proper slope in floor topping a cushioning layer of minimum thickness of 40 mm of concrete mix 1:3:6 (Cement, Coarse Sand, Stone Aggregate 20 mm nominal size) is to be provided over slab.

Bedding

Bedding for the Kota stone slabs/tiles shall be of cement mortar 1:4 (1 Cement: 4 Coarse sand) of average thickness 20 mm. Minimum thickness at any place shall not be less than 10 mm.

Laying

Base Course/Cushioning layer shall be cleaned, wetted and mopped. Bedding Mortar of the specified mix and thickness shall then be spread on an area sufficient to receive one slab. The slab shall be washed clean before laying. It shall be laid on top, pressed, and tapped gently to bring it in level with the other slabs. It shall then be lifted and laid aside. Top surface of the mortar shall then be corrected by adding fresh mortar at hollows or depressions. The mortar is then allowed to harden a bit. Over this surface, cement slurry of honey like consistency at 4.4Kg of cement per square meter is applied. The edges of the slabs already paved shall be buttered with grey cement; with admixture of pigment to match the shade of the slab. The slab shall then be gently placed in position and tapped with wooden mallet till it is properly bedded in level with and close to the adjoining slab. The joint shall be as fine as possible. Surplus cement on the surface of the slab shall be

removed. The slabs fixed in the floor adjoining the walls shall enter not less than 10mm under the plaster, skirting or dado. The junction between the wall and slabs shall be finished neatly. The finished surface shall be true to levels and slopes as instructed by the Engineer-in-Charge.

Curing

The floor shall be kept wet for a minimum of 7 days so that bedding and joints set properly.

Polishing and finishing

Unevenness at the meeting edges of slabs/tiles shall be removed by fine chiseling. Grinding shall normally be commenced after 14 days of laying the slabs. Except for skirting or small areas machine shall be used for the purpose. First grinding shall be done with carborundum stones of 120 grit fitted in the machine. Water shall be properly used during grinding. When the floor has been uniformly rubbed, it shall be cleaned with water. Final grinding shall be done when other works are finished. The machine shall be fitted with carborundum of grit 220 to 350 using water in abundance.

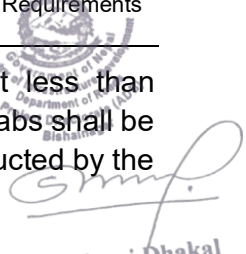
The floor shall then be washed clean with water. Oxalic acid powder shall then be dusted at 33 grams per square meter on the surface and the surface rubbed with machine fitted.

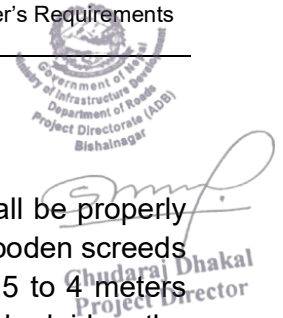
Measurement

Measurement shall be in square meter of exact length and breadth of the floor.

Payment

Payment shall be made on the basis of rates in the BoQ. Rate shall include materials, mixing, laying, curing, finishing and labor etc. all complete


Chudaraj Dhakal
Project Director



108. Plaster and Punning

108.1 General Plaster Works

Plastering shall be started from top and worked down. All putlog holes shall be properly filled in advance of the plastering as the scaffolding is being taken down. Wooden screeds 75 mm wide and of the thickness of the plaster shall be fixed vertically 2.5 to 4 meters apart to act as gauges and guides in applying the plaster. The mortar shall be laid on the wall between the screeds using the plaster's float and pressing the mortar so that the raked joints are properly filled. The plaster shall then be finished off with a wooden straight edge reaching across the screeds. The straight edge shall be worked on the screeds with a small upward and sideways motion 50 mm or 75 mm at a time. Finally, the surface shall be finished off with a plaster's wooden float. Metal floats shall not be used.

When recommencing the plastering beyond the work suspended earlier the edges of the old plaster shall be scraped, cleaned and wetted before plaster is applied to the adjacent areas. No portion of the surface shall be left out in a condition to be patched up later on.

The plaster shall be finished to a true and plumb surface and to the proper degree of smoothness as required by the Engineer.

The average thickness of plaster shall not be less than the specified thickness. The minimum thickness over any portion of the surface shall not be less than the specified thickness minus 3 mm.

Any cracks which appear in the surface and all portions, which sound hollow when tapped, or are found to be soft or otherwise defective, shall be cut out in rectangular shape and re-done as directed by the Engineer.

The surface to be plastered shall be brushed clean mortar joints of brick masonry or hollow concrete walls or any other surface to be plastered shall be raked to a depth of approximately 12mm, and the surface brushed down with a stiff brush and thoroughly wetted. The surface shall be free of all dust, loose materials, grease etc.

The mortar shall be first dry mixed, by measuring with boxes to required proportion, and then water added slowly and gradually and mixed thoroughly to uniform consistency.

The thickness of the plaster shall not be less than 12 mm not more than 20mm. In case of plaster thicker than 20mm, it shall be built by two or more coats each coat not exceeding 12mm in thickness. Cement shall be as specified above.

Sand shall be as before specified but shall be graded to a suitable fineness in accordance with the nature of the plaster, etc., in order to obtain the finish required.

Lime for plastering shall be as before described in clause 414 and slaked and run at least four weeks before use.

All other mixes shall be constructed in a like manner. Moist curing shall be accomplished by keeping the plaster uniformly damp by suitable means. Moist curing shall start during application and continue for not less than 7 days.

Hacking

Prices of all paving and plastering etc. shall include for hacking concrete ceilings, beams, floors etc., by approved means and for raking out joints of walls 12mm deep to form a

proper key. Plastering on walls generally shall be taken to include flush faces of lintels etc., in same.

Surfaces to be paved or plastered must be brushed clean and well wetted before each coat is applied. All cement plaster shall be kept continually damp in the interval between application of coats and for seven days after application of the final coat.

Dubbing out where required shall be composed of similar material to that following.

Partially or wholly set material will not be allowed to be used or re-mixed.

Samples

The Contractor shall prepare sample square meter of the plastering and paving as directed until the quality, texture and finish required is obtained and approved by the Project Engineer after which all plastering or paving executed shall conform with the respective approved sample. No payment shall be accounted for such sampling.

Finish

Care shall be taken to insure that finished plaster surfaces shall be plumb, square, straight and true to line.

Generally, all screeds and paving shall be finished smooth, even and truly level (unless specifically required to falls and currents, etc.), and paving shall be steel troweled or floated. Rendering and plastering shall be finished plumb, square, smooth and even.

All surfaces to be plastered shall be thoroughly wetted before any plastering is commenced and the Contractor shall allow in his prices for dusting external angles with neat cement to give additional strength.

No plastering will be allowed to take place until all chases for service have been cut, services installed and chases made good. On no account may finished plaster surface be chased and made good.

All Work shall be to approval and any not complying with the above shall be hacked away and replaced, as directed, and at the Contractor's expense.

Arises and Angles in Plastering

All arises shall be clean and sharp or slightly rounded as directed including neatly forming miters.

All making good shall be cut out to a rectangular shape, the edges undercut to form dovetail key and finished flush with face of surrounding plaster. All cracks, blisters and other defects must be cut out made good and the whole of the paving and plastering Work left perfect on completion.

Screeds shall be in cement and sand (1:4) and rates shall include for thoroughly hacking, cleaning and soaking the receiving structure in water. No creed shall be laid on a dry structure in any circumstances. Where changes of floor finish occur they shall be divided by strips as specified.

The Contractor's special attention is drawn to the fact that all screeds, immediately after the initial set has taken place, will be required to be continuously covered in water by the sand trap or other approved method for at least 10 days. Any screed panel that is found

to be dry before the end of this period shall be removed at the discretion of the Project Engineer.

Waterproofed external rendering shall consist of minimum 12mm cement and sand (1:4) rendering at the rate of 2.05 liter to 41 kgs of cement all in accordance with the manufacturer's instructions and finished perfectly true and even with a wood float.

External Plastering and Rendering:

Waterproofed External Plaster or Rendering work shall consist of minimum 12.5mm to 16mm as detailed in the Bill of Quantity with cement/ sand ratio 1:3 or 1:4 at the rate of 1/2 gallon to 90 lbs of cement all in accordance with the manufacturer's instructions and finished perfectly true and even with a wood float.

Internal Plastering and Rendering:

Internal Plastering or Rendering shall consist of minimum 12.5mm to 16mm as detailed in the Bill of Quantities with cement/ sand ratio 1:4, 1:5 finished perfectly true and even with a wood float.

Measurement

Measurement shall be in square meter of exact length and breadth of the plaster surfaces. Necessary deductions for door, windows and other openings to be made and items with width less than 0.3m shall be measured in running meter. Sum of total running meter and square meter shall be referred as the final quantity of both external and internal plaster works.

Payment

Payment shall be made on the basis of rates in the BoQ. Rate shall include materials, sand washing, preparing surface, application of cement slurry, scaffolding, support works and all other temporary works including curing.

108.2 Punning works

Refer to plasterwork excluding sand. Keep the cement punning thickness as 3 mm.



109. Paint Works

109.1 General

All materials shall be delivered on site intact in the original drums or tins and shall be mixed and applied strictly in accordance with the manufacturer's instructions and to the approval of the Engineer. All cement paints and washable distemper shall be applied by brush; emulsion paints shall be applied by means of a brush then rolled. All enamel paints are applied by brush or sprayed, and bitumen and bituminous base aluminium paints are applied by brush. Before application of any paint, adjoining surfaces shall be covered by cloth, or paper and wherever paints stains it shall be removed before leaving the work in same day.

The only addition, which will be allowed to be made locally will be liquid thinners supplied or recommended by the manufacturers and none shall be, thinned more than approved by the Engineer.

Preparation and priming of surfaces:

Concrete and Cement rendered surfaces shall be smooth and free from defects and shall be allowed to dry out thoroughly. Surfaces shall be thoroughly brushed down and left free from all efflorescence, dirt and dust.

All such surfaces, which are to be finished with oil or enamel paint, shall be primed with two coats of alkali resisting primer.

Plaster surfaces shall be perfectly smooth and free from defect. All such surfaces shall be allowed to dry for a minimum period of four weeks. Surfaces shall be stopped with approved plaster compound, rubbed down flush, thoroughly brushed down and left free from all efflorescence, dirt and dust.

Fair-faced surfaces shall be dry, brushed down and free from dust or dirt and shall be treated with an approved alkali resisting primer (for plastic emulsion).

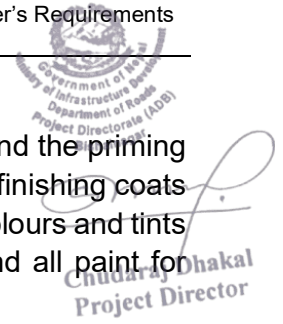
Metal work generally shall be thoroughly wire brushed to remove all scale, rust, and through sand papering shall be done before any painting is done. Where severe rust exists, the special anti-rust primer must be used. After painting it shall be stored in covered shed and 60cm above ground.

Shop primed surfaces shall have bare places touched up with an approved metal primer.

Un-primed surfaces shall be given one coat of primer as last. Galvanized surfaces, which are thoroughly weathered, shall be, brushed down with white spirit, washed down and given one coat of zinc chromate primer. Bituminous-coated surfaces shall be given as isolating coat of shellac knotting followed by an approved metal primer.

Woodwork generally shall be rubbed down, given one coat shellac knotting, one coat wood self-knotting primer, and all cracks, nail holes, defects, and uneven surfaces, etc., stopped and faces up with hard stopping rubbed down flush.

Before oiling woodwork all stains must be removed and uniform color obtained and filled.



Colors and Priming:

The priming undercoats and finishing coats shall each be of differing tints and the priming and undercoats shall be of the correct types and tints to suit the respective finishing coats in accordance with the following instructions. All finishing coats shall be of colours and tints selected by the Engineer. The paintwork shall have a uniform finish and all paint for external work shall be exterior quality only.

Rubbing Down:

Each coat of paint shall be properly dried and shall be well rubbed down with fine glass paper before the next coat is applied. The paintwork shall be finished smooth and free from brush marks.

Samples Cards of all paints, etc., shall be submitted to and samples prepared for approval of the Engineer before laying on and such samples, when approved, shall become the standard for work.

Program:

The contractor shall so arrange his program of work that all other Trades are completed and away from the area to be painted when the painting begins.

Ironmongery, Protection and Cleaning Up:

All ironmongery shall be removed from joinery before painting is commenced and shall be cleaned and renovated if necessary and re-fixed after completion painting.

Cover up all floors, etc., with non-resinous sawdust or other approved covering when executing and all painting decorating work.

Paint splashes, spots and stains shall be removed from floors, woodwork, etc., and damaged surface touched up and the whole of the work left clean upon completion.

Materials:

All paint materials of specified brand shall be obtained from the manufacturer or authorized dealer. All sealers, primers and undercoating are to be obtained from the makers of the finishing materials and are to be in accordance with their recommendation for the particular finish required.

Knot Sealer:

For use on knots and resinous portions of woodwork.

Stopping and Filling composed of parts putty to one part of stiff white lead.

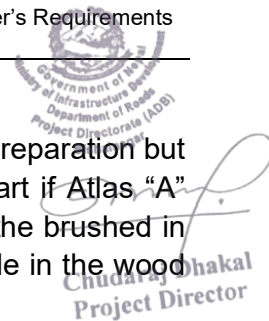
Lacquer:

Approved polyurethane eggshell clear lacquer applied in accordance with the manufacturer's instructions.

Polish shall be an approved brand of wax polish.

Oil shall be best quality linseed oil.

Filler for polished or oiled surfaces to be Beeswax filler.



Wood Preservative:

All wood work, as specified or instructed shall, be treated after cutting and preparation but before assembly or fixing with three coats of solution consisting of one part of Atlas "A" wood preservative brown grade to three parts of water. The solution is to be brushed in all face of all timbers unless exposed to view and painted. This is applicable in the wood frame contact with masonry and roof purling, batten and counter rafter.

The contractor shall note that this solution is HIGHLY POISONOUS and shall take all necessary precautions and instruct his workmen accordingly.

Paint Application:

Painting Items as described hereafter shall comprise the following, and shall all include for preparing and priming surfaces as above described: -

- *Cement Paint*: Apply two coats.
- *Plastic Emulsion*: Apply a minimum of three coats, using a thinning medium or water only if and as recommended by the manufacturer. An approved plaster primer tinted to match may be substituted for the first coat.
- *Paint*: Apply two undercoats and one finishing coat of enamel gloss oil paint.
- *Flat oil paint*: Apply two coats of flat oil paint, using thinning medium in accordance with the manufacturer's instructions.
- *Oil*: Apply two coats of linseed oil.
- *Wax Polish*: Apply a minimum of two coats to approval.
- *Lacquer*: Apply three coats of Polythene lacquer as described, to approval.
- *Prime*: Prepare and prime only before fixing.

Moulded cornices and coves

- (a) Length shall be measured at the center of the girth.
- (b) Moulded cornices and coves shall be given in square meters the area being arrived at by multiplying length by the girth.
- (c) Flat or weathered top to cornices when exceeding 15 cm in width shall not be included in the girth but measured with the general plasterwork.
- (d) Cornices which are curved in their length shall be measured separately.

If the old Paint of existing surface is firm and sound, it shall be cleaned of grease, smoke etc. The surface shall then be rubbed down with sand paper and dusted. Rusty patches shall be cleaned up and touched with synthetic enamel paint. If the old Paint is blistered and flaked, it shall be completely removed.

Measurement:

Measurement shall be in square meters of the actual covered area of the paints. Nothing extra shall be allowed for painting any rough surface. The rate shall include for specified coats inclusive of materials, labor, scaffolding all complete.

Payment

Payment shall be made on the basis of rates in the BoQ.

109.2 Emulsion Paints

On the plastered/POP surface, paint shall be prepared with sand papering, putting, and two coats of primer. The paint is applied in two coats of acrylic emulsion with roller or spray. The surface should be properly cleaned and treated with water-based primer as per manufacturer's specifications. Rectification of defects in plaster, POP with broken edges should be done by using a proper color putty, paste as per manufactures specifications.

The surface on which paint is applied shall become hard dry in 12 hours. The necessary single / multistage scaffoldings required for the work shall be provided as detailed out under coatings. The equipment, rollers or spray used on the work should be immediately washed with water to facilitate future use. After the first coat of the paint has hardened, the second coat is applied as instructed by the engineer. Similarly required number of coats shall be given to get an even and uniform shape.

109.3 Wall Putty Work

General

Provide wall care putty to the specification catered for in the bill of quantity. Approved make of putty shall only be used.

Surface preparation

Remove all loosely adhering material with a help of emery stone, putty blade or wire brush and clean water. The substrata should be clean, free from dust, grease loose materials. Dry and absorbent surface should be moistened with sufficient quantity of clean water. Mixing of putty shall be done with 33-35% clean water slowly mixing to make a paste till a uniform paste is formed.

Application:

The first coat shall be applied on already moistened wall surface from bottom to upward direction uniformly with help of patty blade after drying of first coat of putty the surface will be gently rubbed with wet sponge or with putty blade in order to remove the loose particle. Allow the surface to dry for at least three hours before applying the second coat of putty after drying of second coat marks if any will be removed with the help of moist sponge or with the putty blade.

Total thickness of coat shall be limited to 2 mm.

109.4 Enamel Paints

The primer and paint shall be of approved quality and of approved manufacture like Asian Paints, Nerolac, Jensolin, Berger British Paints India Ltd., Johnson and Nicholson, India or equivalent brand approved by the Engineer. These materials shall be ready mixed and in sealed tins with manufacturer's name, color and instruction clearly painted in the container.

Preparation of Surface

All surfaces to be painted shall be planed and thoroughly sand papered, first by using No. 120 sandpaper. Ordinary putting shall fill up nail holes, cracks or other in equalities. Putting shall be made up of 2 parts of best quality whiting (absolutely dead stone lime) 1 part if white lead mixed together in linseed oil and kneaded (3 oz. of linseed oil to 1 lb. of whiting).

A primer coat shall be locally applied in holes, cracks etc. before putty is applied. The putty/paste fillers shall be of approved quality and manufacture and shall be applied to the surface with a knife or other sharp-edged tools after the priming coat as well as after each undercoat. After the surface is dry, it shall be sand paper by using No. 60 sandpaper. Surface so prepared shall be painted with one coat of primer. The primed surface when dry shall be sand papered by using No. 100 sand paper.

The primed surface so prepared shall be painted with one coat of selected enamel using bristle brush and not horsehair ones. The paint shall be applied in thinnest possible layers with parallel strokes. Care shall be taken to ensure the surface being free from dust or other foreign material before priming or enameling the surface. No paint shall splash on the floor, wall jambs, sill or other part of the building.

Application

On metal surface

The paint shall be continuously stirred in the container so that its consistency is kept uniform throughout. The painting shall be laid on evenly smoothly by means of crossing and laying - off. The crossing and laying off consists of covering the area with paint, brushing the surface hard for the first time and then brushing alternatively in opposite directions, two or three times and then finally brushing lightly in a direction at right angles to the same. In this process no brush marks shall be left after the laying – off if finished. The full process of crossing and laying - off will constitute one coat. Where so stipulated, the painting shall be carried out using spray machines suited for the nature and location of the work to be carried out. Only skilled and experienced workmen shall be employed for this class of work. Paints used shall be brought to the requisite consistency by adding suitable thinner. Spraying shall be carried out only in dry conditions. No exterior painting shall be done in damp foggy or rainy weather. Surface to be painted shall be clean, dry, smooth, and adequately protected from dampness. Each coat shall be applied in sufficient quantity to obtain complete coverage, shall be well brushed and evenly worked out over the entire surface and into all corners, angles and crevices allowed to thoroughly dry. Second coat shall be of suitable shade to match final color, and shall be approved by the Engineer before final coat is started. Allow at least 48 hours drying time between coats for interior and 7 days for exterior work, and if in the judgement of the Engineer more time is required it shall be allowed.

Finished surfaces shall be protected from dampness and dust until completely dry. Finished work shall be uniform, of approved color, smooth and free for runs, sags, defective brushing and clogging. Make edges of paints adjoining other materials of colors sharp and clean, without overlapping.

Finish:

The painted surfaces shall present uniform appearance and semi – glass finish free from steaks, blisters etc.

Measurement

Measurement shall be in square meters of the actual covered area. Nothing extra shall be allowed for painting any rough surface e.g. external sand - faced plaster or work in short width or surface in any shape.

Payment

Payment shall be made on the basis of rates in the BoQ. The rate shall include for specified coats inclusive of materials, labor, scaffolding, all complete.



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110. Stainless steel handrail works

Tubes shall be designated by their nominal bore. These shall be light, medium or heavy as specified depending upon the wall thickness. Tubes shall be clean finished and reasonably free from scale. They shall be free from cracks, surface flaws, laminations and other defects. The ends shall be cut clean and square with axis of tube, unless otherwise specified. Diameter of handrail shall be 50 mm with 50 mm vertical post spaced at 2 m c/c. Three numbers of balusters of 25 mm diameter shall be placed up to height from 2.5' to 3' railing.

Fabrication

The component parts of the structure shall be assembled in such a manner that they are neither twisted nor otherwise damaged and be so prepared that the specified cambers, if any, are, maintained. The tubular steel work shall be painted with one coat of approved steel primer after fabrication.

Straightening:

All material before being assembled shall be straightened, if necessary, unless required to be of curvilinear form and shall be free from twist.

Welding: Where welding is adopted, it shall be as specified.

Sealing of Tubes: When the end of a tube is not automatically sealed by virtue of its connection by welding to another member the end shall be properly and completely sealed. Before sealing, the inside of the tubes should be dry and free from loose scale.

Flattened Ends: In tubular construction the ends of tubes may be flattened or otherwise formed to provide for welded. The change of sections shall be gradual.

Hoisting and Erection

Tubular posts shall be hoisted and erected in position carefully, without damage to themselves, other structure, equipment and injury to workman. The method of hoisting and erection proposed to be adopted shall be got approved from the Engineer-in-charge. The contractor shall however be fully responsible, for the work being carried out in a safe and proper manner without unduly stressing the various members.

Measurements

The work as fixed in place shall be measured in running meters correct to a centimeter on their weights calculated on the basis of standard tables correct to the nearest kilogram unless otherwise specified.

Rate

The rate shall include the cost of labor and materials involved in all the operations described above including application of one coat of approved steel primer, i.e. red oxide zinc chrome primer.

111. Metal Works

Supply, making and fixing in position normal/decorative type metal works for decoration or otherwise including cost of fixing, grinding polishing in all levels including one coat of red oxide paints and two coats of enamel paints approved color.

The metal sections shall comply with the relevant IS standard and thickness parameters as per the table suggested in IS table. The sections shall be the product of Nepal Standard certified or ISO certified company.

Measurements

Measurement shall be done in kg which includes the labor cost and one coat of red oxide primer coat.

Payment

The payment of metal works shall be made in weight (kilo gram) basis as provided in BoQ. The rate shall include the cost of labor and wastages, Nut and bolts, welding rods, tools and equipment, scaffolding and one coat of primer

112. MS Metal Gate:

The Mild steel sliding/Swing gate, fabricated from the cold folded Mild Steel black sheet of thickness 2.5mm, welded on 25mmx50mm by 2.5mm RHS frame, roller pulley, hinges locks etc. The sheet and tube shall conform to the BS 15 or equivalent. The welding shall be butt-welding conforming relevant clause of this specification. The grips are of plastic or metal. The screws shall be steel screws. The gate is primed with two coats of red lead primer. The gate is painted with two coats of enamel of bituminous aluminum paint to get uniform painted surfaces.

Measurement

The work shall be measured in m² of opening in vertical plan completed as specified.

Payment

Payment for the work will be made on the basis of contract unit price indicated in the BOQ. The payment will be full and final compensation for all material, rails, locks, consumables, labor, and equipment to complete the works as specified.

113. Metal Fence Railing:

50mm black metal pipe post placed at 2m distance with 25x25x4mm ISA frame attached with 7mm TOR steel mesh welded diagonally at 62x62mm. The top of the fence railing to be attached 3x20mm MS flat thorny top of height 150mm. The sheet and tube shall conform to the BS 15 or equivalent. The welding shall be butt-welding conforming relevant clause of this specification. The fence is primed with two coats of red lead primer. The fence is painted with two coats of enamel of bituminous aluminum paint to get uniform painted surfaces.

Measurement

The work shall be measured in sq.m.

Payment

Payment for the work will be made on the basis of contract unit price indicated in the BOQ. The payment will be full and final compensation for all material, consumables, labour, and equipment to complete the works as specified.

114. ACP Works

Supply, making and fixing in position Aluminum composite Panel (ACP) board 4mm at any level finished smooth and uniform level including Metal frame with adjustable arrangement filling the pores, cost of scaffolding, material, and labor. The color shall be as per the

provided rendered image of the building or as directed by the engineer with written consent of employer. Metal frame to be anchored to the surface with the high strength plastic grip and screw and proper anchorage of the frame system has to be inspected prior cladding ACP panels.

Those panels shall be the make of ISO 9001-2008 certified company and technical specifications to be verified by the engineer prior installation.

Joints are to be sealed with approved quality/brand/color Silicon sealer in proper line and thickness.

Total Thickness	Composition			Coating	Application
	Front coil thickness	Core thickness	Back coil thickness		
4mm	0.5mm	3mm	0.5mm	PVDF	Exterior

Measurement

Measurement shall be done in square meters which includes the labor cost.

Payment

Payment shall be done in accordance with BoQ and the rate shall include cost of material, consumables, scaffolding, metal battening, cleaning all complete.

115. Toughened Glass Works

Supply & installation of frameless glass Door of size as provided in contract drawing-opening schedule of approved make with over panel/sidelight using 12mm Clear toughened glass of confirming IS2835-1977 and second revision IS5437-1967 with approved make die cast patch fitting with stainless steel cover PT 10, PT 20, US-10, PT 30, PT 40. Stainless steel pull Handle TGDI-H 450 back to back with 350mm CTC, adjustable fixing for glass, Length =450mm, 25mm dia, -SS304 Finish: mill, floor spring, BTS 75V with std. spindle and cover plate. As per DIN EN 1154. (500,000 cycle tested) Finish: Satin stainless steel. floor stop half dome with 45mm dia with fixing accessories, in satin Chrome, final certifications of products should be submitted be from the product manufacturer for the originality of the product and manufacturer should be have its own service team. The above work completes in all respect as per approved drawings and to the satisfaction of the engineer.

Measurement

Measurement shall be done in square meters as stipulated in BoQ.

Payment

The payment shall be made on the basis of quantity provided in BoQ. The rate shall include all manpower, material, tools and equipment's and necessary handles and fixture for ready to use condition.

116. Concrete interlocking Block laying works

Precast Concrete interlocking block laying works shall be done on firmly compacted and level subgrade. The sub grade shall be trimmed and levelled off properly by mechanical method. Over the sub grade second class bricks to be laid for brick soling. 75mm 1:2:4 PCC shall be laid over brick laying. 60 mm precast interlocking block has to be laid over PCC and joints are to be filled with stone dust. The average size of paving block shall be 240x120x60mm and of grade equivalent to M35.

Measurement

Measurement shall be done in square meters as stipulated in BoQ. PCC and brick soling shall measure separately, only the area of interlocking block shall be taken into account.

Payment

The payment shall be made on the basis of quantity provided in BoQ. The rate shall include all manpower, materials, tools and equipment's.

117. Water Proof Works- Surface Treatment:

Providing and applying of two component acrylic polymer modified cementations flexible membrane system (Perma guard, Aquafin 2K/M or equivalent) as approved by engineer, on RCC rooftop, basements, terraces and sunken slabs etc including injection system (pressure grouting) on water leakage area and new & old concreting joint where necessary and filling Perma bond SBR modified mortar or equivalent on junction between floor and parapet wall area with "V" shape groove cutting as specified by the site engineer all complete.

For expansion joints at shear wall, water proofing joint tape of 100 mm thickness should be applied.

Measurement

Measurement shall be in square meter of exact length and breadth. For applying water proofing joint tape at the joint of shear wall, measurement shall be made per running meter.

Payment

The payment shall be done as per the BoQ rates and actual quantity measured and verified by the engineer. Rate shall include materials, surface preparation works, cleaning surface, mixing, application in prescribed layer, curing, Testing, and labor etc all complete.

118. Furniture works

The contractor shall supply, delivery and arrange the office furniture after completion of Civil Works. The furniture shall be of approved brand/quality/standard. The details of furniture are attached in the appendix.

Measurement

The measurement of furniture is to be done in number of particular items as stipulated in detail specification sheet.

Payment

The payment shall be done as per the BoQ rates and actual number delivered and verified by the engineer. Rate shall include materials, transportations and placing in proper places as instructed.

Note: 1

The installation specifications for the approved material if different, the manufacturers specification shall be followed after site engineer's approval. Technical specification from manufacturer and the warranty provision/document shall be submitted to the site engineer before approval by the contractor.

Note: 2

Wherever makes have not been specified for certain items, the same shall be as per National Standard and as per approval of Engineer.

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Appendices

- Appendix1: List of Standards
- Appendix2: Office and Furniture to be supplied by contractor
- Appendix3: Survey Instruments Required at site
- Appendix4: Laboratory Equipment

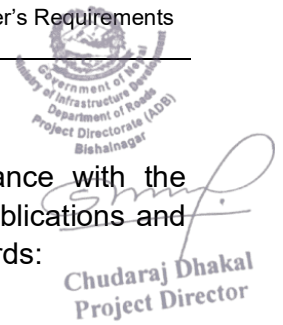


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Appendix 1: List of Standards

The Contractor shall provide for the use of the Engineer, in accordance with the Specifications, copies of the latest editions of the following Standards, Publications and Codes of Practice; or copies of manuals containing details of these Standards:



INDIAN STANDARDS (IS)

IS: 1124-1974	Method of Test for water absorption, apparent specific gravity and porosity of natural building stones
IS: 1597-1992	Code of Practice for construction of stonemasonry Part 1 Rubble stone masonry Part 2 Ashlar masonry
IS: 2116-1980	Sand for masonry mortars
IS: 2250-1981	Method of Test for cement mortar
IS: 2386-1963	Method of Test for Aggregates Parts 1-6
IS: 2720	Method of Test for Soils Parts 1-5, 7, 8, 10, 14, 16, 22, 28, 29, 37 & 40

BRITISH STANDARDS (BS)

BS: 812-1975	Testing Aggregates Part 1: Methods for determination of particle size and shape. Part 2: Methods for determination of physical properties
BS: 1377	Methods of test for soil for civil engineering purposes
BS: 1881	Methods of testing concrete Parts 5, 101-122, 124, 125, 127, 129, 201-207 & 209

AMERICAN PUBLICATIONS & STANDARDS (ASTM/AASHTO).

AASHTO	Part I: Standard Specification for Materials Part II: Method of Sampling and Testing

All standards provided shall remain the property of the Contractor on completion of the contract.

OTHER PUBLICATIONS

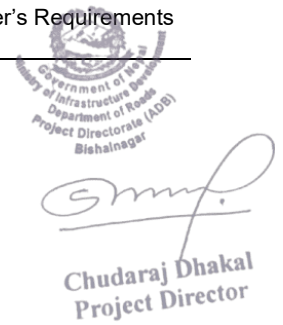
In addition, the Contractor is to be familiar with and be able to provide, in part or in full or photocopies where possible, to the Engineer on a temporary basis the latest editions of the following Standards

And /or Publications, which are mentioned in the most relevant Sections of the Standard Specifications for Road and Bridge Works, when so requested.

NEPAL STANDARDS (NS)

NS: 1-2035(1978)	Specification for Burnt Clay Bricks
NS: 40-2040(1983)	Specification for High Density Polythene Pipes
NS: 80-2042(1985)	Specification for Reinforced Concrete Pipes
NS: 84-2042(1985)	Specification for Reinforcing Steel
NS: 112-2042(1985)	Specification for Enamel and Non-reflectorized Paint
NS: 163-2045(1988)	Specification for Smooth Wire

- NS: 168-2045(1988) Specification for Barbed Wire
NS: 190-2045(1988) Specification for Primer Paint
NS: 191-2045(1988) Specification for Reinforcing Steel
NS: 199-2046(1989) Specification for Galvanized Iron (GI) Pipe
NS: 408-2054(1997) Specification for Road Marking Paint



Other relevant NS documents as required by these Specifications.

INDIAN PUBLICATIONS & STANDARDS

IS: 277-1992	Galvanized Steel Sheets (Plain and Corrugated)
IS: 432-1982	Mild steel and medium tensile steel bars and hard-drawn steel wire for concrete reinforcement
IS456-2000	Code of Practice for plain and reinforced concrete
concrete IS: 1079	Steel plate
IS: 1161	Steel tubes
IS: 1566-1985	Steel mesh fabric (for concrete reinforcement)
IS: 1786-1985	High strength deformed steel bars and wires for concrete reinforcement
IS: 2062-1999	Steel for general structural purpose
IS: 2062-1986	Method of Test for galvanized hardware
IS: 2386	Method of Test for Aggregates Parts 7 & 8
IS2629-1985	Hot-Dip Galvanizing of Iron and Steel
IS: 4031	Method of Test for Cement Parts 2, 3, 5& 6

BRITISH PUBLICATIONS & STANDARDS

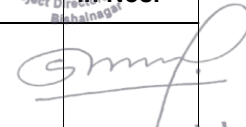
BS: 12	Specification for Portland cement Requirements for composition, strength, physical and chemical properties of four strength classes.
BS: 63	Specification for Single-Sized aggregate for general purposes.
BS: 812	Testing Aggregates Methods for determination of soluble Chloride Content. Part 117
BS: 1707	Specification for hot binder distributors for road surface dressings
BS: 3049	Pedestrian guard rails (metal)
BS: 3148	Methods of test for water for making concrete (including notes on the suitability of water)
BS: 5075	Specification for concrete admixtures/workability agents
BS: 6044	Road Paint



Appendix 2: Office and Furniture to be supplied to Employer

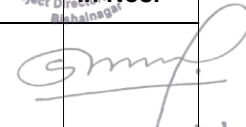
S. No	Items	Description	Symbol	Dimension	Quantity in Nos.
1	Reception U-shaped table	RECEPTION TABLE OF SIZE - 5400W X 390/600D X 1050HT All outer panel is of 25MM thick PPB and Inner is of 18MM thick PPB with Prelam Pedestal (2B+1F).	R1	5000x600x750	1
2	Chairs	Providing & Fixing Glide medium back of SOS /Steel case / Haworth or equivalent brand: Back Type Moulded Mesh Back Seat Upholstery Fabric Caster Type Nylon Base Type Nylon Mechanism CTM Arm Rest Type Fixed PP	C1	550x550	6
3	Conference Hall Table	Providing & Fixing FREE STANDING TABLE @1200LX750DX750HT of SOS /Steel case / Haworth or equivalent brand:FREE STANDING TABLE @1200LX750DX750HTTOP:-To be made of 25 mm thick Prelaminated Particle board with PVC edge band on all sides..SPLAYED LEG:-Linear Workstation /Table shall be constructed using 40 x 50 mm MS Pipe Splayed Leg with caps & levelers for Legs & 40 x 40 mm MS Powder Coated Pipes for cross members.MODESTY: - To be made of 18 mm thick Prelaminated particle board.	T1	1200x750x750	5
4	Cabinate	Providing & Fixing SIDE COMBO STORAGE @1200LX460DX750HT of SOS /Steel case / Haworth or equivalent brand: To be made out of 25mm thick Top & 18mm thick body of Prelaminated particle board with PVC edge band on all sides & Consists of 3 drawers & 2 Nos of Openable Shutter with One Nos of adjustable Shelf.	Q1	400 X 1200	15
5	Conference Hall Chair	Providing & Fixing Elan Medium Back Chair with Foam of SOS /Steel case / Haworth or equivalent brand: Back Type Moulded Mesh Back Seat Upholstery Fabric Caster Type Nylon Base Type Nylon Mechanism S1 Arm Rest Type Fixed PP	C2	550x550	54

S. No	Items	Description	Symbol	Dimension	Quantity in Nos.
6	Table	Providing and Fixing MEETING TABLE @1500LX750DX750HT of SOS /Steel case / Haworth or equivalent brand: To be made of 25 mm thick Prelaminated Particle board with PVC edge band on all side. C LEG: Linear Workstation /Table shall be constructed using 50 x 50 mm MS Pipe with caps & levelers for Legs & 40 x 40 mm MS Powder Coated Pipes for cross members WIRE MANAGEMENT: One Tie Cable Trey Access Flap, & Switch Mounting Box Considered.	T2	1500x750x750	18
7	Meeting Room Chair	Providing & Fixing Elan Medium Back Chair of SOS /Steel case / Haworth or equivalent brand: Back Type Moulded Mesh Back Seat Upholstery Fabric Caster Type Nylon Base Type Nylon Mechanism S1 Arm Rest Type Fixed PP	C3	400x500	31
8	Table	Providing & Fixing MEETING TABLE @1650LX1050DX750HT of SOS /Steel case / Haworth or equivalent brand: :- To be made of 25 mm thick Prelaminated Particle board with PVC edge band on all sides.. C LEG :Linear Workstation /Table shall be constructed using 50 x 50 mm MS Pipe with caps & levelers for Legs & 40 x 40 mm MS Powder Coated Pipes for cross members WIRE MANAGEMENT :-One Tie Cable Trey Access Flap, & Switch Mounting Box Considered	T3	1575x975x750	2
9	Cabinate	Providing and & Fixing OPENABLE STORAGE @1500LX600DX1200HT of SOS /Steel case / Haworth or equivalent brand: TOP in 25/18mm Prelaminated Particle board. with PVC edge bands. Body in 18 mm Prelaminated Particle board. with PVC edge bands. Shutter in 18 mm Prelaminated Particle board with PVC edge bands. Back in 18 mm Prelaminated Particle board. with PVC edge bands. Shelves In 18 mm Prelaminated Particle board. with PVC edge bands. Handle "C" Type SS Brush Finish	Q2	565x1500	7


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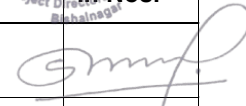
S. No	Items	Description	Symbol	Dimension	Quantity in Nos.
10	Pantry Counter	Providing and fixing 12mm top counter made up of granite 19mm water proof board including 600mm 3 drawers and remaining 18mm shutter door.	K1	3000x600	1
11	Chief accountant Table	Providing & Fixing STEELINE TABLE 1800 L X 900 D X 750 Ht of SOS /Steel case / Haworth or equivalent brand: TOP shall be membrane pressed profiled work top made of 25mm thick one-sided MDF Prelam board, with 0.4mm PVC membrane pressed on top. Stainless steel strip of 3mm thick with buffing or chrome finish shall be mounted on bottom side of the work top contour. HEEL LEGS shall be in a tapered fashion from top to bottom, shall be made of 1.5mm thick Stainless Steel with mirror finish or chrome finish. Horizontal cross member shall be made of 40mmX40mmX1.6mm MS pipe with powder coating . WIRE MANAGEMENT The Vertical (snake) & Horizontal(Switch mounting box) wire carriers are placed below worktop, made up of CRCA with Powder Coating & Fixed to the understructure with specially designed brackets. Switch plates placed in the switch mounting box, easily accessible through an Access Flap(300L). PERFORATED STEEL MODESTY (450H) to be made of 0.8mm thick CRCA sheet with powder coated finish with the thickness of 50-60 μ & a bracket to mount the modesty.	T4	1800x900x750	4
12	Cabinet	Providing & Fixing STEELINE SIDE STORAGE @1200L x 450D x 750H of SOS /Steel case / Haworth or equivalent brand: TOP shall be membrane pressed profiled work top made of 25mm thick one-sided MDF Prelam board, with 0.4mm PVC membrane pressed on top. Stainless steel strip of 3mm thick with buffing or chrome finish shall be mounted on bottom side of the work top contour. • BODY, SHUTTER & BACK - 18mm thick Prelaminated Practical Board with PVC Edge band. Handle less storage with finger grooves.	Q3	525x1200	25

S. No	Items	Description	Symbol	Dimension	Quantity in Nos.
13	Chair	Providing and fixing Stellar high back chair of SOS /Steel case / Haworth or equivalent brand: Back Type Head Rest (High Back) Seat Upholstery Fabric Caster Type Nylon Base Type Nylon Mechanism KTS Arm Rest Type 1D PU	C4	600x540	24
14	Chair	Providing and fixing Stellar medium back chair of SOS /Steel case / Haworth or equivalent brand: Back Type Moulded Mesh Back Seat Upholstery Fabric Caster Type Nylon Base Type Nylon Mechanism KTS Arm Rest Type 1D PU	C5	390x505	26
15	5-seater sofa set	Providing and fixing 5 Seater Sofa SOS /Steel case / Haworth or equivalent brand: • Inner Frame ,Basic Structure And Both Sides Arm are made of Natural Hard wood And Commercial Ply Frame With Upholstery • High Density Foam In Back Seat And Back Foam Covered Leatherette Tapestry •Seat Supportive Frame Is Made Of CRCA Pipe	S1		10
16	3-seater sofa	Providing and fixing 3 seater Sofa SOS /Steel case / Haworth or equivalent brand: • Inner Frame ,Basic Structure And Both Sides Arm are made of Natural Hard wood And Commercial Ply Frame With Upholstery • High Density Foam In Back Seat And Back Foam Covered Leatherette Tapestry •Seat Supportive Frame Is Made Of CRCA Pipe	S2		14
17	Tea Table	Providing & fixing Centre Table @ 900 x 600 x 420mm HT SOS /Steel case / Haworth or equivalent brand: Top prelaminated particle board (as per approved shade) with PVC edge binding. U/s in metal powder coated finish	T'1	450x900	16

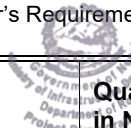
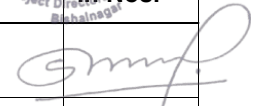

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S. No	Items	Description	Symbol	Dimension	Quantity in Nos.
18	Side table	Providing and fixing ROUND TABLE Dia500*420 SOS /Steel case / Haworth or equivalent brand: HDF board painting white, base solid steel coated white, Dia500*420, Top white and matching white powder coated base	T2	450x400	11
19	Workstation Account - Table	Providing and fixing LINEAR NON-SHARING WS @1500LX750DX1200HT SOS /Steel case / Haworth or equivalent brand: TOP: To be made of 25 mm thick Prelaminated Particle board with PVC edge band on all sides. GABLE END: To be made of 25 mm thick Prelaminated particle board. TILE BASED PARTITION SYSTEM: The partition Main 60 mm thick and 1200mmht with Upper Tile in Pinup /Fabric per WS 1 Nos & rest in Plain Fabric. Lower Tile in Laminated finish on both sides. All trims in anodized / Powder Coated finish. Partition system have adequate raceway at single / Double level for running data & power cables. (Above TT Raceway Considered)	T5	1500x750x750	12
20	Cabinet	Providing and fixing OVERHEAD STORAGE 2 SHUTTER UNIT 18MM BACK WITH SHELF@900LX400DX750H SOS /Steel case / Haworth or equivalent brand: •TOP in 18mm Prelaminated Particle board with PVC edge bands. • Body in 18 mm Prelaminated Particle board with PVC edge bands. • Shutter in 18 mm Prelaminated Particle board with PVC edge bands. • Back in 18 mm Prelaminated Particle board with PVC edge bands. • Shelves In 18 mm Prelaminated Particle board with PVC edge bands. • Handle "C" Type SS Brush Finish.	Q4	450x900	3
21	Cabinet	Providing and fixing OPENABLE STORAGE @5550(900X5+1050X1) LX600DX1800H SOS /Steel case / Haworth or equivalent brand •TOP in 18mm Prelaminated Particle board with PVC edge bands. • Body in 18 mm Prelaminated Particle board with PVC edge bands. • Shutter in 18 mm Prelaminated Particle board with PVC edge bands. • Back in 18 mm Prelaminated Particle board with PVC edge bands. • Shelves In 18 mm Prelaminated	Q5	5800x600x1800	4

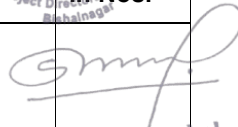
S. No	Items	Description	Symbol	Dimension	Quantity in Nos.
		Particle board with PVC edge bands. • Handle "C" Type SS Brush Finish			
22	Cabinet	OPENABLE STORAGE @30000(1500X20) LX600DX1800H SOS /Steel case / Haworth or equivalent brand: •TOP in 18mm Prelaminated Particle board with PVC edge bands. • Body in 18 mm Prelaminated Particle board with PVC edge bands. • Shutter in 18 mm Prelaminated Particle board with PVC edge bands. • Back in 18 mm Prelaminated Particle board with PVC edge bands. • Shelves In 18 mm Prelaminated Particle board with PVC edge bands. • Handle "C" Type SS Brush Finish	Q6	30000x600x1800	1
23	Cabinet	OPENABLE STORAGE @4050(1050X3+900X1) LX450DX1800H SOS /Steel case / Haworth or equivalent brand •TOP in 18mm Prelaminated Particle board with PVC edge bands. • Body in 18 mm Prelaminated Particle board with PVC edge bands. • Shutter in 18 mm Prelaminated Particle board with PVC edge bands. • Back in 18 mm Prelaminated Particle board with PVC edge bands. • Shelves In 18 mm Prelaminated Particle board with PVC edge bands. • Handle "C" Type SS Brush Finish	Q7	4000x450x1800	1
24	PD Room Table	Providing and Fixing FREE STANDING TABLE @2100LX750DX750HT SOS /Steel case / Haworth or equivalent brand : TOP: To be made of 25 mm thick Prelaminated Particle board with PVC edge band on all sides. SPLAYED LEG: Linear Workstation /Table shall be constructed using 40 x 50 mm MS Pipe Splayed Leg with caps & levelers for Legs & 40 x 40 mm MS Powder Coated Pipes for cross members. MODESTY: To be made of 18 mm thick Prelaminated particle board .	T6	2000x900x750	5
25	Cabinet	Providing & fixing SIDE COMBO STORAGE @1500(750+750) LX460DX750HT SOS /Steel case / Haworth or equivalent brand: To be made out of 25mm thick Top & 18mm thick body of Prelaminated particle board with PVC edge band on all sides & Consists of 3 drawers & 1	Q8	1400x375x750	10


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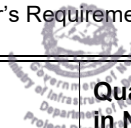
S. No	Items	Description	Symbol	Dimension	Quantity in Nos.
		Nos of Openable Shutter with One Nos of adjustable Shelf.			
26	Cabinet	Providing & fixing OPENABLE STORAGE @3000(1500+1500) LX450DX1800H SOS /Steel case / Haworth or equivalent brand •TOP in 18mm Prelaminated Particle board with PVC edge bands. • Body in 18 mm Prelaminated Particle board with PVC edge bands. • Shutter in 18 mm Prelaminated Particle board with PVC edge bands. • Back in 18 mm Prelaminated Particle board with PVC edge bands. • Shelves In 18 mm Prelaminated Particle board with PVC edge bands. • Handle "C" Type SS Brush Finish	Q9	3000x450x1800	1


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 Department of Project Management
 Project Director

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 Project Director

S. No	Items	Description	Symbol	Dimension	Quantity in Nos.
27	File Record Room cabinets	Providing and Fixing Slotted Angle Storage rack @ 16290(905X17) Lx605x2400HT SOS /Steel case / Haworth or equivalent brand: Back to Back Cantilever shelving Module Welded Frame Upright with base shelf and adjustable shelves. Canopy brackets fixed to welded frame upright. Module having one base shelf and 5 adjustable shelves with clear height between each shelf to be 330 mm. 1. Welded Frame Upright (900x2190) to be made of 2 mm thick fully welded superior quality MS powder coated rolled form section or standard closed section with slots at pitch of 25 mm. Frame having intermediate tie member for extra strength. 2. Base shelf Tray to be made of 1 mm thick superior quality MS CRCA powder coated sheet with bottom stiffener made of 1 mm thick MS CRCA powder coated sheet skirting to be made of 1 mm thick superior quality MS CRCA powder coated sheet end bracket to be made out of 1.6 mm thick MS CRCA powder coated sheet. Base support is made out of 1.6 mm thick MS CRCA powder coated sheet. 3. Adjustable Shelf Tray to be made of 1 mm thick superior quality MS CRCA powder coated sheet with bottom stiffener made of 1 mm thick MS CRCA powder coated sheet end bracket is made out of 1.6 mm thick MS CRCA powder coated sheet. Each shelf to have an index plate in polycarbonate. 4. Canopy bracket made up of 1.6 mm thick MS CRCA powder coated sheet, fixed to welded frame upright. Metal finish: All metal components are color with powder coating not more than 60 microns. 5. Wooden cladding of 18t mm thick Pre-laminated Particle board. (foil same as classroom table top)	Q10	16000x600x1800	1


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S. No	Items	Description	Symbol	Dimension	Quantity in Nos.
28	Cabinet	Providing & Fixing OPENABLE STORAGE @2700(900X3) LX600DX750H SOS /Steel case / Haworth or equivalent brand: •TOP in 18mm Prelaminated Particle board. with PVC edge bands. • Body in 18 mm Prelaminated Particle board with PVC edge bands. • Shutter in 18 mm Prelaminated Particle board with PVC edge bands. • Back in 18 mm Prelaminated Particle board. with PVC edge bands. • Shelves In 18 mm Prelaminated Particle board. with PVC edge bands. • Handle "C" Type SS Brush Finish	Q11	2700x750x750	1
29	Workstation Cabinet	Providing & fixing Openable Storage @1800LX600DX1800HT SOS /Steel case / Haworth or equivalent brand: •TOP in 18mm Prelaminated Particle board. with PVC edge bands. • Body in 18 mm Prelaminated Particle board. with PVC edge bands. • Shutter in 18 mm Prelaminated Particle board with PVC edge bands. • Back in 18 mm Prelaminated Particle board. with PVC edge bands. • Shelves In 18 mm Prelaminated Particle board. with PVC edge bands. • Handle "C" Type SS Brush Finish	Q12	1800x565	6


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Appendix 3: Survey Instrument Required at Site

The Contractor shall provide and maintain the following survey instruments and equipment until Contract Completion or as instructed by the Engineer. The items shall be new or nearly new and subject to the approval of the Engineer.

At Contract Completion the survey instruments and equipment shall become the property of the Contractor.

The survey instruments shall also be for the use of the Engineer's Representative until Contract Completion.

The Contractor shall supply immediately replacement for damaged/lost items and be responsible for insurance against theft.

Survey Equipment Required at Site

S. No	Description	Quantity
1	Total Station with Standard Accessories and Aluminum Tripod	1 Set
2	3 mtr 3 Section Aluminum Ranging Rod	2 Set
3	Auto Level with Tripod	2 Set
4	5 mtr 5 Section Levelling Staff	2 Set
5	Clip on Bubble	2 Set
6	50 mtr Nylon Coated Steel Tape	1 Set
7	50 mtr Fiberglass Tape	1 Set
8	30 mtr Fiberglass Tape	1 Set
9	5 mtr Steel Tape	5 Set
10	Field Books	As required
11	Other miscellaneous accessories	As required

The above equipment are minimum numbers required. Depending upon the actual requirements at site, the Contractor shall arrange for other and/or additional survey equipment as instructed by the Engineer.



Appendix 4: Laboratory Equipment

The following items of laboratory equipment shall be provided in the laboratory, as a minimum, however, this does not relieve the Contractor of his responsibility to equip the laboratory with all equipment needed to perform the full range of tests required by the Specifications:

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S. No.	Particulars	Quantity
	General	
1	Oven 18" x 18" x 18" Aluminum Chamber	1
2	Platform balance 300 kg	1
3	Electronic Balance Model CH30R11 Capacity 30 kg x 5 gm preferably OHAUS or equivalent	1
4	Electronic Balance Model CT6000 Capacity 6010 gm x 0.5 gm preferably OHAUS or equivalent	1
5	Electronic Balance Model NDB110 Capacity 2100 gm x 0.1 gm preferably OHAUS or equivalent	1
6	Water bath serological 2 rack solar	1
7	Mercury Thermometer 250°C	2
8	Dial Thermometer 400°C	2
9	Mercury Thermometer 50°C	2
	Glassware: containers and small tools including;	
10	Wet and Dry Thermometer	1
11	Spatulas 200 mm	2
12	GI Wire Zinc coating and diameter test	1
	GI Tray	
13	300 mm x 300 mm x 75 mm	6
	400 mm x 400 mm x 75 mm	6
	600 mm x 600 mm x 75 mm	6
14	Aluminum Moisture Container 75 mm x 50 mm	50
15	Rubber Mallet	1
16	Aggregate Steel Scoop (690 mm x 300 mm x 100 mm)	1
17	Aluminum Scoop (125 mm x 200mm x 75 mm)	1
18	Gauging Trowel	2
19	S.S Bowl 2 Lit	2
	Volumetric Flasks	
20	1000 ml	2
	500 ml	2
	250 ml	2
	Measuring Cylinders	
21	1000 ml	2

S. No.	Particulars	Quantity
	500 ml	2
	250 ml	2
22	Beakers	
	1000 ml	2
	500 ml	2
	250 ml	3
23	Evaporating Disc 100 mm	3
24	Vernier Caliper 150 mm	1
25	Steel Ruler 300 mm	1
26	Pairs of heat resistant Asbestos hand gloves	2
27	Set of sampling tools all materials	1
28	Set of crowbar, pick, spade and 5 kg hammer, GI Tray	2
29	Gunny bags and plastic bags	50
30	GI Sieve 450 mm dia Size; 75, 69, 63,50, 37.5, 31.5, 25, 20, 14, 16, 12.5, 9.5, 6.3, 4.75, Lid and pan set of 16 pcs	1
31	Brass Sieve 200 mm dia Size; 4, 2.8, 2.36, 2, 1.18mm, 600, 425, 300, 150,170, 75 mic, 90 mic, Lid and pan set of 14 pcs	1
33	Water Testing kit (set)	1
34	Organic Content testing kit (set)	1
	Soil and Aggregate	
35	Sample Splitters (Riffle boxes) 50 mm	1
36	Liquid limit device with grooving tools and counter	1
37	Glass Plate 400mm x 600 mm x 6 mm	2
38	Specific Gravity Bottle 100 ml	1
39	Compaction Mould 100 mm, 150 mm and Rammer 2.5 kg and 4 kg	1
40	Sand Pouring Apparatus 200 mm (sand replacement test)	2
41	Sand Pouring Apparatus 100 mm (sand replacement test)	1
42	Core Cutter Apparatus	1
43	Aggregate Impact Value Test Apparatus	1 set
45	Flakiness	1
46	Elongation Test Gauge	1
47	Standard Measure 30 lit, 15 lit and 3 lit	1
48	Tamping Rod	1
49	Aggregate Crushing Value Test Mould	1
50	Set equipment for specific gravity determination of both coarse and fine graded soils, including ancillary glass ware including pycnometers, and Guy Lussure type density bottles of Capacity 100 ml.	1 set

S.No.	Particulars	Quantity
	Cement and Cement Concrete / Mortar	
51	Vicat Apparatus	1
52	Slump Test Apparatus	1
53	Concrete Cube Mould 150 mm	18
54	Mortar Cube Mould 75 mm	42
55	Compression Strength Testing Machine 200 ton capacity	1
56	Compression Strength Testing Machine 50 ton capacity	1
57	Sand equivalent test set, complete with graduate plastic cylinder, manual or mechanical shaker and stock solution	1
58	Curing tank for test cubes (2 m x 2 m x 0.75 m) with controlled heating facilities	1
59	Schmidt Rebound Hammer	1

The site laboratory equipment and furniture shall become the property of the Contractor when no longer required by the Engineer unless stated to the contrary elsewhere in the contract.




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Section 6D – Drawings

Provided as Section 6D in a separate volume.

FOR WEBSITE



Section 6E – Personnel Requirements

Building construction works

Using Form PER-1 and PER-2 in Section 4 (Bidding Forms), the Bidder must demonstrate that it has Personnel who meet the following requirements:

S. No.	Position	Required Nos.	Minimum Qualification	Total Similar Work Experience [years]	Experience in Similar Position [years]
1	Contract Manager / Contractor's Representative	1	Bachelor's degree in Civil Engineering	10	3
2	Site Engineer	1	Bachelor's degree in Civil Engineering	7	3
3	Senior Laboratory Technician	1	Senior Lab Technician or Sub-engineer	5	3

The Bidder shall provide details of the proposed personnel and their experience records in the relevant Information Forms included in Section 4 (Bidding Forms).

All submitted curriculum Vitae should be duly signed by the concerned person.

Note:

- (i) In case of joint venture, the partner who meets the major requirement of experience in Contracts of Similar Size and Nature shall be present at the Work Site throughout the contract duration; and
- (ii) The Contract Manager / Contractor's Representative shall require being the Senior Employee from the Bidder and working with the firm for at least one year prior to the bid submission deadline.
- (iii) The Contract Manager / Contractor's Representative shall be at the work site substantially during the contract duration.



Section 6F – Equipment Requirements

Building Construction works

Using Form EQU in Section 4 (Bidding Forms), the Bidder must demonstrate that it has the key equipment listed below:


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S. N.	Equipment Type and Characteristics	Minimum No. Required
1	Excavator (> 0.50 m3)	1
2	Electric Concrete Mixer or Batching Plant	1
3	Monkey Jumper	1
4	Hoist (lifting height > 8m)	1

The Bidder shall provide further details of proposed items of equipment using the relevant Form in Section 4 (Bidding Forms).

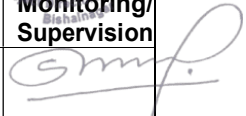
Ownership attestation documentation for each item of equipment and, where, relevant, the original leasing agreements should be attached.

Resources committed by the Bidder should be physically mobilized at site throughout the contract period.

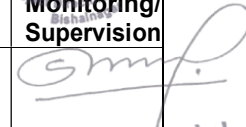
Supplementary Information
(The IEE Report is attached as separate Volume)

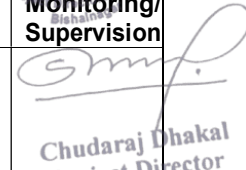
Environmental Management Plan ("EMP"):

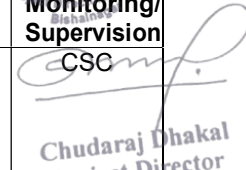
Environmental Impact	Mitigation Measures	Mitigation Cost (NRs.)	Institutional Responsibility	
			Implementation	Monitoring/ Supervision
DETAILED DESIGN AND PRE-CONSTRUCTION STAGE				
Improper design	- All project facilities are to be designed in accordance with the planning and design norms of NNBC. - Earthquake risk should be considered in the structural design of the PD- ADB office building.	Design cost	DSC	PD- ADB
Lack of environmental specifications	- Prepare relevant environmental sections in the tender documents for bidders and include the EMP in the bidding documents - Prepare a bid evaluations section for environment, according to ADB bid evaluation format - Prepare environmental contract clauses for contractors	Design cost	DSC	PD- ADB
Removal of Existing structures	All concrete structures/equipment in the proposed PD-ADB office building area to be dismantled and managed before construction starts.	Construction cost	Contractor	PD- ADB
Tree cutting	- Existing trees are located at the periphery of the site. Hence, cutting of trees should be avoided to the extent possible. - If required to be felled, necessary permission should be processed as per GON requirements. - Every tree felled should be compensated at the rate of 1:25. - Cutting, carry out and selling these trees should be as per GoN procedure to avoid any accident.	Construction cost	Contractor and PD-ADB	PD- ADB
CONSTRUCTION STAGE				
Noise and Dust Pollution during the demolition of existing building	- Prior information shall be given to the adjacent offices regarding the demolishing process, scheduling of the activities etc. - Water spraying at the demolition site - Fencing / Install barriers (GI sheets, geo-net) to shield from dust and aggregates - Avoid usage of machines/equipment	Construction	Contractor	CSC

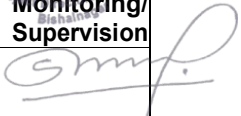
Environmental Impact	Mitigation Measures	Mitigation Cost (NRs.)	Institutional Responsibility	
			Implementation	Monitoring/ Supervision
	- with extra noise; - Carry out demolition activities in stages, give adequate notice and information of activities to the adjoining stakeholders. - Make arrangement of regular monitoring of ambient air quality and Noise in construction site.			 Chudaraj Dhakal Project Director
Drainage Congestion	- Temporary drainage congestion (TDC) in the foundation trench due to rainwater to be removed by pumping. - Avoid monsoon period for foundation works. - TDC in construction yard and camp of the proposed building area to be removed by temporary earth or RCC drains. - All the construction materials will be placed over tarpaulin or heavy plastic sheet and will also be covered with the sheet and ensures no release of sediments and dust from the storage yard.	Construction	Contractor	CSC
	All rainwater, storm water waste water etc. should be drain out via central sewerage pipelines after sedimentation.			
Air Pollution	- Fit construction vehicles with appropriate exhaust systems and emission control devices. - Maintain construction vehicles and equipment in good working condition including regular servicing. - Cover hauls vehicles carrying dusty materials moving outside the construction site. - Equipment/vehicles causing excess pollution (e.g. visible smoke) should be banned from construction sites or fixed immediately prior to further usage. - Water spray to the material stockpiles as and when required to minimize the potential environmental nuisance due to dust. - Increase the watering frequency during periods of high risk (e.g. high winds and dry periods).	Construction	Contractor	CSC

Environmental Impact	Mitigation Measures	Mitigation Cost (NRs.)	Institutional Responsibility	
			Implementation	Monitoring/ Supervision
	Stored materials such as boulders and sand should be covered and confined to avoid them being wind-drifted. - Erect dust barriers along the boundary of the building area to reduce dust movement to the surrounding areas. - Establish mechanism for regular monitoring of the ambient air pollution in project area. - Restore disturbed areas as soon as possible by vegetation/grass-turfing. - Establish adequate locations for storage, mixing and loading of construction materials, in a way that dust dispersion is prevented because of such operations.			 Chudaraj Dhakal Project Director
Sewage Pollution/ Sanitation Hazard	- Provide hygienic sanitary facilities and sewerage system. The toilets and domestic waste water will be collected through a common sewerage. Provide separate latrines and bathing places for males and females workers with total isolation by wall or by location. The minimum number of toilet facilities required is one toilet for every ten persons. - Ensure the sanitary facilities are kept clean and without any odors. - Educate the workers of using the facilities.	Construction	Contractor	CSC
Solid Waste Pollution	- Organize disposal of all wastes generated during construction in an environmentally acceptable manner. - Minimize the production of waste materials by 3R (Reduce, Recycle and Reuse) approach. - Segregate and reuse or recycle all the wastes, as far as practical. - Prohibit burning of solid waste. - Provide refuse containers at worksite and worker camp.	Construction	Contractor	CSC
	- Maintain the construction site in a cleaner, tidy and safe condition and provide and maintain appropriate facilities as temporary storage of all wastes. - Ensure proper collection and disposal of all wastes within the construction camp from where the			

Environmental Impact	Mitigation Measures	Mitigation Cost (NRs.)	Institutional Responsibility	
			Implementation	Monitoring/ Supervision
	municipal services will take by their truck and dispose at their dumping area. Insist on waste separation and store by source; organic wastes, inorganic wastes and recyclables in separate containers.			 Chudaraj Dhakal Project Director
Liquid waste	- Train the relevant construction personnel in handling of fuels and spill control procedures. - Make sure all containers and drums that are used for storage are in good condition and are labelled with expiry date. - Any container, drum that is dented, cracked, or rusted might eventually leak. Check for leakage regularly to identify potential problems before they occur. - Put containers and drums in permanent storage areas on an impermeable floor. - Take all precautionary measures when handling and storing fuels and lubricants, avoiding environmental pollution. - Ensure basic firefighting equipment is in place outside these storage areas in case of a fire.	Construction	Contractor	CSC
Occupational Health and Safety issue	- Awareness to safe work procedure - Use of safety equipment as helmet, gloves, boots, mask, earplugs net safety belt etc. - Awareness to communicable diseases - Keep First aid box at site - Temporary toilet and bathroom will be made - No one outsider will be allowed to enter the construction zone	200,000.00	Contractor	PIU, CSC
Stockpiling of construction materials	- Haphazard disposal will be controlled - Construction materials, grease, paints will be properly arranged - Residual construction materials will be reused for other purpose	Construction	Contractor	CSC
Disturbance to the local Population and pedestrians	- The transportation vehicles will be parked within the premises of PD-ADB - Prohibit the parking of the transportation vehicles outside the construction site	Contractor's BOQ	Contractor	PIU, CSC

Environmental Impact	Mitigation Measures	Mitigation Cost (NRs.)	Institutional Responsibility	
			Implementation	Monitoring/ Supervision
	- Put hoarding board to inform the pedestrian and adjacent offices about the activities - Install barriers (GI sheets, geo-net) to shield from dust and aggregates			 Chudaraj Dhakal Project Director
	- Maintain the construction site in a cleaner, tidy and safe condition and provide and maintain appropriate facilities as temporary storage of all wastes. - Ensure proper collection and disposal of all wastes within the construction camp from where the municipal services will take by their truck and dispose at their dumping area. Insist on waste separation and store by source; organic wastes, inorganic wastes and recyclables in separate containers.			
Liquid waste	- Train the relevant construction personnel in handling of fuels and spill control procedures. - Make sure all containers and drums that are used for storage are in good condition and are labelled with expiry date. - Any container, drum that is dented, cracked, or rusted might eventually leak. Check for leakage regularly to identify potential problems before they occur. - Put containers and drums in permanent storage areas on an impermeable floor. - Take all precautionary measures when handling and storing fuels and lubricants, avoiding environmental pollution. - Ensure basic firefighting equipment is in place outside these storage areas in case of a fire.	Construction	Contractor	CSC
Occupational Health and Safety issue	- Awareness to safe work procedure - Use of safety equipment as helmet, gloves, boots, mask, earplugs net safety belt etc. - Awareness to communicable diseases - Keep First aid box at site - Temporary toilet and bathroom will be made - No one outsider will be allowed to enter the construction zone	200,000.00	Contractor	PIU, CSC

Environmental Impact	Mitigation Measures	Mitigation Cost (NRs.)	Institutional Responsibility	
			Implementation	Monitoring/ Supervision
Stockpiling of construction materials	- Haphazard disposal will be controlled - Construction materials, grease, paints will be properly arranged - Residual construction materials will be reused for other purpose	Construction	Contractor	CSC  Chudaraj Dhakal Project Director
Disturbance to the local Population and pedestrians	- The transportation vehicles will be parked within the premises of PD-ADB - Prohibit the parking of the transportation vehicles outside the construction site - Put hoarding board to inform the pedestrian and adjacent offices about the activities - Install barriers (GI sheets, geo-net) to shield from dust and aggregates - Provide adequate lighting at demolition site for the night to prevent accident	Contractor's BOQ	Contractor	PIU, CSC
Site selection for the disposal of waste and debris	- The disposal area will be selected with the consultation of Municipality authority - The disposal area will not be the environmentally sensitive area - The disposal area will be far from the water source and community area	Contractor's BOQ	Contractor	PIU, CSC
Camp site restoration	- Camp site to be restored to its original condition as per the rehabilitation plan - Restoration of top soil - Disposal at waste at designated locations - Cleaning of water channels - Removal of debris and disposal	Contractor's BOQ	Contractor	PIU, CSC
Operation & maintenance phase				
Change in Water Table/ Water Quality	- Rainwater harvesting technology - Rechargeable pits will be constructed to recharge ground water	Part of agency budget	PD-ADB	PD-ADB
Water Demand / Supply & Waste water Disposal	- Treated Water will be of Nepal's National standard - Only insufficient water will be extracted	Part of agency budget	PD-ADB	PD-ADB
Fire hazard and other emergency response system	- Smoke detection devices will be installed - Earthen and Electrification will be properly done - Fire extinguisher will be installed - Emergency reservoir tank will be made - National Building Code, 2005 will be followed	Part of agency budget	PD-ADB	PD-ADB

Environmental Impact	Mitigation Measures	Mitigation Cost (NRs.)	Institutional Responsibility	
			Implementation	Monitoring/ Supervision
Movement of vehicles and parking	- Haphazard parking will not be allowed - Traffic signs will be placed - Speed limit of vehicle inside business complex will be maintained	Part of agency budget	PD-ADB	 Chudaraj Dhakal Project Director
Surface runoff and drainage systems	- Rechargeable pits will be installed - Greenery area will be maintained	Part of agency budget	PD-ADB	PD-ADB
Loss of open space and vegetation	Development of greenery area through landscaping and regular maintenance	Part of agency budget	PD-ADB	PD-ADB



Special Operation Procedure (SOP)

In response to COVID-19, countries across the globe have implemented a range of public health and social measures, including movement restrictions, partial closure or closure of schools and businesses, quarantine in specific geographic areas and international travel restrictions. Alike global condition Nepal is also suffering with rapid transmission of COVID 19 cases in recent days which seems to be continuous for long run. Asian Development Bank (ADB), Nepal Government (GoN) as well as World Health Organization (WHO) has established their own measures to be followed for construction sites. Hence, there are several standard procedures by different organizations to perform construction work at controlled environment with reduced transmission capability of COVID 19 in work places so that construction work will not be vanished. Here the bidder should offer their modality to work in COVID19 condition ensuring safe environment in terms of its transmission. For the propose, the bidder shall prepare detail SOP based on the best practical and effective measures considering the guideline of GoN, WHO as well as ADB without limiting to the following mentioned sectors.

Workplace risk assessment

Please categorize the working areas in to different category based on exposure risk.

Low exposure risk – Workers in this category have minimal occupational contact with the public and other co-workers.

Medium exposure risk –In areas without community transmission of COVID-19, this scenario may include frequent contact with persons returning from areas with community transmission.

High exposure risk – jobs or work tasks with high potential for close contact with people who are known or suspected of having COVID-19, as well as contact with objects and surfaces possibly contaminated with the virus.

Measures for All Workplaces

Include your proposal for preventing transmission of COVID-19 that apply to all workplaces and all people at the workplace, such as employers, managers, workers, contractors, customers and visitors, include the following:

Broad provisions for preventing transmission through following measures.

- Hand hygiene
- Respiratory hygiene
- Physical distancing

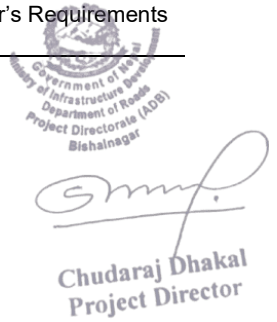
General Provisions for Preventing Transmission in Office

- Reduce and manage work-related travels
- Regular environmental cleaning and disinfection
- Cleaning and disinfecting office
- Office arrangement
- Staff management
- Staff behavior
 - i. Physical Distancing
 - ii. Personal Hygiene
 - iii. Meeting Etiquette
 - iv. Visiting Site or Client's Office

Commencement of Work in Construction Sites

- Preparation before work
- Procedure to be followed at entry
- Measure to minimize worker and community contact
- Restriction of workers movement outside the camp
- Disinfection of plant/ machineries

- Batching plant site (enclosed area)
- Manage delivery zones
- Manage storage area
- Personal protective equipment
- Manage workers accommodation (permanent and make-shift camps)
 - i. Camp Arrangements
 - ii. Kitchen and Dinning
 - iii. Toilets
 - iv. Changing Facilities and Showers



Emergency Handling Protocol (Covid-19)

- Emergency response team
- Preparedness for emergency
- Emergency protocol for symptomatic case
- Management of people with COVID-19 or their contacts

Specific Measures for Jobs Based on Risk Level

- Workplaces and jobs at medium risk
- Workplaces and jobs at high risk

SOP Implementation, Internal Monitoring and Reporting Mechanism

- Organogram for SOP implementation
- Internal monitoring and reporting mechanism
- Risk communication, training, and education
- Rights, duties, and responsibilities of workers and employers



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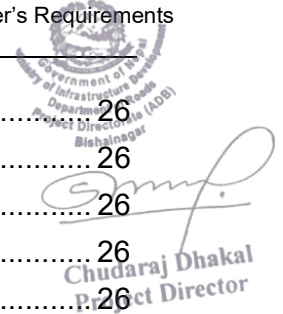
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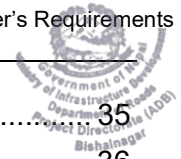


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6C-B: Special Provision to the Standard Specifications for Building Construction (Sanitary) Works

200 General

200.1 Scope

The Contractor shall furnish all materials, labor and related items necessary to complete the work indicated on the Drawings and Specified herein.

200.2 General

Unless specifically mentioned otherwise, all the applicable codes and standards published by the Indian Standard Institution and its subsequent revision and all other Standards which may be published by them before construction work starts, shall govern in respect of design, workmanship, quality and properties or materials and method of testing.

Some of these available Standards are listed below.

IS: 458 - 1971 Specification for Cement Concrete Pipes with and without Reinforcement

IS: 778 - 1964 Specification for Gun Metal Gate, Globe and Check Valves for Water, Steam and Oil only

IS: 780E -1966 Specification for Sluice Valve for Various Purpose

IS: 781 - 1984 Specification for Cast Copper Alloy Screw Down Bib Taps and Stop Valves for Water Services.

IS: 781E -1959 Specification for Sand Cast Brass Screw down Bib Taps and Stop Taps for Water Services

IS: 783 - 1959 Code of Practice for Laying of Concrete Pipes.

IS: 1171 - 1963 Basic Requirement of Water Supply, Drainage and Sanitation.

IS: 1703 - 1989 Water Fittings -Copper Alloy Float Valves (Horizontal Plunger Type) -Specification

IS: 1726 - 1991 Cast Iron Manhole Covers & Frames -Specification

IS: 1742 -1983 Code of Practice for Building Drainage

IS: 2064 -1962 Code of Practice for Selection, Installation and Maintenance of Sanitary Appliance

IS: 2065 – 1983 Code of Practice for Water Supply in Building

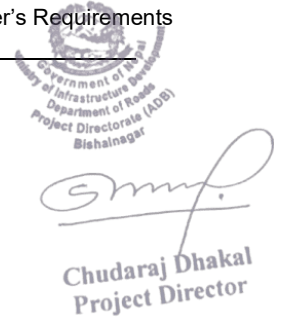
IS: 2373 – 1963 Specification for Water Meters (Bulk type)

IS: 2470 - 1985 Code of Practice for Installation of Septic Tanks.

IS: 2556 - 1967 Specification for Vitreous Sanitary Appliances (Vitreous China).

IS: 3597- 1966 Method of Test for Concrete Pipe

IS: 5329- 1969 Code of Practice for Sanitary Pipe Work Above Ground for Building.



Abbreviations

CI	Cast Iron
CP	Chrome Plated
CPVC	Chlorinated Polyvinyl Chloride
GVT	Glazed Vitrified Tiles
PVC	Poly Vinyl Chloride
GI	Galvanized Iron
WC	Water Closet

The Contractor will submit all samples to the Engineer for approval, together with Manufacturer's literature and installation instructions and obtain his full approval before placing any material orders or commencing the works.

In cases where materials are not available in Metric Measurements (as referred to) the nearest size Imperial units shall be provided, with prior approval of the Engineer, at no extra cost to the contract.

200.3 Basic Materials and Method

All materials provided for the Contract will be in strict accordance with the latest version of the applicable Indian Standards. All manufacturer's data, specifications and relative information together with samples will be submitted to the Engineer for approval prior to being purchased, otherwise at the Contractor's own risk.

200.4 Materials Trade Names Variations

Tenders shall be based upon complete installations. Products required which are not shown or mentioned, or not specified herein as to manufacturer, quality, etc. shall be furnished of the highest quality (commercial standard).

Materials shall be new and free from all defects.

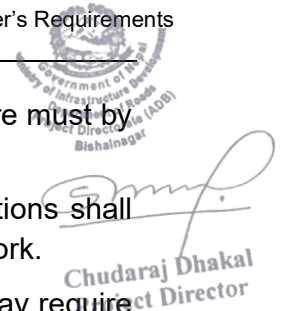
All materials, apparatus or equipment called for on the Plans or in the Specifications by trade names, or the name of a particular manufacturer, or by catalogue reference are the materials, apparatus, or equipment which should be allowed for in the Tender, or qualification submitted at the time of Tender submission.

200.5 Regulations

The work shall be carried out in accordance with all rules, regulations, by-laws and requirements of all authorities having jurisdiction. All changes and alterations required by an authorized inspector of any authority having jurisdiction shall be carried out at no cost to the employer.

200.6 Drawings and Specifications

These Specifications shall be considered as an integral part of the Drawings which accompany them. Neither the Plans nor the Specifications shall be used alone. Any item or subject omitted from one, but which is mentioned or reasonably implied in the



other shall be considered as properly and sufficiently specified and therefore must be supplied by the Contractor.

Misinterpretation of any requirements of either the Drawings or Specifications shall not relieve the Contractor of his responsibility for properly completing his work.

The Contractor shall apply to the Engineer for any explanation which he may require in regard to the meaning and intent of any clause in the Specification and Contract. He shall be held responsible for any errors or losses consequent upon failure to obtain such explanation.

The Contractor shall consult with the Engineer to obtain detail drawings or instructions for exact location of equipment as work progresses, before installing fitting or equipment and will be responsible for coordination with all other work trades including finishes.

Drawings show general location and routes to be followed by pipes, ducts, etc. where not shown, or shown diagrammatically, the Contractor shall install them in accordance with best trade practices.

200.7 As Built Record

The Contractor shall request a complete set of drawings, (white) from the Engineer and use these for "As Built" records.

"As Built" records shall be retained in the site office and kept up to date daily in regard to changes in actual installation from the Plans and Specifications. Alterations to duct work, piping services, etc. shall be noted and the revised arrangement drawn in accurately, complete with dimensions from column lines. Every precaution shall be taken to protect the Drawings from damage and loss.

The "As Built" records shall be made available to the Engineer upon request and made available at each site meeting. After no further alteration can be expected and the Contract is nearing completion, the records shall be submitted for final approval.

The Contractor shall include on "As Built" records the dimensions location of all buried piping and valves, and during construction plainly mark location of exterior services and valves to prevent damage to these until the Project is completed.

200.8 Cutting and Patching

Openings not indicated on the Architectural or Structural drawings which are required for bringing equipment into the building or for other temporary or permanent service, shall be approved by the Engineer. The Contractor will provide, maintain and restore these openings and shall pay for their provision and restoration. Ample notice shall be given of size and location of such openings.

The Contractor shall ensure that he does not undertake any cutting that may impair the strength of the building. No holes, except expansion bolts and small screws may be drilled into the structure without obtaining prior approval.



All cutting and patching work shall be done in a neat and workman like manner by mechanics skilled in the trades.

200.9 Painting

All equipment supplied under this Specification shall be delivered to the site with a factory applied prime coat of paint unless noted otherwise. All supports and hangers shall receive a prime coat of paint.

Painting where required for pipe, duct services, equipment identification including stenciling shall be carried out by a paint tradesman under this division in accordance with the workmanship and material specification.

All factory prime-coated or finish coated equipment shall be touched up or repainted if equipment is marred during shipment or installation.

200.10 Expansion and Contraction

Unless shown otherwise, the Contractor shall be responsible for measures to control the thermal movement of piping and apparatus. Piping shall be erected in such a manner that strain and weight does not come upon cast connections or apparatus.

Where possible, the effect shall be obtained by providing changes in direction and loops in pipe runs, supplemented by the necessary guides, anchors and limit stops.

200.11 Clean up

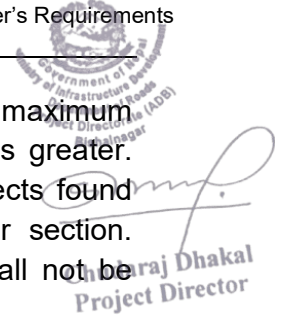
The Contractor shall clean all exposed metal surfaces from grease, dirt or other foreign materials. Chrome plated and polished work shall be left bright and clean. All openings in pipes and fixtures shall be properly capped and plugged during construction.

Fixtures and equipment shall be properly protected from damage during the construction period and shall be cleaned in accordance with the manufacturer's instructions.

200.12 Pressure Testing

General

- i. These clauses shall apply to all piping systems including the plumbing and drainage systems, which shall also be governed by the applicable requirements of the IS specifications.
- ii. The Contractor shall notify the Engineer 24 hours in advance of all test.
- iii. Tests of piping system or protection thereof shall include all apparatus forming part of the complete systems, except where such apparatus is factory tested prior to installation in the systems.
- iv. All tests shall be performed before the application of pipe covering or before being concealed.



- v. Except where otherwise noted, test pressure shall be twice the maximum working pressure of the systems, or 0.5 N/mm², whichever is greater. Test fluid shall be water, unless otherwise indicated. All defects found shall be rectified by removing and remarking the particular section. Caulking of thread, hammering and welding of leak joint shall not be allowed.
- vi. Piping systems may be tested in whole or in part. Each system to be tested shall be suitably isolated from existing or new systems using temporary blanks between flanges, thickness of blanks shall be approved by the Engineer or caps. Where necessary for testing purposes, a pair of flanges shall be installed in the piping system for the installation of blanks. Tests shall not be performed against a closed valve.
- vii. All drains, vents, safety or relief valves and other pressure sensitive devices shall be removed prior to testing, and the openings capped or plugged. It is not permissible to plug or seal safety or relief valves. Air shall be removed from all high points to the satisfaction of the Engineer before flushing vent openings.
- viii. Temporary blanks or caps shall be removed when testing has been satisfactorily completed and drains, vents, safety or relief valves etc. replaced.
- ix. At least four hours shall elapse after erection before any welded or brazed line is subjected to test pressure.
- x. When test pressure is attained, the test pump or compressor shall be disconnected and the connection capped. The test pressure gauge shall be left in the system.
- xi. At least four hours shall elapse after test pressure is applied before the system is inspected for leaks. All joints, glands, connections etc. shall be carefully inspected for leaks and tightened as necessary.
- xii. Test pressure shall be maintained without loss for a period of 24 hours.
- xiii. Joints or connections which continue to leak after tightening shall be completely dismantled, checked, cleaned (replace if necessary), re-assemble and retested. Opening, caulking or hemp shall not be used for leaking joints.
- xiv. All water shall be drained from system following testing to prevent damage.
- xv. During testing, precautions shall be taken to prevent injury to persons or property as a result of sudden rupture of a piping system.



201 Soil, Waste, Vent and Rainwater pipes

201.1 Scope

Work under this section shall consist of furnishing all labor, materials, equipment and applications, necessary and required to completely install all soil, waste, vent and rain water pipes as required by the drawings, specified hereinafter and given in the Bill of Quantities. Without being restricted to the generality of the foregoing, the soil waste and vent pipes system shall include:

- Vertical and horizontal soil wastes and vents pipes, rain water pipes and fittings, joints, clamps and connections to fixtures.
- Connection of all pipes to sewer and storm water lines as shown on the drawings at ground floor levels.
- Floor and urinal traps, clean-out plugs and inlet fittings.
- Waste pipe connection from all fixtures e.g. Washbasins, sinks, urinals, kitchen, equipment and plant room equipment.

201.2 General Requirements

All materials shall be of the best quality conforming to the specifications and subject to the approval of the Engineer. Pipes and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workman like manner. Pipes shall be fixed in a manner as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts, passages, etc. Fitting positions shall in all cases line up with & conform to access panels for ease of maintenance. Pipes shall be securely fixed to walls by suitable clamps at intervals specified. Access doors for fittings and clean-outs shall be so located that they are easily accessible for repair and maintenance. All work shall be executed as directed by the Engineer.

201.3 PVC pipes and Fittings: soil, waste and vent pipes

Where specified, soil, waste and rain water pipes shall be 4 or 6 kg. F/cm² working pressure rigid PVC single socketed push-on rubber joint pipes. PVC pipe should have a length of 3m or 6m with moulded PVC fittings of thickness not less than 3.2mm. Pipes shall be of colour specified by the Engineer. Fitting for PVC pipes shall be moulded and include tees, bends, reducers, offsets, plugs etc. Outlets of suitable diameter for connection to the appliance shall be provided. PVC pipes shall be jointed as recommended by the manufacturer. Fixing of PVC pipes shall be done in the best workmanship.

Before use at site, all pipes shall be tested by filling up with water for at least 10 minutes. After filling, pipes shall be struck with a hammer and inspected for blowholes and cracks. All defective pipes shall be rejected and removed from the site.

Pipes shall be further tested after installation, by filling up the stack with water. All opening and connections shall be suitably plugged. The total head for PVC pipes

shall not exceed 10 meters. All pipes shall be fixed in gradient towards the outfall drain. Pipes inside toilets shall be chased and concealed or otherwise as shown on the Drawings.

PVC pipes to be laid in trench or floor or wall. Complete installation of PVC pipes includes supply of pipes and necessary fittings such as Tees, Bends, Reducers, Crosses, Couplers, epoxy materials etc., trench excavation in any type of soil and backfilling with proper compaction, chasing in wall or floor and repair to original finish, laying and jointing of PVC pipes and fittings and pressure testing. The trench width shall be 2 times 300 mm + outer diameter of pipe, and the pipes laid underground shall not be less than 600mm from the ground level.

All soil and waste pipes shall be tested to detect any leakage etc. in accordance to IS: 5329-1969.

Measurements:

PVC Pipes shall be measured along the centre line of pipes with fittings in running meter between socket to socket or bend, tee of pipes.

201.3.1 UPVC Pipes

All Soil, waste, vent and rain water pipes shall be unplasticized rigid Poly Vinyl Chloride (UPVC) pipes conforming to IS: 4989-1958. Pipes shall be of following specifications:

Table 1 specifications of pipes

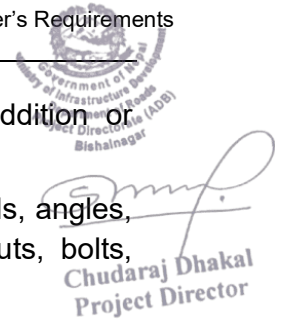
Normal diameter	Working pressure kg/cm ²
50mm	6
75mm	6
110 mm	6
160 mm	6

Pipes shall be of colour specified by the Engineer. Fitting for UPVC pipes shall include couplings tees, bends, elbows, unions, reducers, nipples and plugs. Outlets of suitable diameter for connection to the appliance shall be provided. Contractor shall use pipes and fittings of matching specifications. Fittings shall be of the required degree of curvature with or without access door. Access door shall be screw type with neoprene gaskets as shall be approved by the Engineer.

201.3.2 Clamps

Holder bat clamps shall be of standard design and fabricated from M.S. flat 40 mm x 3 mm thick and 12 mm dia. rod and 6 mm nuts bolts. They shall be painted with two coats of black bitumen paint before fixing. Holder bat clamps shall be fixed in cement concrete of 1:2:4 mix.

Where holder bat clamps are to be fixed on RCC column, wall or beam they shall be fixed with 40mm x 3mm flat iron "U" type clamps with anchor fasteners of approved



design. Rates for both types of clamps shall be the same and no addition or deduction shall be made.

Structural clamps shall be fabricated from MS structural members e.g., rods, angles, channels, flats as per detailed Drawing. Contractor shall provide all nuts, bolts, welding and paint the clamps with one coat of red oxide.

201.3.3 Pipe supports and Hangers: Spacing for supports and hangers of fixing for internal piping shall be as given in the following table.

Table 2 Spacing for supports and hangers of fixing for internal piping

Kind of Pipe	Size of Pipe(mm)	Interval Horizontal Run (m)	Interval Vertical Run(m)
UPVC	50	2	2
	75	2.5	2.5
	100	2.5	2.5

201.3.4 Waste pipe from appliances

Waste pipe from appliances e.g. wash basins, sinks, urinals, bath tubs, water coolers shall be of UPVC pipes with proprietary fixtures & fittings of the approved make conforming to all relevant ISS & also to IS 4984-1978. All pipes shall be fixed in gradient towards the out-falls of drain. Spacing for clamps for such pipes shall be as follows:

Table 3 spacing for clamps for waste pipes

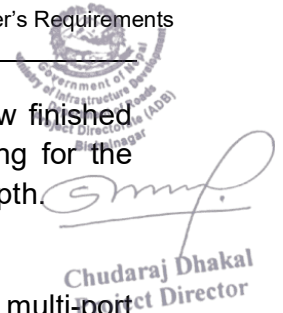
	Vertical	Horizontal
PVC Pipes	300cm	240cm
HDPE Pipes	180cm	120cm

Pipes shall be galvanized steel tubes conforming to IS 1239-1979 (medium class) and quality certificates shall be furnished. Pipes shall be provided with all required fittings, e.g. tees, couplings, bends, elbows, unions, reducers, nipples, and plugs. All GI waste pipes shall be terminated at the point of connection with the appliance with an outlet of suitable diameter.

201.4 Traps

201.4.1 Floor Traps

Floor traps shall be PVC, deep seal with an effective seal of 50mm. All waste pipes shall be over the trap. The trap and waste pipes shall be set in cement concrete blocks firmly supported on the structural floor. The blocks shall be in 1:2:4 mix



(1cement: 2 coarse sand: 4 stone aggregate) and extended 35 mm below finished floor level. Contractor shall provide all necessary shuttering and cantering for the blocks. Size of the block shall be 300 mm x 300 mm and of the required depth.

201.4.2 Floor Trap Inlets

Where specified, the Contractor shall provide a special type 4-way PVC multi-port inlet hopper without or with one, two or three inlet sockets to receive the waste pipes.

201.4.3 Grating for Floor Traps

Floor traps shall be provided with 125 mm dia. Chrome Plated (CP) Brass or Stainless-Steel grating with rim of approved design and shape. Minimum thickness shall be of 3 mm.

201.4.4 Urinal traps

Urinal traps shall be PVC 'P' or 'S' trap with or without vent and set in cement concrete blocks as specified without extra charge.

201.5 Fixing

All vertical pipes shall be fixed by MS clamps truly vertical. Branch pipes shall be connected to the stack at the same angle as that of the fittings. A heel rest bend supported on concrete block shall be provided at the feet of the stack. No collars shall be used on vertical stacks. Each stack shall be terminated at top with a cowl (terminal guard).

Horizontal pipes laid to the correct slopes running along ceilings shall be fixed on structurally adjustable clamps of special design shown on the drawings or as per details shown on the drawings or as directed. Horizontal pipes shall be laid to uniform slope and the clamps adjusted to the proper levels so that the pipes fully rest on them. The Contractor shall provide all sleeves, openings, hangers, inserts during the construction. He shall provide all necessary information to the building contractor for making such provision in the structure as necessary and as required.

201.5.1 Joining

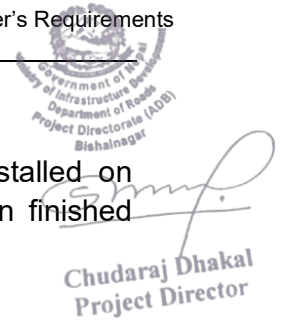
All joints to be O ring type washer and Solvent as per specification and instruction of Engineer. Fixing of UPVC pipes shall be done in the best workmanship.

201.5.2 Clean outs

Clean-outs shall be full pipe size up to 100 mm and a minimum of 100 mm on larger pipes with cast brass plug and caulked lead seat. A clean-out shall be installed at, or as close as possible to, the base of every vertical waste, soil and drain stack. A clean-out shall be installed at the up-slope of each pipe at which a building drain or branch changes direction by 45° or more.

Clean-outs in horizontal drainage piping shall be at intervals not greater than:

- 15 m where the piping is of dia. 100 mm and smaller.
- 30 m where the piping is of large than dia. 100 mm.



- 6 m where waste pipes are horizontally connected to sinks.

Nickel Bronze or Stainless-Steel Floor Plates with Frames shall be installed on finished floors for access to clean-outs. Clean-outs on horizontal lines in finished areas shall be as per IS Specifications.

201.5.3 Cement Concrete

Soil and waste pipes under floor in sunken slabs and in wall chases (when cut specially for the pipe) shall be encased in cement concrete 1:2:4 mix (1 cement: 2 coarse sand: 4 stone aggregate), 75 mm bed and all round. When pipes are running well above the structural slab, the encased pipe shall be supported with suitable cement concrete pillars of 150 mm x 150 mm of required height at interval of 1800 mm. Rate for concrete around pipes shall be inclusive of pillars support, shuttering and cantering.

201.5.4 Painting

Pipe fittings and clamps in exposed positions shall be painted with three or more coats of ready-mix oil paint of approved make, quality and shade.

201.5.5 Cutting and Making Good

Pipes shall be fixed and tested as building work proceeds. Contractor shall provide all necessary holes, chases in structural members as building work proceeds. Wherever holes are cut or left originally, they shall be made good with cement concrete 1:2:4 mix (1 cement: 2 coarse sand: 4 stone aggregate) and the surface restored as in original condition. No additional payment shall be made for cutting and making good holes.

201.6 Tolerances

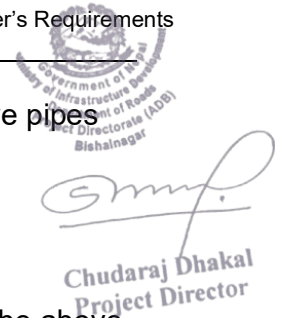
Acceptable tolerance for pipes to IS: 3989 and IS: 1729 shall be as follows:

a. Wall thickness	15%
b. Length	20 mm
c. Height	10%

201.7 Testing

Before use at site, all pipes shall be tested by filling up with water for at least 10 minutes. After filling, pipes shall be struck with a hammer and inspected for blow holes and cracks. All defective pipes shall be rejected and removed from the site within 48 hours. Pipes with minor sweating shall be accepted at the discretion of the Engineer. Pipes shall be tested after installation, by filling up the stack with water. All opening and connection shall be suitably plugged. However, the total head in the stack shall not exceed 3m.

Alternatively, the Contractor may test all soil and waste stacks by a smoke testing machine. Smoke shall be pumped into the stack after plugging all inlets and



connections. The stack shall then be observed for leakages and all defective pipes and fittings removed or repaired as directed by Engineer.

201.8 Measurement

General

Rates for all items quoted shall be inclusive of all work and items given in the above-mentioned specifications and Bill of Quantities and applicable for the work under floor, in shafts or at ceiling level at all heights and depths. All rates are inclusive of preparing timber block-outs in RCC and chasing masonry work and making good the same. All rates are inclusive of pre-testing and on-site testing of all the installations and materials prior to commissioning to the satisfaction of the Engineer.

Pipes (Unit of measurement: Linear meter to the nearest centimetre)

PVC Pipes shall be measured per running meter correct to a centimetre for the finished work, which shall include proprietary fittings, e.g. crosses, sockets, nipples and nuts but exclude bends, tees, elbows, reducers. The length shall be taken along centreline of the pipes and fittings. All pipes and fittings shall be classified according to their diameters, method of jointing and fixing substance, quality and finish. The diameters shall be nominal diameter of internal bore. The pipes shall be described as including all cutting and waste. In case of fittings of an equal bore, the largest bore shall be measured. Cement concrete around pipes shall be measured along the centre of the pipe line measured per linear meter and include any masonry supports, shuttering and centring cutting complete as described in the relevant specifications. Slotted angles/channels shall be measured per linear meter of finished length and shall include support bolts and nuts embedded in masonry walls with cement concrete block and nothing extra will be paid for making good the same.

Measurement

Unit of measurement shall be the number of pieces. Floor and urinal traps, traps gratings, hoppers, clean-outs, plugs shall be measured by numbers and shall include all items described in the relevant specifications. Bolt welding shall be by number of complete pipe joints.

202 Sanitary-Ware

202.1 Scope

Work under this section shall consist of furnishing all labour materials necessary and required to completely install all sanitary fixtures, chromium plated fittings and accessories required by the drawings and specified hereinafter or given in the schedule of quantities. Without restricting to the generality of the foregoing the sanitary fixtures shall include all sanitary fixtures, CP fittings and accessories, etc., necessary and required for the buildings. Whether specifically mentioned or not, all fixtures and appliances shall be provided with all fixing devices, nuts, bolts, screws, hangers as required. All exposed pipes within toilets and near fixtures shall be chromium-plated brass or copper unless otherwise specified. All hot water pipes



shall be lagged & properly insulated from the hot water storage tanks to the hot water taps & outlets.

202.2 General Requirements

Sanitary fixtures shall be of the best quality approved by the Engineer. Wherever particular makes are mentioned, the choice of selection shall remain with him. All fixtures and fittings shall be provided with all such accessories as are required to complete the item in working condition whether specifically mentioned in the schedule of quantities, specifications or drawings or not. All fixtures and accessories shall be fixed in accordance with a set pattern matching the tiles or interior finish as per Engineer/interior designer's requirements. Wherever necessary, the fittings shall be centred to dimensions and pattern desired. Fixing screws shall be half round head chromium plated brass screws with CP washers wherever required as per directions of Engineer. All fittings and fixtures shall be fixed in a neat workmanlike manner true to level at heights shown on drawings and in accordance with the manufacturer's recommendations. Care shall be taken to fix all inlet and outlet pipes at correct positions. Faulty locations shall be made good and any damage to the finished floor.

202.3 Orissa Type Pan or IPWC commode and Cistern

Pan or Commode shall be of white vitreous china first class quality, single or double symphonic close 'P' or 'S' trap coupled with cistern with fittings, brackets as specified in the Bill of Quantities. The W.C. pan/Commode and cistern shall be new free from cracks, crazes, and blisters and shall have smooth surfaces.

202.4 European pattern W.C. commode with flush valve or cistern

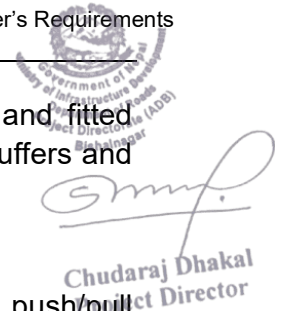
These shall be of white glazed vitreous china first class quality, double or single trap symphonic water closet suite as specified in the Bill of Quantities, P or S Trap flushing cistern or flush valve as specified conforming to Indian standard Specification. The commode and flushing cistern shall be free from cracks, blisters and shall have smooth surface.

Fixing: - W.C. commode shall be fixed to floor with CP brass screws or by means of 75mm long 6.5mm dia. counter sunk bolts and nuts imbedded in floor concrete or as per the instruction of the Project Engineer. The base of pedestal of the commode shall be filled with white cement mixed with pigment to match the shade of floor or as directed by the Project Engineer. Following measure shall be adopted for fixing the W.C. commode

The central axis of the commode shall be perpendicular to the finished face of wall.

The outlet of the commode shall be centrally placed in the rubber gasket of the PVC. pipe as per drawing or as directed by the Project Engineer and shall have not leakage.

The distance between centre line of outlet of W.C. commode and finished wall face shall be so adjusted as to rest squarely against the finished wall face.



Seat and lid: This shall be of ISI marked solid of heavy-duty quality and fitted exactly on the rim of the W.C. Commode with C.P. brass hinges, rubber buffers and C.P. brass nuts.

202.4.1 Flushing Cistern

Flushing Cistern shall be of white vitreous china first class quality with push/pull handle of 10 lit capacities. Cistern shall have mosquito proof cover ball valve with copper float, lever and siphon complete with necessary unions etc. for inlet outlet and overflow connections. Cistern shall be fixed on rolled cantilever bracket, which shall be firmly embedded in the wall by making holes of required sizes. Brackets shall be grouted in holes with cement mortar 1:2 (1cement: 2 fine sand). The wall used for making holes shall be made good to original condition.

202.4.2 Flush Pipe

Cistern shall have 32 mm. dia. outlets for flush pipe connected to W.C. pan. /commode Flush pipe shall be of chromium plated. Vertical drop of flush pipe shall be embedded in the wall with a long bend from outlet of cistern. Horizontal piece shall be laid under floor. The chase of embedding shall be made good with cement concrete 1:2:4 mix. Jointing between C.P. flush pipe and W.C. pan shall be made with white lead, yerr and water proofing compound or any other suitable method. The joint shall be absolutely leak proof.

202.4.3 Ceramic/plastic cistern

Cistern shall be connected of 450mm Length with brass unions at the ends. One end shall be connected to cistern inlet and the other to distribution line with an angle cock in between for control of flow.

202.4.4 Stop Cock

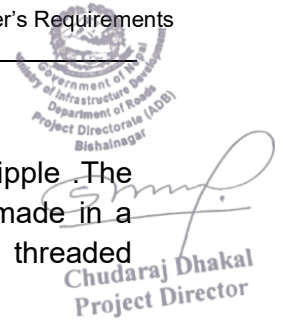
Stop Cock shall be of C.P. brass.

202.4.5 Fixing

The W.C. pan or commode shall be laid in floor slope towards the pan in a workman like manner care being taken not to damage the pan in the process of fixing. If damaged in any way, it shall be replaced at no cost to the Employer. The pan shall be fixed on a proper base of cement concrete 1:2:4 mix (1 cement: 2 coarse sand: 4 stone ballast 20mm. nominal size) taking care that cushion is uniform and even without having any hollows between the concrete base and pan. Joining between the pan and finished floor shall be neatly done and no hair cracks shall be visible. Joining between the outlets of pan white trap shall cement concrete and water proofing compound and made leak proof.

202.5 Mixing fittings

Mixing fittings shall be C.P. brass of approved quality with modern head for hot and cold for spray and rim with diverter.



202.5.1 Angle Valve

Angle valve shall be of 12.7mm dia. C.P. brass with C.P. cap and c.p. nipple. The connection between angle valve and supply line laid in chase shall be made in a manner so that the union is flush with finished face of the wall and no threaded portion of the angle valve or supply line is visible.

202.6 Urinals

Urinals shall be lipped type half stall white glazed vitreous china of size 610 x 400 x 380 mm size. Flat back urinals shall be provided with 15 mm dia. spreader, 32 mm dia. PVC bottle trap with pipe and wall flange, and shall be fixed to wall by one CI bracket and two CI wall clips complete as recommended by manufacturer's directives with approval by Engineer. Urinals shall be fixed with CP brass screws. Flush pipes shall be GI pipes concealed in wall chase but with chromium-plated bends at inlets and outlets wherever they are visible.

Urinals may be flushed with flush valves, if given in the schedule of quantities and as described in the item

Waste pipes shall be concealed by chasing into the walls as directed by the Engineer. Specifications for waste pipes shall be same as given in the relevant section of this specification.

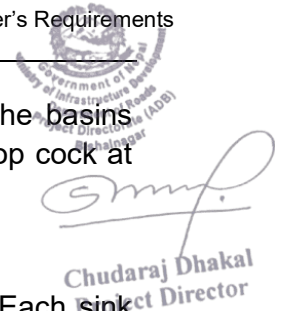
Urinal partition shall be white glazed porcelain of size 680 x 300 mm (division plate).

202.7 Wash basin

Wash basins shall be white glazed vitreous china size, shape and type specified in the schedule of quantities, as shall be approved by the Engineer. Each basin shall CI brackets and clip-sand the basin securely fixed to wall. Placing of basin over the brackets without secure fixing shall not be accepted. They shall be provided & fixed in place early so that the built-up vanity may be installed in sufficient time to comply with completion dates. Each basin shall be provided 32mm dia. C.P. Waste Coupling with C.P. Chain and Rubber plug, 32mm dia. C.P. or pvc P or S trap ,15mm dia. C.P. Bib-cock/mixer, pipe connector etc. fittings as given in the schedule of quantities. Each basin shall be provided with mixing fitting or pillar tap as specified in the Bill of Quantities and/or as approved by the Engineer. Basins shall be fixed at proper heights as shown on drawings. If heights are not specified, the rim level shall be 79cms or as directed by the Engineer.

202.7.1 Stainless steel wash basin

Stainless Steel Wash basin shall be JENA or NERALI or approved brand heavy quality of size and shape specified. These shall be fixed to wall by means of CI or MS brackets or if under counter type, fixed under counter. Wash basins shall have one 15 mm CP push-on type pillar tap, 32 mm dia. CP waste with chain and plug, 32 mm PVC bottle trap with pipe to wall and flange. The wash basin shall be securely



fixed to the brackets by means of studs or lugs fixed on the brackets. The basins shall have 15 mm dia. 500 mm long PVC connector pipes with angular stop cock at inlet.

202.8 Sinks

Sinks shall be stainless steel as specified in the schedule of quantities. Each sink shall be provided with CI brackets and clips and securely fixed. Counter top sinks shall be fixed with suitable angle iron clips or brackets as recommended by the manufacturer. Each sink shall be provided with 32 mm dia. C.P. waste coupling with C.P. chain rubber plug, 32 mm dia. bottle trap with clean out hole and plug, 15 mm dia. C.P. Sink cock. Fixing shall be done as directed by the Engineer and shall be coordinated with the Interior Fit-out Program. Supply fittings for the sinks shall be fittings or CP cock/mixer as specified in the Bill of Quantities.

202.8.1 Fixing

The sink shall be laid in wall in a workman like manner care being taken not to damage the sink in the process of fixing. If damaged in any way, it shall be replaced at no cost to the Employer. The sink shall be fixed on a proper base of cement concrete 1:2:4 mix (1 cement: 2 coarse sand: 4 stone ballast 20mm. nominal size) taking care that cushion is uniform and even without having any hollows between the concrete base and sink. Joining between the sink and wall shall be neatly done and no hair cracks shall be visible. Joining between the outlets of sink shall be made leak proof.

202.9 Stainless Steel Scrub Sink/ sluice/ sterilization sink

Stainless Steel Scrub Sink, sluice, sterilization sink shall be of shape and type as specified in the Bill of Quantities. The scrub sink shall be fabricated from 16 SWG stainless steel as per bill of quantity. The sink shall be fitted with a 38mm waste coupling and joined to the wall drain pipe. The sink is fabricated by fabricator with the equivalent quality.

202.9.1 Fixing

The sink is fixed to the wall with nickel-painted pan head screws and mild steel brackets as indicated in the drawings.

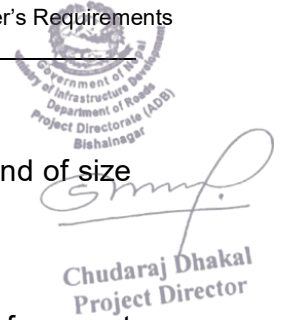
The fittings shall be 15mm elbow-operated mixer or sensor of approved make.

202.10 Towel Rail

Towel Rail shall be of C.P. brass heavy quality of size 15mm x 600mm, 15mmx450mm.

202.10.1 Fixing

Brackets shall be fixed to wall by means of C.P. brass screws to wooden plugs or crawl plugs or dash fasteners firmly embedded in the wall or as directed by the Engineer.



202.11 Toilet Paper Holders

Toilet Paper Holders shall be white vitreous China, Stainless steel or CP and of size as specified in Bill of Quantity.

202.11.1 Fixing

These shall be fitted in recess in masonry on 80mm thick cushion of cement concrete 1:2:4 and jointing to the masonry with white cement or with approved materials to match with dado work.

202.12 Soap Dish

Soap Dish shall be of white vitreous China, Stainless steel or CP of size as specified in Bill of Quantity.

202.12.1 Fixing

These shall be fitted in recess in masonry on 80mm thick cushion of cement concrete 1:2:4 and jointing to the masonry with white cement or with approved materials to match with dado work.

202.13 Mirrors

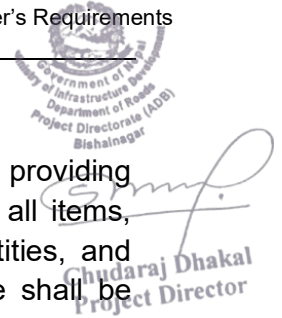
Mirrors shall be electro-coated copper 5.5mm thick of guaranteed quality and reputed make. The size shall be as specified in the Bill of quantities & the drawings. The image shall be clear and without waviness at all angles of vision. Mirrors shall be provided with plastic frame fixed with CP brass semi-round headed concealed screws and cup washers or CP brass clamps as specified or instructed by the Engineer.

202.14 Shower Set

Shower set shall comprise of one or two CP brass stopcocks, concealed as specified in the Bill of Quantities. Each shower set shall be provided with bathtub spout hot and cold with CP Telephonic shower of approved quality to be approved by the Engineer or as specified in the Bill of Quantities or detailed as per the drawings. Concealed stop cocks wall mixer or diverter shall be so fixed to allow for tiled or other finishes as keeping the wall flange clear off the finished wall. Wall embedded in the finishing shall not be accepted flanges.

202.15 Accessories

The Contractor shall install all chromium plated and porcelain accessories as shown on the drawings in compliance to the manufacturer's specifications directed by the Engineer, and given in the Bill of Quantities. All CP accessories shall be fixed with CP brass half round head screws and cut washer in wall with raw plugs and shall include cutting and making good as directed by him. Porcelain accessories shall be fixed in walls and set in cement mortar 1:2 mix (1 part cement and 2 part fine sand) and fixed in relation to the tiling work.



202.16 Measurement

Unit of measurement shall be based on the number of fixtures. Rate for providing and fixing of sanitary fixtures, accessories, urinal partitions shall include all items, and operations stated in the respective specifications and Bill of Quantities, and nothing extra is payable. Rates for all items under specifications above shall be inclusive of cutting holes and chases and making good the same, CP screws, nuts, bolts and any fixing arrangement required and recommended by manufacturers, testing and commissioning.

203 Water Supply Works

203.1 Scope

Work under this section consists of furnishing all labour, materials, equipment and appliances necessary and required to completely install the water supply system as required by the drawings, specified hereinafter and given in the schedule of quantities. Without restricting to the generality of the foregoing, the water supply system shall include the following:

- Connecting the mains supply to the designed tanks as per the drawings.
- Control valve, masonry chambers and other appurtenances.
- Connections to all plumbing fixtures, pantries and overhead tanks.
- Excavation and refilling of pipe trenches.
- Pipe protection and painting

203.2 General Requirements

All materials shall be new of the best quality conforming to specifications. All works executed shall be to the satisfaction of the Engineer. Pipes and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workman like manner. Short or long bends shall be used on all main pipelines as far as possible. If HDPE, PPR, PVC, CPVC, multilayer pipes are used then methods approved by the manufacturer shall be used. Pipes shall be fixed in a manner as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts, passages, etc. Pipes shall be securely levelled to the required slopes & fixed to walls and ceilings by suitable clamps at intervals specified. Valves and other appurtenances shall be located to provide easy accessibility for operation, maintenance and repairs.

203.3 GI Pipes, Fittings and Valves

All pipes inside the building and where specified, outside the building shall be galvanized steel tubes conforming to IS 1239-1979 of class specified. When class is not specified, they shall be of medium class. Fittings shall be malleable iron galvanized fittings of approved make. All fittings shall have manufacturer's trademark stamped on it. Fittings of GI pipes shall include couplings, bends, tees, nipples, reducers, unions, and bushes. Fittings shall be IS 1979 (part I to X) 1975.

Pipes and fittings shall be joined with screwed fittings. Care shall be taken to remove butt from end of pipe after cutting by a round file. Genuine red lead with grumet and a few strands of fine hemp shall be applied and seal tape shall be used for C.P fittings and gate valves. All pipes shall be fixed in accordance with layout and alignment shown on drawings. Care shall be taken to avoid air pockets. GI pipes inside toilets shall be fixed in wall chases well above the floor. No pipes shall be run inside a sunken floor unless specifically instructed. Pipes shall be run under ceilings or floors and other areas as shown on drawings.

203.4 PPR Pipes and Fittings

All water supply pipes inside the building and where specified shall be 3-layer PPR (Polypropylene Random Copolymer) brand tubes conforming to DIN 8077: 1999-07 of class PN 20. The inner layer should be of anti-microbial PPR layer, the inner of plain PPR layer and the outer layer of UV stabilized PPR layer. The details of class PN 20 pipes regarding outer bore, thickness and weight are given below:

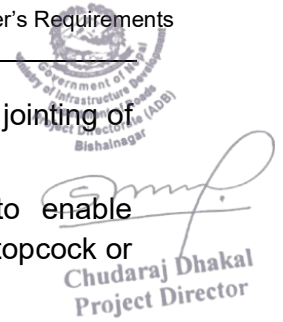
Table 4 details of class PN 20 pipes regarding outer bore, thickness and weight

Outer bore (mm)	Thickness (mm)	Weight per meter (kg)
16	2.2	0.095
20	2.8	0.148
25	3.5	0.230
32	4.4	0.370
40	5.5	0.575
50	6.9	0.896
63	8.6	1.410

Fittings shall be PPR brand malleable iron galvanized fittings. All fittings shall have manufacturer's trademarks stamped on it. Fittings for pipes shall include tees, unions, elbows, bends, reducers, nipples, crosses etc.

Pipes and fittings shall be jointed with PPR fittings. Care shall be taken to remove burr from the end of the pipe after cutting by a round file. All pipes shall be fixed in accordance with layout and alignment shown on the Drawings. Care shall be taken to avoid air pockets. As far as possible, pipes inside toilets shall be fixed in wall chases well above the floor.

PPR pipes in shafts and other locations shall be supported by G.I. holder bat clamps of approved design. Pipes in wall chases shall be anchored by iron hooks. For external works, PPR pipes and fittings shall be laid in trenches. The trench width shall be 2 times 300 mm + outer diameter of pipe, and the pipes laid underground shall not be less than 900mm from the ground level. Complete installation of PPR pipes include supply of pipes and necessary fittings such as Tees, Bends, Reducers, Crosses, Unions etc., trench excavation in any type of soil and backfilling with proper



compaction, chasing in wall or floor and repair to original finish, laying and jointing of PPR pipes and fittings and pressure testing.

Contractor shall provide adequate number of unions on all pipes to enable dismantling later on. Unions shall be provided near each gunmetal valve, stopcock or check valve and at an interval of 20m on straight runs or as specified.

Testing

All water supply PPR pipes, fittings and valves shall be tested by hydrostatic pressure of 7 kg/cm². Pressure shall be maintained for a period of at least two hours without appreciable drop in the pressure after fixing at site.

In addition to the testing carried out during the construction, the Contractor shall test the entire installation after connections to the pumping systems or mains. The Contractor shall rectify all leakage, and shall replace all defective materials in the system.

After commissioning of the water supply system, the Contractor shall test each valve by closing and opening it a number of times to observe if it is working efficiently. The valves, which do not operate effectively, shall be replaced by new ones at his cost and tested as above.

Upon completion of all the tests and necessary replacements, all domestic water piping shall be disinfected as below:

After thoroughly flushing the system with clean water to remove sediment, the system shall be filled with a measured quantity of sodium hypochlorite solution shall be added to the water to give free residual chlorine of 50 mg/l. After 1 hour of retention, the system shall be drained, re flushed and returned to service.

Measurement

Measurement for the Contract Item "PPR pipes" will be made per running meter of complete installation. Measurement will be made in running meter for installed pipeline including all PPR fittings. No extra measurement will be made for PPR fittings separately. Valve shall be measured by number.

203.5 CPVC pipe for hot and cold water

Providing, fixing, testing and commissioning CPVC (Chlorinated Poly Vinyl Chloride) CTS SDR 11 water supply pipes & fittings NSF marked as specified in the Bill of Quantities for hot and cold water distribution conforming to ASTM 2846 using fittings i.e. Tees, Elbows, Couplers, Unions, Reducers, Bushings etc. including transition fittings connection between CPVC & metal pipe/GI i.e. Brass Adaptors (Both male & Female threaded), with IPS WELD ON CPVC solvent cement as per ASTM F-493, with fabricated and subsequently hot dip galvanised clamps / structural steel supports as required / directed at site including cutting chase and fitting the same with cement concrete cement mortar as required. All termination points for



installation of faucets shall have brass termination fittings. Installation shall be to the satisfaction of the Engineer-In-Charge.

203.6 Clamps

GI pipes in shafts and other locations shall be supported by MS clamps of design approved by Engineer. Pipes at ceiling level shall be supported on structural clamps fabricated on MS structural brackets as described in relevant sections of this specification. Pipes in typical shafts shall be supported on slotted angles/channels as specified.

203.7 Unions

The Contractor shall provide adequate numbers of unions/flanges on all pipes to enable dismantling later. Unions shall be provided near each gunmetal valve, stop cocks or check valves and on straight runs as necessary at appropriate locations and required and/or directed by the Engineer.

203.8 Flanges

Flanged connections shall also be provided on all equipment connections as necessary and required or as directed by the Engineer. Connections shall be made by the correct number and size of bolt-and made with 3mm thick insertion rubber washers. Where hot water or steam connections are made insertion gasket shall be of 1.5mm thick compressed fibre gaskets approved by the Architect. Bolt hole diameter for flange shall conform to match the specification for CI sluice valve to IS 780.

203.9 Trenches

All GI pipes below ground level shall be laid in trenches and shall have a minimum cover of 60cms. Excavation for trenches shall be done as specified in subsequent pages of this documents but the width and depth of the trenches shall be as follows:

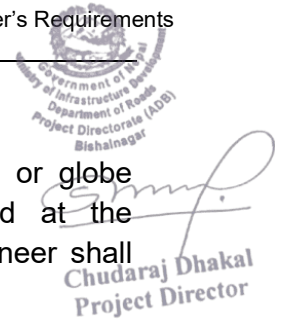
Table 5 dimensions of trenches

Dia. of pipes	Width of trenches	Depth of trenches
15mm to 50mm	30cms	75cms
65mm to 100mm	45cms	100cms

Where specified all GI pipes in trenches shall be protected with fine sand 15cms all-round before filling in the trenches.

203.10 Pipe Protection

Where specified in the schedule of quantities all pipes in chase or below ground shall be protected against corrosion by applying two coats of bitumen paint, wrapping with polythene tape and finishing with one more coat of bitumen paint.



203.11 Valves

Valves 65mm dia. and below shall be heavy gunmetal full-way valves or globe valves conforming to IS 778-1971 class I. Valves shall be tested at the manufacturers with test results and their name stamped on it. The Engineer shall approve all valves before they are allowed to be used in the works.

203.12 Air Valves

Air valves shall be provided in all high points in the system to prevent air locks, as shown on the drawings or directed by the Engineer. Air valves shall be gunmetal or CI of size as specified in the Bill of Quantities. Each air valve shall be provided with an isolation gunmetal full-way valve for size 65mm dia. and below and CI double flanged valve 80mm dia. and above.

203.13 Scour Valves

Scour valves shall be provided at all low points in the system as shown on drawings or directed by Engineer. Valves shall be gunmetal full-way valves for sizes 65mm dia. and below and CI double flanged valves 80mm dia. and above.

203.14 Valves

Valves shall be heavy gunmetal full way gate valves or non-return valves conforming to I.S. 778-1964 (Class – I) valves shall be tested at manufacturer's works to 21 kg/sq.cm and shall have manufacturer's name stamped on it. All valves shall be approved by the Engineer before they are allowed to be used on work.

203.15 Brass Fittings

All brass stop cocks and bib cocks shall be heavy type bright finished with renewable leather washers conforming to I.S. 781-1967. The weight shall be as follows:

Diameter mm	Stop Cocks kg	Bib Cocks kg
15	0.40	0.40
20	0.75	0.75
25	1.30	1.25

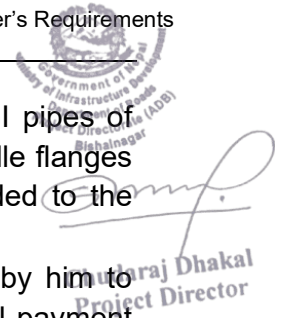
203.16 Ball Cocks

Ball cocks used for storage tanks shall be high- or low-pressure ball cocks with brass lever rods and polythene ball floats. The ball floats shall conform to Indian Standard which shall be hammer tested.

203.17 GI Pipes, Fittings and Valves

Each tank shall be provided with adequate number of C.I. lockable type manhole frames and standard cast iron tank covers as specified in Bill of Quantities. Manhole covers shall be of sizes shown on drawings and shall be approved by the Engineer.

Concrete tanks:



- The Contractor shall provide puddle flanges fabricated from MS/GI pipes of required sizes and lengths and welded to 5mm MS plates. All puddle flanges must be fixed in true alignment and level and shall be back welded to the reinforcement to prevent movement during concreting.
- The Contractor shall make connection of pipelines laid and fixed by him to concrete, masonry or steel tanks as required at site. No additional payment shall be allowed for making connections.

203.18 Water Meters

Water meters shall be of the domestic type, inferential and semi-positive water meter conforming to IS 779-1961. Insulation of the meter shall conform to IS: 2401-1963.

203.19 Testing

- a. All pipes fittings and valves shall be tested by hydrostatic pressure as follows:
For medium class pipes 7.0 kg/sq. m
For heavy class pipes 10.5 kg/sq. m
Pressure shall be maintained for a period of at least two hours without appreciable drop in the pressure after fixing at site.
- b. In addition to the testing carried out during the construction the Contractor shall test the entire installation after connections to the overhead tanks or pumping systems or mains. He shall rectify all leakages, and shall replace all defective materials in the system at own expense without any extra money.
- c. After commissioning of the water supply system, the Contractor shall test each valve by closing and opening it a number of times to observe if it is working efficiently. The valves which do not operate effectively shall be replaced by new ones at his cost and tested as above.

203.20 Measurement

G.I. pipes above ground shall be measured per running meter (to the nearest cm) and the rate shall be inclusive of all fittings including unions, elbows. Clamps, cutting chases and hooks in wall and floors and making good the same and testing of pipes and fittings.

G.I. pipes below ground shall be measured per running meter and the rate shall be inclusive of all fittings including unions, excavation for trenches refilling and disposal of surplus earth and testing.

Gunmetal valves, non-return valves, ball cocks, foot valves, stop cocks, bib cocks, shall be measured by number.

For Painting for pipes with enamel or black bituminous paint, no separate payment shall be admissible.

Protection to pipes with polythene tape shall not be measured separately.



204 Storage Tanks

204.1 General

The Contractor shall provide and install Storage tanks in accordance with the Detailed Drawings and as specified in Bill of Quantities and in the location shown on the Plans.

The Contractor shall provide inlets, outlets, and overflow pipes, socket for float level switch and inter connection. The overflow and vent pipes shall be provided with a mosquito proof brass net. The vent pipes of size mentioned shall be provided with bends and pieces of pipes facing downward. The holes in the tanks for the inlets, outlets, overflows, etc. shall be made as per the manufacturer's specifications.

204.2 GI Storage Tank

GI storage tank shall be of riveted construction. The sheet shall be of specified gauge thickness riveted to angle iron frames as required. The sheets shall be fixed by means of 6 mm diameter rivets at 32 mm pitch on all sides except on top angle iron frame which shall be at 62 mm pitch. Holes for riveting shall be drilled and not punched. White Lead shall be applied before the surface to be jointed. The tank shall confirm to the Drawings.

204.3 RCC Storage Tanks

RCC storage tanks shall be constructed as per the Drawings. The Contractor shall provide puddle flanges fabricated from GI pipes of required sizes and welded to 300 x 300 x 6 mm MS plate. All puddle flanges must be fixed in true alignment and level and shall be tack welded to the reinforcement bar to prevent movement during construction.

The Contractor shall make connections of pipe lines laid and fixed by him to existing concrete, masonry or steel tanks as required at site. No additional payment shall be allowed for making connection.

204.4 Plastic tanks

The tanks shall be vertical or horizontal type as required and of One Piece Moulded (without any seam, joints or weld) High Density Polyethylene. The tank shall be provided with a manhole of size 400 mm in diameter. The tanks shall be of Hill take, Roof top.

Contractor shall provide inlets, outlets, and overflow pipes, socket for float level switch and inter connection. The overflow and vent pipes shall be provided with a mosquito proof brass net. The vent pipes of size mentioned shall be provided with bends and pieces of pipes facing downward. The holes in the tanks for the inlets, outlets, overflows, etc. shall be made as per the manufacturer's specifications.

All outlets connections shall be at least one size higher than the pipe connections and shall be connected to the pipes by reducers (no reducing bushes will be accepted).



204.5 Support for overhead water storage tanks

The tanks where required shall be on the roof top over an elevated RCC platform or other structural member as shown on the Drawing. The tanks shall be put in such a manner that the bottoms of all the tanks have a sufficient bearing. The Contractor shall provide all supporting and fixing devices (such as mild steel ring around the tanks with anchoring members) necessary to fix the tanks and fitting securely in position as per the manufacturer's Specifications. The fixing devices shall be rigidly anchored into the building structure. All the devices shall be rust proof and shall be so fixed that they do not present any unsightly look.

205 Plumbing Fixtures

205.1 Support for overhead water storage tanks

Water heater shall be complete packaged unit with insulated heavy gauge factory painted metal casing as shown on the Drawings. Electric heaters shall have glass lining with magnesium anode rod, ceramic heating element, anti-mixing baffle (to avoid quick mixing of cold and hot water) and nylon bushes in order to avoid electrolysis problems.

Electrical heaters shall be provided with double safety thermostat and safety valve. Electric heaters shall be furnished with cord and plug for connection to grounded sockets. Size as indicated on Drawings.

205.2 Plumbing Fixtures

Plumbing fixtures shall be new free from flaws and blemishes and shall have a clear smooth surface. Fixtures shall be white in colour unless stated otherwise. Visible parts such as trim, supplies, traps, etc. shall be heavy chrome plated brass.

Each fixture shall be provided with a trap and with loose key compression stops in addition to a valve or faucet on the fixture.

Each fixture shall be piped up with domestic hot water as applicable and cold water, waste and vent in accordance with the schedule.

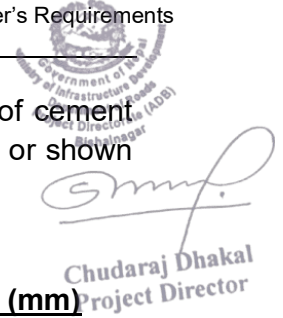
205.3 Chrome Plated (CP) Brass Fittings

All mixers, fittings, bib cocks, etc. shall be of the best quality heavy pattern of approved make.

All CP fittings shall be fixed in a neat workmanlike-manner and shall not carry tool mark and scratches. All valves shall carry identical CP handles (Knobs) approved by the Engineer.

206 Manhole and Chambers

All manholes, chambers, septic tanks and other such works designated to be constructed shall be as specified in the Schedule of Quantities.



All manholes, chambers, septic tanks, etc. shall be supported on a base of cement concrete of such thickness and mix as given in the Schedule of Quantities or shown on the Drawings.

Where not specified, manholes shall be constructed as follows:

<u>Internal Dimension</u>	<u>Maximum Depth of Manhole Chamber (mm)</u>
450 mm x 450 mm	up to 750
600 mm x 600 mm	up to 750 mm
800 mm x 800 mm	up to 1000 mm
1200 mm x 900 mm	over 1000 & up to 1500 mm
1400 dia. or 1200 x 900 mm	over 1500 & up to 3000 mm

All manholes shall be provided with cement concrete benching in 1:2:4 mix. The benching shall have a slope of 100 mm towards the channel. The depth of the channel shall be the full diameter of the pipe. Benching shall be finished with a floating coat of neat cement.

The manhole chamber covers and frames shall comply with the following ratings:

Road gratings Med. Duty -	406 mm x 356 mm o/a frame -	102 kg
Road gratings Med. Duty	508 mm x 356 mm o/a frame -	140 kg
Manhole covers L. Duty	mm x 600 mm o/a frame with 500 mm square lid -	78.5 kg
Manhole covers Med. Duty -	750 mm x 750 mm o/a frame with 600 mm dia. round lid -	216 kg
Manhole covers L. Duty -	450 mm round (single seal) o/a frame -	20 kg

All manholes shall be plastered with 12 mm thick cement mortar 1:3 (1 cement: 3 coarse sand) and finished inside with a floating coat of neat cement. Manholes shall be plastered outside as above cut with rough plaster.

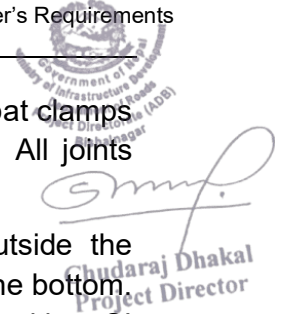
All manholes with depths greater than 1.2 m shall be provided with 20 mm square or 25 mm round rod catch rings set in cement concrete or brickwork in 1:2:4 mix, 300 mm vertically and staggered. Catch rings shall be coated with tar before embedding.

All manholes shall be provided with cast iron covers and frames and embedded in reinforced cement concrete slab. Weight of cover and frame thickness of slab shall be as specified in the Bill of Quantities or given above.

206.1 Drop Connection

Drop connections of the required sizes shall be provided between branch sewer and main sewer or in the main sewer itself in steep ground when the difference in invert level of the two exceeds 450 mm.

Drop connections from gully traps to main sewer on rectangular manhole shall be made inside and shall have HCI special type door bend on top and heel rest bend at



bottom connected by an HCI pipe. This pipe shall be supported by holder bat clamps at 1800 mm intervals with at least one clamp for each drop connection. All joints shall be lead caulked joints 25 mm deep.

Drop connection from branch sewer to main sewer shall be made outside the manhole with glazed stoneware tee connection, vertical pipe and bend at the bottom. The top of the tee shall be finished up to the surface level and provided with a CI hinged type frame and cover 300 mm x 300 mm. The connection shall be embedded in cement concrete 1:2:4 mix, 150 mm all-round the pipe and tee up to the surface chamber of the tee. Drop connection made from vertical stacks directly into manholes shall not be considered as drop connections. They shall be paid for under the relevant soil and waste pipes work items.

206.2 Making Connections

The Contractor shall connect the new sewer line to the existing manhole by cutting the walls, benching and restoring them to the original condition. A new channel shall be cut in the benching of the existing manhole for the new connections. The Contractor shall remove all sewage and water if encountered in making the connection without additional cost.

206.3 Septic Tank

The septic tank shall be constructed as per the detailed drawing and item provided thereof in particular.

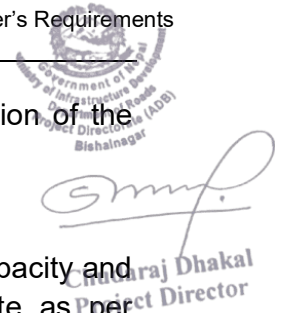
Excavation for the septic tank is to be excavated in open trenches etc., to true lines and depth as per invert level of the inlet manhole as shown or required including planking and shuttering as necessary. The inlet level, bottom level and outgoing level must be properly followed as per the Drawing and direction and the septic tank should be air tight, water tight, and light is also excluded to help decomposition of the sewage.

Septic tank should be initially filled with water, disinfections should not be used beyond very small quantities which may be absolutely necessary. Since they kill bacterial life and the septic tank will not function. Soap and grease from bathrooms are also harmful.

Two sets of CI manhole cover and frames 450mm (round) are to be provided and fixed on the top RCC slab as per the Drawing. 90-degree tee to be provided for and outlet of septic tank. All level pegs for inlet and outlet pipes and invert level shall be approved by the Project Engineer prior to proceeding to work.

206.4 Soak Pit

The soak pit work shall be done as per the Drawing. The earthwork in excavation shall be carried out to the exact dimensions given in the Drawing. The soak pit shall be constructed and honeycomb dry brick shaft as per the Drawing. Round the shaft and within the radius of given measurement shall be placed well-burnt brickbats. Brickbats of sizes 50 to 80 mm shall be packed round the radius of given



measurement. The top of the slab shall be as per the Drawing or direction of the Project Engineer.

206.5 Pumps

Pumps shall be Crompton, Kirloskar or KSB or equivalent brand of said capacity and installed in pump house or shed including its structure and base plate as per drawings or supplied drawings. The pumps shall be installed with all wiring and electrical fixtures such as switches, wires, light, low and high level guard and pump control panel.

206.6 Measurement

Measurement of works shall be made in unit piece of works as specified.

206.7 Color Code

Pipe for various uses shall be painted with colour code for pipes as approved by the Project Engineer.

207 Sanitary and Sewer Pipes

207.1 HDPE/ PVC Pipe System

Material

HDPE pipes shall confirm to NS 206/2046 or other equivalent standards. The High-Density Polyethylene shall be of high quality and of wall thickness conforming to a working pressure of 4.0 Kg/sq.cm. The pipe shall be manufactured using virgin GM 5010 T2 raw materials as manufactured by Nepatop, Panchakanya Plastics or equivalent.

Fitting shall be of high-density polythene pipe of series II, made at site there from shall be true to shape, smooth and cylindrical, their inner and outer surface being as far as practicable concentric. These shall be sound and cast so as to be free from cracks, pinholes or other imperfections.

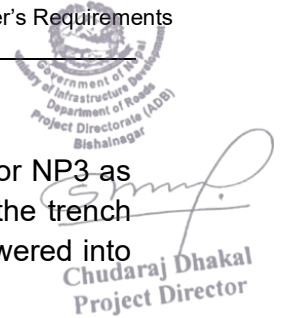
Fixing

Jointing, laying and testing shall be as per the manufacturer's specifications. Pipes shall be of colour specified by the Project Engineer. Fitting for HDPE pipes shall include couplings, tees, bends, elbows, unions, reducers, nipples and plugs. Outlets of suitable diameter for connection to the appliance shall be provided.

No joints shall be covered until these are checked and tested by the Project Engineer. Inlet and outlets of levels of the soil pipe and waste pipe line shall be strictly followed (Peg marking to be approved).

Measurement

HDPE pipe shall be measured per running meter and fitting per number as stated in the BOQ.



207.2 RCC Hume Pipes

RCC Hume Pipes shall be socket and spigot joint and class shall be NP2 or NP3 as specified in BOQ. Unless specified otherwise, pipe shall be lowered into the trench and installed singly. Pipes shall not be joined until after they have been lowered into the trench.

The line and levels of the pipeline are shown approximately on the drawings. The pipes shall be accurately installed to the lines, levels, grades and positions set out by the contractor from data given on the drawings or supplied to him by the Engineer. The excavated bed shall be properly compacted and 75 mm thick PCC 1:3:6 base to be done. Pipe shall rest on the PCC base for the full length of the pipe barrel. Earthwork in excavation and back filling, concreting works shall be according to the Civil Works specification.

The contractor shall keep the interior of pipes clean and free from water, dirt, stones or other foreign matter as installation proceeds and at the end of day's work or at other times when installation work is not proceeding, the open ends of pipes shall be sealed off by a wooden plug or approved stopper.

The pipe trench shall be kept free from water all the times. The contractor shall take all necessary precautions to prevent the pipe from floating due to water entering the trench from any source, and shall assume full responsibility for any damage due to this cause. It shall be at the contractor's expense to restore and replace the pipes to its specified condition and grade if it is displaced due to floating.

The contractor has to take necessary precautions including shoring of trenches and dewatering from trench, if necessary, without any extra cost.

The collar of each pipe shall be placed home in the socket of the one previously laid, and the pipe then adjusted and fixed in the correct position with the spigot of the pipe accurately centred in the socket. A ring of gasket in or tarred rope yarn shall be inserted in the socket of each pipe previously laid and driven home with a wood caulking tool and wooden mallet, such yarn when in position shall not occupy more than one quarter of the total depth of the socket. The socket shall then be completely filled with cement sand mortar of 1:2 and a fillet shall be protected by means of a cover of damp jute which shall be kept moist for at least 24 hours after forming.

Measurement

Measurement for sewer installation will be taken from inside of manholes and all specials shall be included in the linear measurement (in running meters). No extra measurement will be done for trench excavation, dewatering, shoring of trenches, PCC bedding, supply and installation of RCC Hume pipes and specials, trench back filling with proper compaction, resealing of original floor or ground finish etc.



208 Solar Water Heater

208.1 General Requirement

Each solar water heater shall be 1.6 sq.m. absorber collector with integral insulated hot water tank of 200 /300/400 litres capacity .The collector plate will be of 15 dia G.I pipes running vertically collector plate will be of 15mm dia G.I pipes manifold at the bottom, at 90 mm c/c, welded to 25mm dia G.I pipe manifold at bottom, the 15 mm dia G.I pipes supply fittings and wired on to corrugation of 1830 X 830 corrugated G.I sheet. The collector surface shall be painted with 1 coat of red lead primer and two coats of blackboard matt black paint. The underside of collector plate (where it rests on 50mm fibre glass wool) shall be painted with 1 coat of red lead primer and two coats of white enamel.

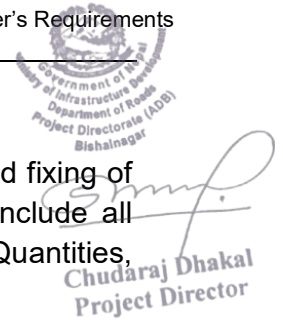
Single glazing cover shall be 5.6 mm clear glass with the fully weatherproofed 25mm, air gap between the glass and collector surface. There shall be 50mm deep fibreglass wool insulated beneath and around the side edges of the collector plate. A 25mm drain pipe shall be provided with plug or end cap at the lowest part of the solar panel.

The top end of the G.I pipes running vertically shall enter and be welded to a 90 litre hot water tank lying across the top and of the solar panel, this tank, if of oxy-acetylene gas welded joint, is to be of gauge thickness 10 SWG .If of arc welded, the tank shall not be of gauge thinner than the 10 SWG. The tank shall be painted with the 1 coat of red lead primer and 2 coats of white enamel. There shall be a vent pipe of 15mm dia. rising from the central topmost portion of the insulated hot water tank, from which the hot water supply is also drawn off the vent pipe rises from the tank.

The hot water shall be insulated with 75mm thick fibreglass wood all around and the whole solar panel plug insulated hot water tank encased in a weather proof box of 24 BWG G.I sheet (unpainted).

Minimum vertical distance between the bottom of cold-water storage tank and top of the solar panel /hot water storage shall be 600mm.The whole solar collector tank system shall be mounted on stout framework of GI pipes or MS Angles at 40°- 45° to the horizontal and facing south, clear of any shadowed areas throughout the year. The frame shall be fitted with foot rest plates 150mm X 150mm & sat on Tow elf pads in order to avoid damage to the both roof deck finish and to the absorbed set.

A material used in the construction of the solar heater shall be clean, free from dust, rust, oil, or other blemishes. Welded joint should be thoroughly tapped and brushed free of welding scale, residue etc. The solar water unit is to be able to withstand a pressure maximum of 2 kg/cm² (20m vertical head) the system shall be pressure tested and flushed before installation, and shall be pressure tested again after installation to the satisfaction of Engineer.



208.2 Measurement

Unit of measurement shall be based on the number. Rate for providing and fixing of solar heater with (booster) electric rod with thermostat of 3 KW. shall include all items, and operations stated in the respective specifications and Bill of Quantities, and nothing extra is payable.

209 Testing and Commissioning

209.1 Testing and commissioning

Piping shall not be buried, concealed or insulated before being properly tested.

The tests shall be carried out in accordance with the requirements of all authorities having jurisdiction.

Storm waste and sanitary drainage systems within the building shall conform the following:

The tightness of joints and the soundness of piping shall be tested in the presence of the Engineer. After drains and roof leaders have been placed in position and branches installed, but before the fixtures have been set and connected or the main drain has been connected permanently to the sewer.

The test shall be carried out in the following manner. Openings and pipe end throughout the work shall be securely closed by means of approved plugs and the entire system, including rising stacks, rain- water leaders, branches to the fixtures and all horizontal mains and drains shall be filled with water up to the top of the highest opening. This water shall stand at the same level for not less than two hours. Another test shall be made of the entire plumbing system after the fixtures have been set and the main sewers connected to the drains. This test shall consist of turning the water into all pipes, fixtures and traps in order that any imperfect material or workmanship may be detected.

Where it is impossible to test the whole system at any time, it may be divided into parts. A smoke test shall also be made and any other test required by the Engineer. Any leaks discovered shall be made tight while the system is under pressure. If this is impossible, the pipe, etc. shall be removed and refitted and the test reapplied until satisfactory results have been obtained.

209.2 Water Piping

Water piping shall be tested at 10.5 kg per sq. cm pressure for a period of not less than 24 hours. The pressure must remain constant for the period and the leaks, if any, shall be made tight while the system is under pressure. If this is impossible, the joint shall be re-made and the test reapplied until satisfactory results have been obtained.



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Project Director

209.3 Disinfection

Before being placed in service, all sanitary water piping shall be thoroughly flushed and chlorinated by the application of a chlorinating agent which shall calcium or sodium hypo chloride obtained from an approved manufacturer.

The chlorinating solution shall have a chlorine dosage of 50 ppm and shall be injected into the system at one end through a cock or tapped connection. All valves and accessories on the system shall be operated to ensure treatment of entire system. The solution shall be retained in the system for a period of at least 24 hours. At the end of this period the water shall be flushed from the line at its extremities until the water at these points is of the same quality as the source of supply.

209.4 Commissioning and Testing

Before commissioning and testing of fixtures, the Contractor shall ensure that all soil and waste stacks and drainage system are connected to the respective manholes and the out fall. He shall also ensure that the water supply system has been commissioned and tested.

Fixtures shall be cleaned and all debris and dirt removed. All stickers, labels, etc. shall be removed with hot water.

Cold water shall be let in each fixture individually. The fixtures shall then be observed for any leakage or drip at inlet and outlet connection. The rate of flow for each fixture shall be adjusted by control valves. All defective part shall be replaced and retested.

After commissioning of the cold-water system, water heaters shall be charged with hot water. After expelling all air in the system by allowing the water to flow through the tap for some time, the heaters shall be switched on. Each heater shall be observed for any leakages and its thermostatically controlled operations. If necessary, thermostats shall be reset and any leakage or defects in the heater repaired or replaced.

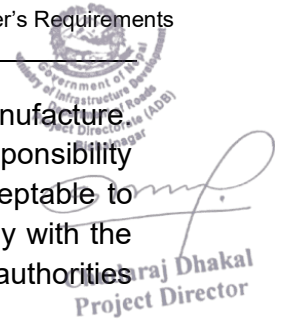
On satisfactory testing and commissioning of the fixtures, the Contractor shall clean all fixtures and accessories by a suitable detergent and hand over the bath room in absolutely clean and usable conditions.

The Contractor shall remove all debris, dirt and surplus materials caused by the work. The system shall be left complete and ready for use.

210 Fire Hydrant System

The scope of work covered in this specification shall also include the information contained in the NBC Code and following IS specification.

- IS: 1648 – 1961
- IS: 3614 – 1966
- IS: 3844 – 1966



General: Provide complete wet riser pipe system, all of approved manufacture. Notwithstanding any other provision elsewhere in the contract, the sole responsibility of supplying and installing the complete installation totally and finally acceptable to the local Fire Brigade and the Regional council of Fire section, rest entirely with the contractor and the contractor shall obtain certificate to the effect from the authorities concerned

All pipes, fittings and accessories of the entire installation should be painted with one coat of approved quality primer and two coats of anti-corrosive paint of approved quality and shade. The rate quoted for supplying and fixing shall include for painting as well.

Pipe installation & fittings: All supply pipes shall be of heavy duty 'C' class GI quality as per IS:1239 (Indian Tube Co. Make) or approved equivalent to that required by the local Fire Brigade and THE REGIONAL COUNCIL OF FIRE SECTION as follows:

Wrought iron pipes shall be GI treated and fixed in accordance with the Fire Brigade Department's requirements. As far as possible, it is preferred to have all pipes joints welded with flanges.

The joints shall be distributed in normal conformity with local fire brigade requirements, if any, and in consultation with Engineer for case of future maintenance, repair and inspection. They shall be secured clear off the wall surface by means of C.I. or M.S. holder bat clamps or brackets.

Flanges: All flanges shall be as per IS table.

Fittings: All fittings such as bends, tees, elbows and reducers etc. shall be fabricated out of pipes of quality as approved.

Control Valves: All main control valves other than in the cabinets shall be of cast iron, sluice type, manufactured by approved make.

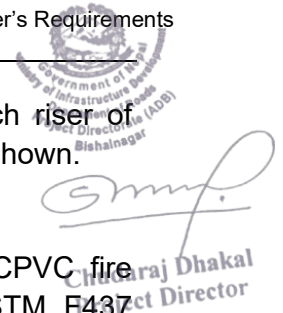
Check Valves: All check valves shall be REC II type, specially designed to close without shock under conditions of rapid arrestation or reversal flow in water columns working on a pressure of 10 kg/cm² manufactured by approved make.

Fire Hose Cabinet: Provide fire hose cabinets of approved manufacture and size with 30"X24" to two hose length of 15m each and one branch pipe with locking arrangement. Fire Hose Cabinet.

Cabinet shall consist of 65mm dia. hose reel with 30m length or (15mX 2) gun metal branch with nozzle coupling reel.

All fire hose cabinets shall be sized to receive landing valve, hose reel and fire extinguishers. The word **FIRE HYDRANT** shall be painted on cabinets.

Hose Reel: Swinging hose reel with 20mm hydraulic rubber braided hose 30m long, swinging up to 170° nozzle shape reel carrier, with drum set all complete.



Shock Control: Provide MS fabricated air cushion tanks on top of each riser of 225mm dia. and 1200mm long with shut off drain and air release valve as shown.

210.1 Fire Sprinklers System

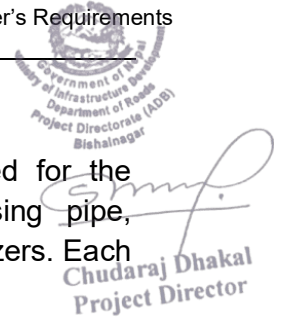
Providing, fixing, testing and commissioning ASTRAL's BlazeMaster® CPVC fire sprinkler pipe as per ASTM F442 in SDR13.5 and fittings as per ASTM F437 (schedule 80 threaded), ASTM F438 (schedule 40 socket) and ASTM F439 (schedule 80 socket). Both pipe and fittings shall be listed by Underwriters Laboratories for use in wet automatic fire sprinkler systems and shall bear the logo of the Listing Agency. Installation to be made with proper special type anchoring, fasteners, clamps, etc. and shall be to the satisfaction of the Engineer-In-Charge.

211 Deep Tube wells Specifications

211.1 Procedures

The following procedure shall be followed:

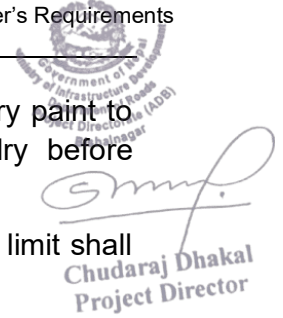
- 1.1 The method of drilling should be Cable Tool or Hydraulic Rotary (Direct or Reverse).
- 1.2 During the course of drilling, the contractor shall take geological samples of the different strata and record these on bore hole log sheets. The soil samples packed with minimum of 0.50 Kg and sealed in polythene bags, together with the log sheets shall be submitted to the Employer as soon as possible.
- 1.3 After completion of drilling, the contractor shall carry out an electro resistivity survey both down and up the bore hole.
- 1.4 Based on the geological log and electro resistivity survey results, the contractor shall submit his detailed proposal for the tube well assembly he considers most suitable to be installed. Approval of the proposed assembly must be received in writing from the Employer before installation.
- 1.5 The tube well assembly shall be installed in the bore hole using centralizers at a maximum of 24-meter centers.
- 1.6 The contractor shall carry out a verticality test immediately after installation of the assembly and shall furnish readings at 3-meter intervals. Bore holes or tube wells assemblies outside the limits specified will be repaired or rejected.
- 1.7 The well shall be gravel packed using well rounded non-calcareous pea-gravel placed by back wash method in a continuous operation. The gravel packing shall confirm to clause 3 of this specification.



211.2 Tube well Assembly

- 2.1. The contractor shall provide all necessary materials required for the complete assembly for the bore hole, housing pipe, casing pipe, necessary seamless MS sockets, well screen, plug and centralizers. Each assembly shall be approved by the Employer before installation.
- 2.2. The dia. of housing pipe shall be of mild steel heavy duty pipe of min. thickness 7.0 mm with pipe lengths of 6m. having plain/ beveled ends suitable for welding. The housing pipe shall project a distance of 300- 500 mm above the ground level. The top of the housing pipe shall have a flange welded on to which a blank flange shall be bolted on at all time when the well is not attended by the contractor.
- 2.3. The dia. of casing pipe shall be as specified in the bill of quantities and of mild steel heavy duty pipe of minimum thickness 5.4 mm with pipe length of 3 or 6 m. having plain/beveled ends suitable for welding.
- 2.4. The housing pipe and casing pipe shall be joined by means of electric welding.
- 2.5. Well screen / slotted pipe shall be in accordance with IS: 8110 - 1976 or equivalent having following requirements:

The well screen pipe shall be seamless or electrical resistance welded, corrosion-resistant material of mild steel heavy duty pipe having thickness of 5.4 mm. to guard against the effect of corrosion and to ensure reasonable life of tube well. The percentage slot opening in the slotted pipe shall be 12 ~ 15 percent and the slot size shall be 1.2 ~ 1.6 mm 65 ~ 75 mm. and shall be distributed in rows as closely and evenly as possible, staggering the slots between each row. The rows shall be vertically arranged. Slots shall be rectangular in shape and tapered with smaller opening on the outside of the pipes so that the solid particles passing through the outer lip do not clog. The outer lip shall be sharp edged. The slotted pipes and screens shall be coated with anti-corrosive protective treatment.
- 2.6. There must be a minimum length of 3 meters of casing pipe below the lowest screen pipe as a sand trap and this must be fitted with welded conical steel plug with a solid point.
- 2.7. All pipes and screens shall be of the best quality and contractor shall submit full details concerning the specifications and sources of supply before bringing the materials on site.
- 2.8. All housing and casing pipes shall be thoroughly cleaned and descaled before assembly and shall be painted with one priming coat and one thick top coat of an approved nontoxic corrosion inhibiting paint.



- 2.9. All welds shall be allowed to cool before applying the necessary paint to the joints as specified above which must be allowed to dry before lowering down the well.
- 2.10. After installation a verticality test shall be carried out and the limit shall be 1 cm. in 48 meters.

211.3 Gravel Packing

- 3.1 The contractor shall fill the annular space between the well assembly and the wall of the bore hole with filter pack gravel in the manner and to the extent specified below.
- 3.2 The gravel pack shall be thoroughly washed, rounded non calcareous pea-gravel with a minimum size of 2 mm. and maximum size of 5 mm.
- The particle size distribution and pack aquifer ratio shall confirm to IS: 4097 - 1967 specification for gravel for use as pack in tube wells. The overall grading shall be approved by the Employer before placing.
- 3.3 The gravel pack shall be placed around the tube well assembly in a continuous operation using the back-wash method to prevent bridging and reduce the possibility of damage to the tube well assembly by the sudden collapse of bridged gravel. Circulation of water should continue until the entire gravel is packed, and then clean water should be pumped through the casing to remove drilling mud.

The gravel shall extend from the bottom of the bore hole to a level of approximately 1.5-3 meters below ground level. A stockpile of 1 m³ of gravel pack shall be left after completion of packing as spare for subsequent topping up.

1. SEALING OF BORE HOLE

- 3.4. After completion of gravel packing, the contractor shall supply and place in position two 50 mm dia GI pipes approximately 6 meters long. They shall extend from just inside the gravel packing to the top of the housing pipe. The pipes are required for topping up the gravel packing and shall be fitted with socket and plug.
- 3.5 After the placing of 'Top up' pipes, the space between the borehole and the housing pipe shall be sealed with an approved concrete mix made with fine aggregate of maximum size 10 mm. or with cement slurry.

The contractor shall submit his proposals for sealing the well for approval before commencing slurry.

211.4 Developing the well

The well shall be developed by the contractor using bailer and plunger for mechanical surging and then by airlift pumping. Developing work shall be done with a higher capacity than the rated capacity of the tube well. The airlift pumping shall

be carried out using a 50 mm. dia pipe set to an agreed depth and coupled to a compressor of at least 450 cfm capacity. Drawdown and discharge shall be measured. The completion of the development shall be certified by the Employer when the well water becomes sparklingly clear and contains less than 20 parts per 100,000 of silt or sand. Duration of the development shall be counted only for the actual mechanical surging and air compressing. Sodium Hexametaphosphate treatment shall be done prior to air pumping.

211.5 Pumping Test Step Drawdown and Continuous

5.1 The contractor shall carry out the step draw-down test with a suitable pump having sufficient capacity and discharge measuring device as specified below. The pump should have a total lifting capacity of over 75 meters.

- (a) The pumping rate shall be kept constant at the following rates for the following period of time:

Pumping Rate	Time
<u>m³ / hr</u>	<u>hrs</u>
25	2
50	2
76	2
100	2
150	2
200	2

- (b) The drawdown corresponding to each of the above pumping rates shall be measured and recorded by the contractor.
- (c) The pumped discharge shall be measured and recorded by the contractor using flow meter or a right-angled V-notch weir made of steel preceded by a stilling chamber.
- (d) The contractor shall measure the solids content in the pumped water in each of the different steps.
- (e) All test results shall be handed to the Employer as soon as the tests are completed.

Note: The pumping rate and time of pumping shall be changed as per yield of tube well

5.2 The Employer will advise the discharge for the continuous pumping test which shall be recorded by the contractor.

The procedure shall be:



<u>Time after starting</u>	<u>Measurement interval</u>
0 to 20 mins	every minute
20 mins. to 1 hr.	every 5 mins.
1 hr. to 2 hrs.	every 10 mins.
2 hrs. to 6 hrs.	every 30 mins.
6 hrs. to 24 hrs.	every hrs.

The pumped discharge shall be measured and recorded for the step drawdown test.

211.6 Report Submission

The contractor shall provide three copies of Report of the works which will include tube well drilling, Electrical Resistivity test, well design, pumping test, water sample test etc.

211.7 Well Disinfection

After completion of all tests the well shall be thoroughly disinfected by means of a chlorine compound - bleaching powder or high-test hypochlorite. The contractor must submit full details of his proposals for approval before carrying out well disinfection which should include for the circulation of heavily chlorinated water within the bore hole.

212 Water Treatment Plant

212.1 Scope

This Specification covers the Supply, delivery, installation, testing and commissioning of Water Treatment Plant (WTP) including all required civil works associated with Water Treatment Plant.

212.2 Reference Document

The work specified in this section shall be in accordance with the following standards, or approved equal, except as they are modified and supplemented herein:

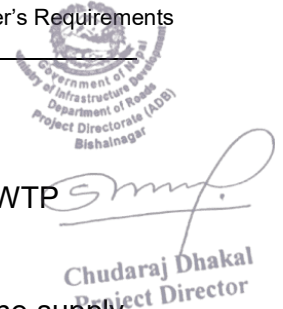
Table 6 Reference list

S.No.	References	Subject
1.	IS	Indian Standards
2.	WHO	World Health Organization
2.	NS	Nepal Standards

212.3 Related Work

The Contractor shall become familiar with other Divisions of the specifications affecting work of this trade.

- Electrical Supplies: To the Water Treatment Plant.
- Sanitary: Water supply and distribution piping.
- Civil Works: Aeration System, Water Tanks & Foundation works for WTP



212.4 General Requirement

The scope of work covered by this Chapter shall be deemed to comprise the supply, delivery, installation, testing and commissioning of WTP as in BOQ and shown on drawings and as specified. It shall also include the supply of the appertaining materials and structural parts, internal piping and valves, support structures for piping, scaffolding, off-loading on site and all operations in connection with these works, unless otherwise specified in the Bills of Quantities.

Materials, which the Contractor shall supply and install and which thereafter will be incorporated in the works, shall be new and unused. They shall comply with the regulations regarding quality and dimensions. Materials that are not standardised shall be used only with the approval of the Engineer.

The materials shall be protected from rain and inclement weather all to the satisfaction of the Engineer. The cost of covering materials shall be deemed to be included in the respective unit prices.

212.5 Samples/ Submittals

Representative samples of followings may be required before awarding the contract / starting the work at site to check upon the material quality:

Piping Materials

The samples shall be kept with the Engineer for future reference and comparison. All materials supplied shall conform to these approved samples in all respects.

All above materials shall have to be approved by the Engineer. Any of these materials not up to the specification must be removed from the site immediately at Contractor's own cost.

212.6 Raw Water Analysis

Raw Water which has to be treated has been tested and has been analyzed as follows:

Table 7 Analytical Table of rain water treatment testing

S.No.	Parameters	Unit	Result	Normal Level*	WHO
PHYSICAL					
1	Turbidity	NTU	5	(5-10)	5
2	Color	*Hazen	15	(5-15)	15
3	Temperature	o C	25	-	
CHEMICAL					

4	pH	-	7.3	(6.5-8.5)	
5	Electrical Conductivity	μS/mS/cm	640	(400-1500)	
6	Total Alkalinity	as CaCO ₃	442	(500)	
7	PPH Alkalinity	as CaCO ₃	Nil	-	
8	Total Hardness	as CaCO ₃	170	(100-500)	500
9	Calcium Hardness	as CaCO ₃	100	-	
10	Magnesium Hardness	as CaCO ₃	70	-	
11	Calcium	as Ca	40	(75-200)	
12	Magnesium	as Mg	17	(<30-150)	
13	Total Iron	as Fe	1.5	(0.3)	
14	Total Ammonia	as N	52	(1.5)	
15	Chloride	as Cl ⁻	5.76	(250)	
	Amonia	Mg/l			1.5
	Iron	Mg/l			0.3
BIOLOGICAL					
	Coliforms	MPN/100ml			Nil
	E. coli	MPN/100ml			Nil
* National Drinking water guidelines Nepal 2065, Groundwater.					

The above raw water analysis can be taken as reference for designing the vessel sizing and quantity of media etc. But the fluctuation which happens in valley should be taken into account while designing the same.

212.7 Capacity of the plant

The Water Treatment Plant of 10 m³/hr. to be designed to work for 16 hours.

212.8 Quality of the treated water

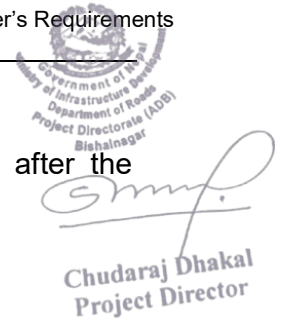
Potable water should match standards set by National Drinking water guidelines Nepal 2065, Groundwater and WHO.

212.9 Materials

212.9.1 Water Treatment Plant

212.9.1.1 Aeration System

An Open Cascade Type Aeration System should be made with concrete outside the plant room as per the drawing attached herewith.



212.9.1.2 Oxidation Chamber

Oxidation Chamber to remove iron available in raw water shall be put after the aeration system. It shall as per the following specifications:

Diameter (mm)	:	As per design
Height on straight (mm)	:	As per design
Media	:	Graded Sand & MnO ₂
Material of construction	:	MS with Inside & outside Epoxy Coat
Working pressure (kg/cm ²)	:	3.5
Service flow rate (m ³ /hr.)	:	10
Valves type	:	Diaphragm

212.9.1.3 Dual Media Filter

A Dual Media Filter to remove turbidity available in raw water shall be put after the oxidation chamber. It shall as per the following specifications:

Diameter (mm)	:	As per design
Height on straight (mm)	:	As per design
Media	:	Graded Sand & Anthracite
Material of construction	:	MS with Inside & outside Epoxy Coat
Working pressure (kg/cm ²)	:	3.5
Service flow rate (m ³ /hr)	:	10
Valves type	:	Diaphragm

212.9.1.4 Activated Carbon Filter

A Dual Media Filter to remove turbidity available in raw water shall be put after the oxidation chamber. It shall as per the following specifications:

Diameter (mm)	:	As per design
Height on straight (mm)	:	As per design
Media	:	Graded Sand & Activated Carbon
Activated Carbon Iodine value	:	850 (min.)
Material of construction	:	MS with Inside & outside Epoxy Coat
Working pressure (kg/cm ²)	:	3.5
Service flow rate (m ³ /hr)	:	40
Valves type	:	Diaphragm



212.9.1.5 Coagulant Dosing Pump

An electronic fully automatic dosing pump shall be installed before aeration system for doing alum or chemical used for coagulation. It shall as per the following specifications:

Dosing Capacity (lph)	:	0-5
Type	:	Diaphragm, positive displacement
Dosing Rate	:	Electronically controlled

212.9.1.6 Sodium Hypochlorite Dosing Pump

An electronic fully automatic dosing pump shall be installed before aeration system for dosing sodium hypo chloride or chemical used for coagulation. It shall as per the following specifications:

Dosing Capacity (lph)	:	0-15
Type	:	Diaphragm, positive displacement
Dosing Rate	:	Electronically controlled

212.9.1.7 pH Correction Dosing Pump

An electronic fully automatic dosing pump with online pH sensor shall be installed at the end of potable water treatment plant for dosing chemical to adjust and achieve the required pH. It shall as per the following specifications:

Dosing Capacity (lph)	:	0-10
Type	:	Diaphragm, positive displacement
Dosing Rate	:	Electronically controlled

212.9.1.8 Tank for Dosing Chemical

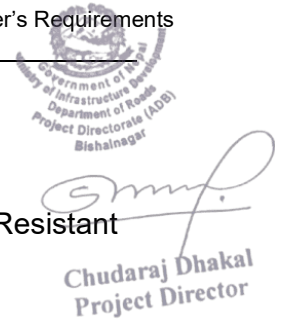
A tank for preparation of the chemical with level sensor shall be used. It shall as per the following specifications:

Dosing Capacity (lph)	:	200 (min.)
MOC	:	Chemical Resistant PVC/HDPE
Features	:	With level sensor

212.9.1.9 Cation Exchange Unit

A Cation Exchange Unit for removal of cation impurities shall be installed after the activated carbon filter. It shall as per the following specifications:

Diameter (mm)	:	As per design
Height on straight (mm)	:	As per design
Resin	:	Cation Resin (Hydrogen Base)
Resin quantity (liters)	:	2000 (Recommended)



Regenerate quantity (HCl 100% kgs)	:	to be specified
Regeneration mode	:	to be specified
Material of construction	:	MSRL / Suitable Chemical Resistant SS
Valves type	:	Diaphragm
Working pressure (kg/cm ²)	:	3.5
Service flow rate (m ³ /hr.)	:	40
Regeneration tank MOC	:	HDPE/PVC with level sensor
Regeneration tank capacity (liters)	:	200 (min.)

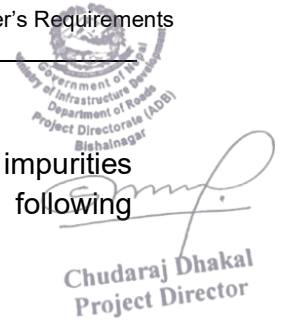
212.9.1.10 Degasification System

A Degasification Unit for removal of gaseous impurities shall be installed after the cation exchange unit. It shall as per the following specifications:

DG tower Diameter (mm)	:	As per design
Height on straight (mm)	:	As per design
Tower internals	:	Rashig Rings
MOC Tower	:	MSRL / Suitable Chemical Resistant SS
Working pressure (kg/cm ²)	:	Atmospheric
Service flow rate (m ³ /hr)	:	40
No of blowers required	:	Two (One standby)
MOC Blower	:	MSRL / Suitable Chemical Resistant SS
No of DG pumps required	:	Two (One standby)
DG pump capacity (m ³ /hr)	:	10
DG pump head (kg/cm ²)	:	3.5
Material of construction	:	SS 316 (Body, Impeller, Shaft)
Pump type	:	Multistage, Centrifugal inline vertical

212.9.1.11 Degasification sump

A Degasification underground sump of suitable capacity for retention of water for minimum 1 hour shall be made in concrete after the degasification tower.



212.9.1.12 Organic Scavenger

An Organic Scavenger Unit for removal of anion and organic (ammonia) impurities shall be installed after the degasification sump. It shall as per the following specifications:

Diameter (mm)	:	As per design
Height on straight (mm)	:	As per design
Resin Type	:	Organic Removal
<i>(Macro porous Strong Base Type I Anion Exchange Resin with Controlled Pore Size)</i>		
Resin quantity (liters)	:	600 (Recommended)
Regenerate quantity (NaOH100%kgs)	:	to be specified
Regeneration mode	:	to be specified
Material of construction	:	MSRL / Suitable Chemical Resistant SS
Valves type	:	Diaphragm
Working pressure (kg/cm ²)	:	3.5
Service flow rate (m ³ /hr)	:	10
Regeneration tank MOC	:	HDPE / PVC with level sensor
Regeneration tank capacity (ltrs)	:	200 (min)

212.9.1.13 Filter Feed pumps

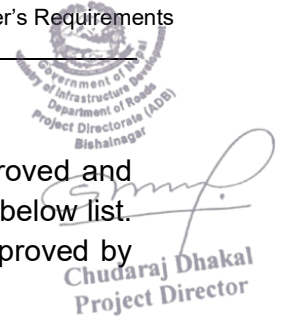
Filter Feed Pumps shall be installed before Oxidation Chamber and before Cation Exchange Unit. It shall as per the following specifications:

Pump capacity (m ³ /hr)	:	10
Pump head (kg/cm ²)	:	3.5
Material of construction	:	Body (Cast Iron), Impeller Bronze)
	:	Shaft (Stainless Steel)
Pump type	:	Single stage, Centrifugal

212.9.1.14 Electrical Control Panel

A fully automatic electrical control for operating the Potable Water Treatment Plant. It should have incoming MCCB, Copper Bus Bars, Isolation Switch, Indicating Lamps, Voltmeter and ammeter for mains incoming, sequential starting of Water Pumps and Dosing pumps, alarms for level sensors with complete protections. It shall as per the following specifications:

Number required	:	One
MOC	:	MS with Powder Coating



212.10 Guide for Approved Makes

Following makes of the equipment, instruments and accessories are approved and recommended to use. Please give proper justification for makes out of the below list. However, the Contractor can propose alternative brand and should be approved by the Engineer prior to ordering and shipment.

212.10.1 Mechanical

Filter Vessels	:	IS or equivalent
Chemical Dosing Pumps	:	Grundfos / Hanna/italia/Indian
Chemical Tanks	:	Sintex or equivalent
Water Pumps	:	Grundfos
Resin	:	Thermax / Ion Exchange / Dow
MS Pipes	:	TATA/JINDAL/HULAS/RAJESH METALS
Valves	:	AUDCO / Danfoss / Leader
Strainers	:	AUDCO / Danfoss / Leader
NRV	:	AUDCO / Danfoss / Leader
Foot Valves	:	AUDCO / Danfoss / Leader
Level Sensor	:	ADVANCE/MINICONTROLLER/EQUIV.
Level Switches	:	LEVCON/MINILAC/EQUIV.
Level Guage	:	LEVCON/SIGMA INSTRUMENTS
Pressure Guage/Indicators	:	FIEBIG / H GURU
Temperature Guage/Indicators	:	FIEBIG / H GURU
Testing Meters	:	ABB/Siemens
Flowmeters	:	DANFOSS / EQUIVALENT
Conductivity Meter	:	Hanna or Equivalent
ORP Meter	:	Hanna or Equivalent
RO Pressure Tube	:	GE / Dow / Equivalent
RO Membrane	:	GE / Dow
Micron Filter Housing	:	GE / Dow / Equivalent
Micron Filter Cartridges	:	GE / Dow

211.10.2 Electrical

Switchgears	:	Merlin Gerin/ABB/Siemens/ Schneider
Contactors	:	Merlin Gerin/ABB/Siemens/ Schneider
Push Button element	:	L&T
Indicating Lamps	:	L&T
Protective Relay	:	GECA/ABB/Siemens
MCB	:	Schneider/Merlin Gerin/Siemens

Electrical Cables

:

Water Proof



212.11 Technical data required

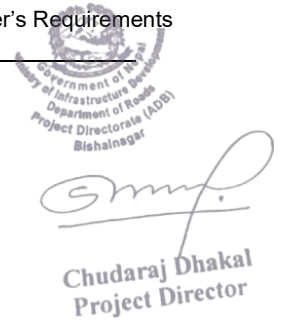
The Below data needs to be mentioned for each equipment/instruments/parts as mentioned below:

212.11.1 Water Pumps

- Discharge (m3/hr.) as per BOQ
- Head (m)
- Make
- Model
- Pump Discharge (m3/hr.) (Max./Min.)
- Pump Head (m3/hr.) (Max./Min.)
- MOC
- Body
- Impeller
- Shaft
- Power of Motor
- P1
- P2
- Shaft Seal Type & Material
- Type of Coupling
- Efficiency of Pumps

212.11.2 Filter

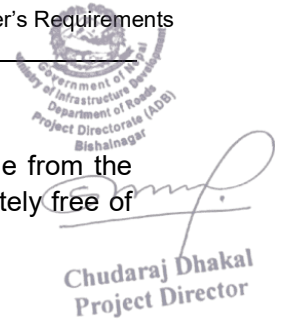
- Make
- Model
- Dia (mm)
- Height (mm)
- Type of Flow
- Material of Construction
- Shell / Dished end thickness
- Max. Working Pressure
- Hydro Test Pressure
- Max. Flow Rate



- Min. Flow Rate
- Filtration Rate
- Inlet/outlet pipe size
- Type of Media's
- Media's quantity
- Type of Valves
- Back Wash Frequency
- Pressure Drop across bed

212.11.3 Cation / Organic Scavenger

- Make
- Model
- Dia (mm)
- Height (mm)
- Type of Flow
- Material of Construction
- Shell / Dished end thickness
- Max. Working Pressure
- Hydro Test Pressure
- Max. Flow Rate
- Min. Flow Rate
- Min. Flow Rate
- Inlet/outlet pipe size
- Type of Media's
- Resin quantity
- Make / Type of Resin
- Make / Type of Valves
- Regeneration Frequency
- Output between regeneration
- Regeneration chemical quantity



212.12 Warranty

A 12-month warranty shall be given for all equipment and accessories applicable from the date of handover. The defective parts and accessories shall be replaced completely free of cost (no extra cost against customs or any other taxes shall be paid separately).

212.13 After Sales Service

212.13.1 Preventive Maintenance

Preventive maintenance details as specified by the manufacturers and chart shall be submitted. It should be carried out by the contractor at no extra cost within warranty period.

212.13.2 Breakdown Maintenance

Breakdown maintenance calls shall be attended within 2 hours by the contractor within warranty period.

212.14 Execution

212.14.1 Laying of Pipes & Installations

Piping should be laid as specified in the standard guidelines.

Layout drawings, detailed foundation drawings, P&I drawings, piping routing drawings and other detailed drawings should get approved by the engineer before starting the works.

212.14.2 Erection of Vessels

Erection of Vessels should be carried out using the cranes, fork lift or other appropriate means of erection tools.

212.14.3 Charging of Media

All media used should be washed and cleaned before being poured into the vessel.

212.14.4 Cleaning

All left over and waste materials left shall be cleaned off on the same day that the work in that specific area is over. The welded joints and drills should be grinded and cleaned to perfection.

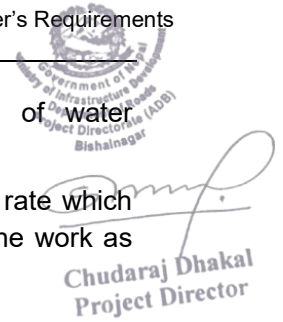
212.15 Measurement

Measurement for payment of completed works shall be measured in complete lot including required civil works.

212.16 Rates and Basis of Payment

The rate shall include the cost of materials and labor required for all the operations described above. The rate shall also include the following:

- (f) Scaffolding works.
- (g) Supports, hangers and trays for Piping, accessories and cables.
- (h) Rough cutting and waste of pipe and fittings.
- (i) PVC Sleeves used in walls, underground and ceiling for pipes.



- (j) All required Civil Works related to the completion of water treatment plant.

The payment for entire work shall be made at their respective contract unit rate which shall be the full and the final compensation to the Contractor to complete the work as per these Specifications.

212.17 Area of the Plant

Please refer the layout drawing provided with this tender document for the area available for the installation of the plant.

212.18 Documentation and Certificates

212.18.1 Test Certificate

Test Certificates specified and required standards shall be submitted for all the equipment, vessels, valves, strainers, fittings, medias, resins and membranes and all other accessories and instruments being used in the plant.

212.18.2 Certificate of Testing

As and when water treatment plants, parts, equipment or shall have passed the tests referred in the specifications, the engineer or engineer's representative shall furnish to the contractor a certificate.

212.18.3 Manuals

A proper and detailed operation and service manual shall be submitted for all the equipment, accessories and parts used in the works as specified in the BOQ at the time of handover.

212.18.4 Drawings

Drawings like as built detailed layout, pipeline drawings, schematic diagrams, circuit diagrams shall be submitted at the time of handover.

212.19 Standards

In case of any disagreements between the contractor and the employer over the quality or execution of the works, the following standards shall be followed:

- IS : 4270 Specification for steel tubes used for water wells.
- IS : 2800 Code of practice for tubewell construction.
- IS : 4097 Specification for gravel for use as pack in tubewells.

213 Make of Equipment and Approved Manufacturers

S. NO.	Description	Manufactures / Brand Name
Part – I Sanitary Plumbing Installation		
A. Sanitary Fixture and Faucets		
1.	Vitreous China Sanitary ware	Parry-ware Sanitaryware Hindware Sanitary ware



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		Cera, Boolan or Approved Equivalent
2.	C.P. brass Faucets, Wastes, Traps etc.	Parryware,jaquar or approved equivalent ARK,Boolan Ess-Ess or rEssco or Approved Equivalent
3.	C.P. Flush Valves for W. C.	Parrywr,Jaquar or approved equivalent Ark,Ess-Ess,Essco or Approved Equivalent
4.	C. P. Angle Valves (Ball Valve Type)	Parryware,Jaquar or approved equivalent Ark,Ess-Ess,Essco,boolan or Approved Equivalent
5.	C. P. Bathroom Accessories (toilet paper Holder,Glass shelf,Towel Rod,Soap Tray etc)	Parryware or approved equivalent Jaquar,Hindware ESS ESS or Approved Equivalent
6.	C. P. Wastes, Spreaders, Urinal Flush Pipe	Parrywae or approved equivalent Jaquar,hindware ESS ESS or Approved Equivalent
B. Pipes and Fittings		
1.	UPVC Soil, Waste & Vent Pipes and Fittings	Nepatop or Approved Equivalent Panchankanya Mangalam Supreme
2.	G.I. Pipes	Hipco Jindal, Hissar or Approved Equivalent
3.	G. I. Fittings	R' Brand Unik Brand Sun or Approved Equivalent
4.	PPr Pipes and Fittings	Nepatop.



5.	RCC Pipes	Panchakanya, Hilltakr of approved quality
6.	Grattings strainers Cleanouts etc.	Neer' Brand (Sage Metals) or Approved Equivalent

C. Insulation

1.	Synthetic polymeric Rubber Compound insulation	Superlon Aeroflex or Approved Equivalent

D. Valves

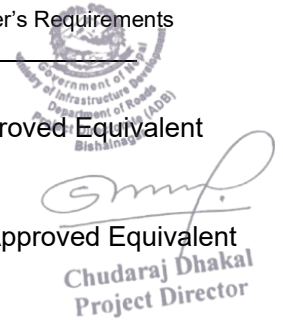
1.	Gunmetal Gate Valves, Non-return Valves, Float Valves	Sant or Approved Equivalent
2.	Ball Valves	Laxmi Parryware or approved equivalent
3.	C. P. Angle Valves	Jaquar, Hindware, Parryware, boolan Ark ESS-Ess or Approved Equivalent
4.	Butterfly Valves	Audco Keystone C & R Advance or Approved Equivalent

E. Manhole Covers Grattings etc.

1.	C. I. Manhole Covers	Nepal Dhalaut Pvt. Ltd swastika

F. Pumps & Motors

1.	Clear Water Pumps	Crompton Kirloskar Pedrollo Ksb



2.	Package Hydropneumatic Systems	Grundfos, U K or Approved Equivalent Grundfos, U K Salmson, France or Approved Equivalent
3.	Drainage Pumps	Grundfos, U K Salmson, France KSB Nocchi, Italy Pedrollo or Approved Equivalent Femack or Approved Equivalent
4.	Level Controllers	

Part - II Fire Fighting Installation

A. Pipes & Fittings

1.	Mild Steel Pipes / G. I. Pipes conforming to IS:1239	Tata, NEPAL NS MARK Jindal (Hissar) or Approved Equivalent
2.	Mild Steel Pipes conforming to IS:3589	Swastrik, NEPAL NS Prakash Surya or Approved Equivalent
3.	Seamless pipe and fitting	tata Jindal Unik Brand or Approved Equivalent

B. Valves

1.	C. I. Sluice Valves & Non-return Valves	Kirloskar / C & R I.V.C. or Approved Equivalent
2.	Butterfly Valves	Keystone, Kirloskar Audco C&R Advance or Approved Equivalent
3.	Brass Fullway Valves	Zoloto RB-Italy Leader Sant or Approved Equivalent



4.	Gunmetal Gate Valves and Non-return Valves	Leader Zoloto Sant or Approved Equivalent
5.	Gunmetal Landing Valve, Branch Pipe Nozzle, Fire Brigade Connection Male-female Couplings etc.	Minimax Vijay Newage Firex or Approved Equivalent
C. Hose Pipes & First Aid Hose Reels		
1.	Fire Hose Pipe	Jaishree, ISI mark Firex Newage or Approved Equivalent
2.	First Aid Hose Reel	Tiger (ISI Marked) Newage or Approved Equivalent
D. Pumps, Electric Motors		
1.	Pumps, Electric Motors	Kiloskar Mather & Platt Crompton KSB or Equivalent Approved
2.	Motors for Pumps	Siemens ABB Kirloskar Electric or Approved Equivalent
E. Fire Extinguishers		
1.	Portable Fire Extinguishers	Minimax Vijay Firex Safex Cease Fire or Approved Equivalent
F. Electric Switch Gear and Starters		
1.	Electric Switch Gear	Siemens



L & T

GE

ABB

Merlin Gerin or Approved Equivalent

PART- III MACHINERY & PLANT

1. Water Filtration Plant

ION Exchange,

Acqua Tec,

Thermax Co., or Approved Equivalent



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Project Director

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6C-C: Special Provision to the Standard Specifications for Building Construction (Electrical) Works

300 Scope of Work

The work to be carried out under this contract comprises internal and external electrical installation. All works required for NEA connection or other will be Contractor's responsibility. The experience of electrical sub-contractor must be minimum 4 years.

The works covered shall include supply of all materials, labour, equipment and services in connection with the work complete as indicated. The contractor shall consult drawings, bill of quantities and specifications all together, which gives the total scope of the works.

The contractor shall include for the supply of the whole or the new materials in accordance with these specifications and the whole of the work of fixing, installation, testing and commissioning necessary for the complete installation as set down in this specification and with the accompanying schedules and drawings, commencing from the supply authority's terminals. This also includes any materials, appliances, equipment not specifically mentioned herein or noted on the drawings as being furnished or installed but which are necessary and customary to make the installation complete in all respects. In general, the work to be performed under tills contract shall comprise supply and installation, testing & commissioning of the followings as per schedule of quantities.

- a. All conduit work including junction boxes, outlet boxes and wiring for lighting power.
- b. Switches, plug sockets, cover plates and other wiring accessories.
- c. Main and sub-main between various distributions panels.
- d. Main distribution panels, sub-distribution panels and final distribution panels.
- e. Cables on cable trays and / or within suspended ceiling spaces including jointing of cables, cable trays, hangers, supports and all fixing accessories.
- f. Supply installation and connecting of earthing (grounding) system.
- g. Distribution Transformer & HT Cable.
- h. Supplying and laying of conduits along with outlet boxes with pull wires for telephones, other communication systems.
- j. Wiring with terminal block for telephone & other communication systems.
- k. Wiring for computer networking
- l. Prepare shop drawing prior to installation works for approval; prepare "As Build" drawing after testing and commissioning of complete electrical system.

301 Standard of Work

The work shall be carried out to the satisfaction of the Consultant/Engineer (here by in Electrical Technical specification if not mentioned; the Consultant refers to the Design Electrical Engineer and Engineer refers to the Client Electrical Engineer) and in accordance with the regulations of IS, NS, BS & Nepal Electricity Authority, Electricity Rules and Regulations and the enclosed specifications.



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302 Abbreviations

The following abbreviations have been used in the accompanying specifications, drawings and Schedule of Quantities.

GI	stands for Galvanized Iron.
MS	stands for Mild Steel.
HT	stands for High Tension.
HV	stands for High Voltage.
LV	stands for Low Voltage.
LT	stands for Low Tension.
PVC	stands for Polyvinyl Chloride.
HDPE	stands for High Density Polythene
A	stand for Amperes.
V	stands for Volts.
kV	stands for Kilo Volts.
kVA	stands for Kilovolt Ampere
ISS	stands for Indian Standard Specifications.
IS	stands for Indian Standard.
IEE	stands for Institution of Electrical Engineers London.
NEC	stands for National Electrical Code.
NEA	stands for Nepal Electricity Authority
SFU	stands for Switch Fuse Unit.
DG	stands for Diesel Generator.
RYB	stands for Red, Yellow, Blue.
MCB	stands for Miniature Circuit Breaker.
MCCB	stands for Moulded Case Circuit Breaker.
ELCB	stands for Earth Leakage Circuit Breaker.
RCCB	stands for Residual Current Circuit Breaker.
CT	stands for Current Transformer.
PT	stands for Potential Transformer.
DO	stands for Drop out Fuse.
SP	stands for Single Pole.
DP	stands for Double Pole.
TPN	stands for Triple Pole and Neutral.
MDB	stands for Main Distribution Panel.
SMDB	stands for Sub-Main Distribution Board (Panel).
FDB	stands for Final Distribution Board (Panel).
DB	stands for Distribution Board.



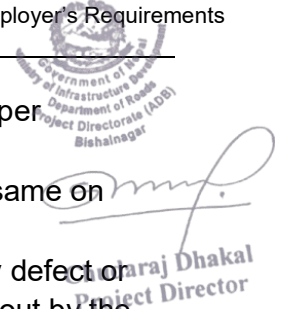
FTL	stands for Fluorescent Tube Light.
PVC	stands for Polyvinyl Chloride.
C/O	stands for Change-over Switch.
AC	stands for Alternating Current.
VRF	stands for Variable Refrigerant Flow.
DC	stands for Direct Current.
SS	stands for Switched Socket/Selector Switch.
LA	stands for Lightning Arrester.
XLPE	stands for Cross-Linkable Polyethylene

303 Fees, Permits and Tests

The Contractor shall obtain and pay for any and all fees and permits required for the installation of all electrical works including the HT lop off from the supply Authority's (NEA) 11 kV line pole with necessary NEA control and measurement provisions as required. On completion of the work, the Contractor shall deliver certificates of final inspection to the Consultant/Engineer and obtain approval by the local electricity supply authority. The Consultant/Engineer shall have full authority to get the require materials or work to be tested by an independent, agency at the Contractor's expense in order to prove their soundness and adequacy.

304 Workmanship

- a) Workmanship and good appearance of the installation shall be of equal importance with its electrical and mechanical efficiency, and all portions of the work shall be so laid out and installed that the work as a whole is of uniform quality and shall present a neat appearance in a manner meeting the approval of Consultant. The Contractor shall verify in the field all measurements necessary of the electrical work and shall assume responsibility for their accuracy.
- b) Materials, which are defective or damaged during the progress of work, shall be replaced or repaired in approved manner at the expenses of Contractor. The installation shall comply with all applicable laws and ordinances and with the requirements of Indian codes, Nepal Standard and as specified herein or shown on the drawings. The progress of the electrical work shall be carried out so as to conform to the entire installation shall be completed as soon as the condition of site and working places will permit. The work progress report shall be submitted at the end of every month to the Consultant.
- c) All cutting, drilling, chiseling, patching etc., required for installation of electrical work shall be carried out in a manner approved by the Consultant. Any defects in finishes, plasters, wood work, metal work, masonry, concrete, or other materials resulting from the performance of the work shall be replaced or repaired at no expense to the owner and to be satisfaction of the Consultant.
- d) Upon completion of the electrical work the Contractor shall submit to the Consultant, reproducible drawings showing the layout, and connection of electrical



- system as constructed and denoting all information pertinent to the proper maintenance of the system.
- e) If any alteration is found necessary, the Contractor will have to do the same on mutually agreed rates.
 - f) The work shall be carried out in the best workman like manner and any defect or minor changes in the design/ connection if pointed out shall be carried out by the Contractor without any extra charges.
 - g) An Electrical Supervisor and Electrical Engineer shall be employed by the Contractor and will remain at site to receive orders or any other instructions from the Consultant/Engineer.
 - h) Whatever recessed fittings are required to be provided the electrical Contractor shall be responsible for informing the civil Contractor to keep the necessary recesses in the slab and in the false ceiling.
 - i) The list of approved makes and manufacturers of electrical materials is attached. Only such materials as are on the list shall be used.

305 Materials

All materials and Equipment shall be new and shall be in accordance with the standard established by ISI and NS. Where materials of Equipment are specified or shown on the drawings by name of manufacturers, name plates, instruction plates, warning signs and any other marking whatsoever on the Equipment and accessories there of shall be in English language. Equipment or materials of other manufacturers may be considered for use if of equal quality, appearance and, electrical and mechanical characteristics and approved by the Consultant/Engineer.

306 Colour Coding

All outgoing and incoming power cables including point-wiring cables will follow the following colour coding phase indicating lamps wherever recommended.

Phase - 1 - Red (R); Phase - 2 - Yellow (Y); Phase - 3 - Blue (B); Neutral - Black (B); Earthing- Green (G).

307 Quantities

All quantities mentioned in the bill of quantities are not actual and the contractor will get payment according to measurement of actual work. The schedule of quantities is liable to alteration by deletion or addition as required.

308 Specifications

The specifications shall be considered as part of this contract. The drawings indicate the extent and general arrangement of the futures, controlling switches, wiring system etc. and are essentially diagrammatic. The drawing indicates the points of termination of conduit runs and broadly suggests the routes to be followed.

The work shall be installed as indicated on the drawings. However, any minor changes found essential to co-ordinate the installation of this work with other trades shall be made without any additional cost to the Owner. The data given herein and on the

drawings is as exact as could be secured, but its complete accuracy is not guaranteed. The drawings are for the guidance of the Contractor; exact locations, distances and levels shall be governed by the site conditions and the Conceptual drawings.

309 Shop Drawings

The drawing provided are design drawing and generally are diagrammatic. They do not show offsets, bends, pull box, junction box, which may be required for the installation. The Contractor must prepare and submit the shop drawings to the Consultant/Engineer before the conducting installation work for the approval. Detail shop drawings of conduit layout for power and light, equipment layout, cable routing, distribution panels, switch boards, cabinets, special pull boxes, PABX System, Fire Alarm System, Surveillance System, AC system, Solar PV System, Earthing system and any other electrical equipment should be provided by the contractor. The drawings must be got approved by Consultant/Engineer before execution at site.

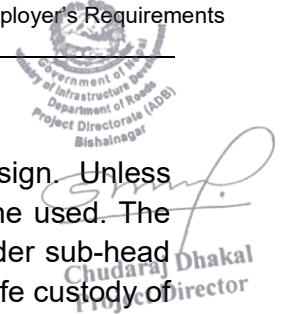
310 Completion Drawings

At the completion of the work and before issuance of certificate of virtual completion the Contractor shall submit as build drawing to the Consultant; three (3) sets of printed copy or as required set of layout drawings at approved scale indicating the complete wiring system as installed and the softcopy of the drawing in which they are drawn. These drawings must provide:

- a) Run and size of conduits, inspection, and junction and pull boxes.
- b) Number and size of conductors in each conduit.
- c) Location and ratings of sockets and switches controlling the light and power outlets.
- d) Location and details of distribution panels, main switches, switchgear and other particulars.
- e) A complete wiring diagram as installed and schematic diagrams showing all connections in the complete electrical system.
- f) Equipment layout showing location of HT panel, transformer and panels.
- g) Cable routing and layout.
- h) Location of outlets, junction boxes, sizes of various conduits for telephone and other communication systems.
- i) Location of all earthing stations, routes and size of all earthing conductor, manholes etc.
- j) Instruction, maintenance, and operation manuals, if any, for the equipment.
- k) Section drawings where required or instructed by Consultant/ Engineers.

311 Manufacturer's Instructions

Where manufacturers have furnished specific instructions relating to the materials used in this job and covering points not specifically mentioned in these documents, manufacturer's instructions shall be followed.



312 Materials and Equipment

All materials and equipment shall be of the approved make and design. Unless otherwise called for, only the best quality materials and equipment shall be used. The materials and equipment shall conform to relevant standards as listed under sub-head "Regulations and Standard". The Contractor shall be responsible for the safe custody of all materials and shall insure them against theft or damage in handling or storage etc. A list of items of materials and equipment, together with a sample of each shall be submitted to the Consultant / Engineer within 30 days of the award of the contract for the approval. Any item, which is proposed as a substitute, shall be accompanied by all technical data giving sizes, particulars of materials and the manufacturer's name. At the time of submission of proposed substitute, the Contractor shall state the credit, if any. Only the Consultant/Engineer have full right to accept or reject the proposed substitute as per his/her design requirement. In the event the substitution is approved, all changes and substitutions shall be requested in writing and approvals obtained in writing from the Consultant/Engineer.

313 Engineer and Foreman

The Contractor shall employ a competent, fully licensed, qualified full time one (1) number of Electrical Engineer and one (1) of Sub-Electrical Engineer to direct the work of electrical installation in accordance with drawings and specifications. The Electrical Engineer shall be available full time on the site to receive instructions from the Consultant/Engineer or his nominee in the day-to-day activities throughout the duration of the Contract. The Electrical Engineer shall correlate the progress of the work in conjunction with all relevant requirements of the supply authorities.

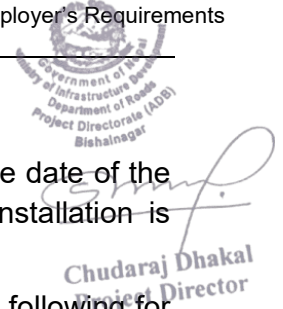
The works contract-executing agency (Contractor) shall employ a full-time electrical engineer having similar site experience of at least 5 years and electrical overseer having minimum 5 years' experience. The site supervisor to be available on full time basis at Site shall be able to interpret the specifications, bill of quantities.

314 Completion

On completion of the electrical installation, a certificate shall be furnished by the Contractor countersigned by the licensed Supervisor, under whose direct supervision the installation was carried out. This certificate shall be in the prescribed form as required by the local electricity supply authority. The Contractor shall be responsible for getting the electrical installation inspected and approved by the local authorities concerned.

315 Demonstration to Owner

At completion, devices subject to manual and automatic operation shall be operated as per the nature at least three times or as required in presence of Consultant /Engineer to demonstrate satisfactory operation.



316 Maintenance of Electrical Systems

The period of maintenance of the electrical works shall commence from the date of the Certificate of Completion for the (main) works, provided the electrical installation is giving sufficient service to the employer for the intended use.

The term maintenance is applied to all electrical works and shall mean the following for a period of Twelve (12) months from the commencement of the maintenance period for electrical works; the Contractor shall:

- a. Guarantee the entire installation in respect of all defects, which may occur and undertake to repair such defects immediately at no cost whatsoever to the employer.
- b. The maintenance work must be scheduled according to the recommended procedures set out in the manufacturer's catalogues.
- c. During the maintenance period the Contractor shall undertake to train employer's staff in all aspects of servicing and maintenance of all equipment.

317 Internal Wiring

System of Wiring

The system of wiring shall consist of FRLS insulated copper conductor wires in FRLS conduits and shall be concealed or surface mounted as called for.

General

Prior to laying and fixing of conduits, the contractor shall carefully examine the drawings indicating the layout, satisfy Consultant/Engineer about the sufficiency of number and sizes of conduits, location of junction boxes, sizes and location of switch boxes, single run of wires/cables without joints and other relevant details. Any discrepancy found in the drawings shall be brought to the notice of the Consultant/Engineer. Any modification suggested by the Contractor shall be got approved by the Consultant/Engineer before the actual laying of conduits is commenced.

Materials

317.1.1 Conduits

Conduits and accessories shall conform to relevant IS/BS Standards. Heavy duty FRLS PVC conduit or galvanized steel conduits shall be used as called for in the Schedule of Quantities. Buried wiring passing under floor of ground floor shall run in FRLS PVC conduit. Joints between conduits and accessories shall be securely made to ensure earth continuity. Sample of all the conduits to be used shall be submitted before laying for approval from Consultant/Engineer.

The conduits shall be delivered to the site of construction in original bundles and each length of conduit shall bear the label of the manufacturer.

The number of 650/1100 volt grade PVC insulated copper/aluminium conductor wires that may be drawn in the conduits of various sizes are given below and space factor shall not exceed **as per NBC 207**. Separate conduits shall run for all power outlet

wiring, ELV and Light. Conduit connections for FRLS PVC conduits shall be done perfectly. Junction Box and the conduit joint must be used where necessary. **Metal Saddle of appropriate size must be used while laying the conductor.**

Maximum permissible numbers of 650/1100 volt grade PVC insulated wires that may be drawn into rigid non-metallic or MS conduits are given below:

Size of wire nominal cross section area	Maximum number of wires within conduit of size (mm)				
sq.mm.	20	25	32	40	50
1.5	6	10	14	-	-
2.5	5	10	14	-	-
4	3	6	10	14	-
6	2	5	8	11	-
10	-	4	7	9	-
16	-	2	4	5	12
25	-	-	2	2	6
35	-	-	-	2	5

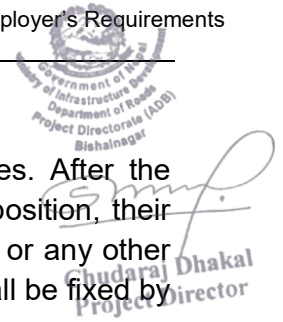
317.1.2 Connections

All jointing methods shall be subject to the approval of the Consultant /Engineer. Separate conduits shall run for all power outlet wiring.

The threads and sockets shall be free from grease and oil. Connections between screwed conduit and sheet metal boxes shall be by means of a brass hexagon smooth bore bush, fixed inside the box and connected through a coupler to the conduit. The joints in conduits shall be free of burrs to avoid damage to insulation of conductors while pulling them through the conduits.

Bends in Conduit

Where necessary, bends or diversions may be achieved by means of bends and / or circular inspection boxes with adequate and suitable inlet and outlet screwed joints. In case of recessed system each junction work shall be provided with a cover properly secured and flush with the finished wall surface. No bends shall have radius less than 2.5 times the outside diameter of the conduit.



Fixing Conduits

All conduits shall be installed so as to avoid steam and hot water pipes. After the conduits, junction boxes, outlet boxes and switch boxes are installed in position, their outlets shall be properly plugged or covered so that water, mortar, insects or any other foreign matter does not enter into the conduit system. Surface conduits shall be fixed by means of spacer bar saddles at intervals not more than 500mm.

The saddles shall be of 3mm x 19mm galvanised mild steel flat, properly treated, primed and painted, securely fixed to supports by means of nuts and bolts/rail bolts and brass machines screws.

Switch Outlets and Junction Boxes

All outlet boxes for switches, sockets and other receptacles shall be rust proof and shall be of 1.6mm thick G.I. sheets, **and made of single sheet without any welding** having smooth external and internal surfaces to true finish.

All outlet boxes for receiving plug sockets and switches shall be fabricated to approve sizes. All boxes shall have adequate number of knock out holes of required diameter and earthing terminal screws. All boxes shall have both fixed lugs and adjustable lug/lugs.

Inspection Boxes

Rush proof inspection boxes (Pull Box of min 1.21mm thick mild steel sheet having smooth external and internal finish shall be provided to facility removal and replacement of wires, where required. These shall be provided if continuous length of conduit is more than 10 meters. The depth of the box shall be 100mm and shall have a hinged cover with push button lock.

Circuit for Telephone, TV, Computer Networking and Music System

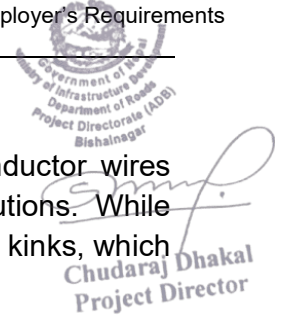
Conduits and system of conducting for telephone, TV, Computer networking and alarm system shall be the same as far electrical system, except they shall be installed at least 150 mm away from the electrical conduits.

Conductors

All PVC insulated Copper/Aluminium conductor wires shall conform in all respects to standards as listed under sub-head "Regulations and Standards". The under sizing/gauge of the conductor is not acceptable. During the inspection Electrical Engineer have full authority to make the contactor to remove the installed cable and no extra payment will be done in replacement of it.

Bunching of Wires

Wires carrying current shall be so bunched that the outgoing and return wires are drawn into the same conduit. Wires originating from two different phases shall not run in the same conduit.



Drawing Conductors

The drawing and jointing of FRLS PVC insulated copper/aluminium conductor wires and cables shall be executed with due regard to the following precautions. While drawing wires through conduits, care shall be taken to avoid scratches and kinks, which cause breakage of conductors. There shall be no sharp bends.

Insulation shall be shaved off like sharpening of a pencil and it shall not be removed by cutting it square,

PVC insulated copper conductor wire ends shall be soldered (at least 20mm length).

Strands of wires shall not be cut for connecting terminals. The terminals shall have sufficient cross-sectional area to take all strands and shall be soldered. Connecting brass screws shall have flat ends. All looped joints shall be soldered and connected through terminal block/connectors. The pressure applied to tighten terminal screws shall be just adequate, neither too much nor too less. Conductors having nominal cross-sectional areas exceeding 4 sq.mm shall always be provided with cable sockets/shoes. At all terminals, brass flat washer of large area and approved steel spring shall be used. Brass nuts and bolts shall be used for all connections.

Only certified wireman and cable jointers shall be employed to do jointing work. All wires and cables shall bear the manufacturer's label and shall be brought to site in original packing. For all internal wiring, FRLS PVC insulated wires of 650/1100 volts grade shall be used. The sub-circuit wiring for point shall be carried out in loop system and no joints shall be allowed in the length of the conductors. If the use of joints connections unavoidable due to any specific reason, prior permission, in writing, shall be obtained from the Consultant /Engineer. No wire shall be drawn into any conduit, until all work of any nature, that may cause injury to wire, is completed. Care shall be taken in pulling the wires so that no damage occurs to the insulation of the wire. Before the wires are drawn into the conduits, the conduits shall be thoroughly cleaned of moisture, dust, dirt or any other obstruction by forcing compressed air through the conduits. The minimum size of FRLS PVC insulated conductor wires for all sub-circuit wiring for light points shall be 2.5 sq.mm copper equivalents and for all sub-circuit wiring for power points shall be 4 sq. mm.

Joints

All joints shall be made at main switches, distribution boards, socket outlets, lighting outlets and switch boxes only. No joints shall be made in conduits and in junction boxes. Conductors shall be continuous from outlet to inlet.

Mains and Sub-Mains

Mains and Sub-Mains cable or wires where called for shall be of the rated capacity and approved make. Every main and sub-main wire shall be drawn into an independent adequate size conduit. An independent earth wire of the proper rating shall be provided for every single-phase sub-main. For every 3-phase sub-main, 2 nos. earth wires of proper rating shall be provided along with the sub-main. The earth wires shall be fixed to conduits by means of clips at not more than 1000mm distance. Where mains and

sub-mains cable are connected to switchgear, sufficient extra lengths of cable shall be provided to facilitate easy connections and maintenance.

Load Balancing

Balancing of circuits in three-phase installation shall be planned before the commencement of wiring and shall be strictly adhered to.

Colour Code and Tagging of Conductors

Colour code shall be maintained for the entire wiring installation: red, yellow, blue for three phases, black for neutral, green (or YG) for earthing. Tagging/labelling of the conductors must be done and drawing shall be provided so that it will be easier for future maintenance and finding of circuits.

Wiring for CCTV Surveillance System

Each camera point outdoor/indoor is considered as a point and wiring shall be done using low loss CAT-6-A cable or Optical Cable from each point to the central monitor room as shown in the drawing in a FRLS PVC Conduit concealed inside RCC slab, ceiling, wall, underground as per site condition. Cable joints between camera point and central monitor system are not allowed. The cables shall be properly terminated at the face plate and properly numbered at control room for identification. All the civil works including chipping and finishing shall also be included in point wiring.

Wiring for Telephone System

Wiring of telephone points shall be done using telephone cables of various pairs in FRLS PVC conduit of at least 25 mm internal diameter concealed inside wall and slabs. Tapping from one socket to other is not allowed. Each single telephone line shall be connected to floor Distribution point by 2 pair cable. Each telephone outlet shall be of single RJ 11 type or with two (2) RJ11 type with face plate on 18 SWG metal boxes flushed inside a wall.

At least 150mm separation shall be provided between electricity cable FRLS PVC conduit and telephone. Each separate telephone line shall be considered as a point. Cost of telephone point wiring shall include the complete labour charge and cost of telephone cables of appropriate pair from main exchange to DP and to each telephone outlet including extra spare pair as per above specifications.

Wiring for Television Cable

Each point for TV is considered as a point and wiring shall be done using Copper conductor with Cu shield RG-6 coaxial cable, GEL Filled cable from each point to the central control system as shown in the drawing in a conduit concealed inside RCC slab, ceiling, and wall as per site condition and the cables shall be properly numbered at control room for identification. All the civil works including chipping and finishing shall also be included in point wiring.

Wiring of Computer Points

Each point for Computer Network point is considered as a point and wiring shall be done using CAT-6 cable with Copper conductor shall be taken to every RJ45 outlet

socket point from Computer networking Hubs (installed on different location). From Hubs to Hubs 50 Ohm coaxial cable shall be drawn and connected with suitable connectors. These cables shall be drawn through the HDP conduit without having mid-way joints. Where computer networking cable and electric cables are crossing each other an aluminium jacket screen is to be provided on the telephone cable for that crossing length but it shall not be less than one meter.

Wiring of Fire Alarm System

Each point for Fire Alarm system is considered as a point and wiring shall be done using 2 core 1.5 sq.mm shielded, FRLS, Copper conductor. The outer insulation shall be in RED colour. The Fire Alarm System consist of the wiring for Smoke Detector, Heat Detector, Manual Glass Break and Hotter/Sounder. Each point shall be connected to the central control system or Fire Alarm Panel and its Repeater Panel located at Guard House in a conduit concealed inside RCC slab, ceiling, and wall as per site condition and the cables shall be properly numbered at control room for identification. All the civil works including chipping and finishing shall also be included in point wiring.

Earthing

All the non-current carrying metal parts of electrical installation shall be earthed properly. All metal conduits, trunking, cable sheaths, switchgear, distribution fuse boards and all other parts made of metal shall be bonded together and connected by means of specified earthing conductors to an efficient earthing system as per IS 3034-1966.

Earthing shall be carried out as per drawing with at least 600 mm. x 600 mm. x 5 mm. Pure copper plate buried at least 3m below ground and connecting respected to Main Distribution Panel, Transformer, EPABX system, Distribution Boards, Generators and where necessary with 25 x 3 mm copper strip with test clamp/point in between. The earth resistance of the earthing electrode shall not exceed 5 ohms.

The contractor shall furnish main earth connection to all electrical equipment chassis and metallic conduit by means of appropriately sized copper wires as specified herein or shown in drawing.

Earthing system shall be at least 1 meter away from the building foundation and the main earth to the building shall be obtained by tapping this system by earth wire of appropriate size as shown in the drawing. The connection of these earth wires by twisting shall not be allowed.

All the earth terminals of 15 A power sockets shall be connected by insulated copper conductor with 2.5 sq. mm. Copper cable emanating from the respective distribution board. The earth connection to the distribution board shall be obtained from the main switch board and main switch board in turn shall be connected to the earthing system by using copper wires of sufficient sizes a shown on the drawings.

Earthing set shall consist of the following:

1 no. of 600 cm x 600 cm x 5 mm. Copper plate.



1 no. of watering GI pipe 3.5 m x 50 mm dia.

Brick masonry with metal slab for inspection and earth connection.

Charcoal and salt filling.

Electrolytic bare copper wire secured to earth plate with cable shoe, nut bolt and also connected to the earth pipe with nut and bolt.

Where Plate Earthing is not possible then Cu Coated Chemical Earth Electrode rod with earth resistance enhance compound of 50mm diameter with 3-meter length can suggested as per consultant suggestion.

318 Switches, Sockets & Plates

Switches

All 6/16 amps switches shall be enclosed type flush mounted, suitable for 240 volts AC. All switches shall be fixed inside the switch boxes on adjustable flat MS strips/plates with tapped holes and brass machine screws, leaving ample space at the back and sides for accommodating wires. Switch controlling the light/power point shall be connected to the phase wire of the circuit. All switches shall be:

- Modular Type
- Colour: White
- Marked with ISI as per IS 3854:1997

Power Socket Outlet

All wall socket outlets shall be of the three-pin type. The switch controlling the socket outlet shall be on the phase wire of the circuit. An earth wire shall be provided along with the circuit wires and shall be connected to earthing screw inside the box. The earth terminal of the socket shall be connected to the earth terminal provided inside the box. All sockets shall be:

- Modular Type
- Colour: White
- Marked with ISI as per IS 1293:2005

Rating of Outlets

For purpose of determining the size of the sub-mains and controlling switches, the ratings of outlets shall be as follows, unless otherwise specified.

- Light, Fan Points & 6 amp. Convenience outlets - 800W
- Convenience outlets 10/13/16 amp - 2500W

Mounting Heights

Mounting heights of all devices such as switches, Power Socket, Telephone, Network receptacles and wall bracket lights, etc. shall be approved before embedding of the boxes in the masonry. In general, mounting heights to bottom of devices shall be as indicated herein below, unless otherwise specified in the drawings: -

i.	Power Socket	Centred in skirting mounted horizontally 350 mm from finished floor level (FFL); 150mm above or below the working table
ii.	Switches	1250 mm from FFL
iii.	AC Power Socket	300 mm from Primary Beam Level

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Project Director

Junction Boxes

There must be junction boxes for circuits and branch circuit, junction box shall be not less than 100 mm square and not less than 30 mm deep. The junction box shall be suitable to receive 19 mm dia. (Min.) conduit or required as per condition.

Wall switch and receptacle boxes mounting

Wall switch and receptacle boxes shall be securely fastened in place; in wall or ceiling; provide with plaster rings if required. The box must be set in proper way and shall be properly jammed. After the inspection of the boxes then only the switches and other receptacles shall be installed. During the inspection if found not acceptable no extra charges shall be bearded by the client. Wall switch and receptacle box shall be not less than 75 mm square and not less than 37 mm deep. Prior to grouting of the wall boxes the proper size shall be confirmed to receive type and number of light switch / MCB/ outlet.

Finish Plates

Plates shall be plain finish to match the skirting or wall as directed. The plate shall be properly aligned in level.

319 Light Fixtures & Fan

Scope

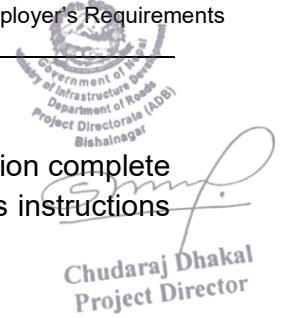
The scope of this section comprises the supply, erection, testing and commissioning of lighting fixtures for internal lighting of service areas wherever required of the specified models. Without restricting to the generality of the foregoing, this section shall include luminaries, lamps and accessories necessary and required for the installation.

Whether specifically mentioned or not, the luminaries and lamps shall be provided with all fixing devices, terminal blocks, holders etc. as required.

General Requirements

All the luminaries and lamps shall be of best quality and as per approved makes. Wherever alternative makes are specified the choice of selection shall remain with the Consultant/Engineer. The luminaries and lamps shall be fixed in a neat workman like manner, true to level and in accordance with manufacture's instruction. The luminaries and lamps shall be provided with such accessories as are required to complete the item in working conduit whether specifically mentioned in the specifications, drawing or not.

A brief technical descriptions are mentioned in Annex 1 of Light Fixtures.



Fitting of Lighting Fixtures & Fans

The light fixtures, fans and fittings shall be assembled and installed in position complete and ready for service, in accordance with details, drawings, manufacturer's instructions and to the satisfaction of the Consultant/Engineer.

Fixing of Exhaust Fan

Exhaust fans shall be fixed at location shown on drawings. They shall be wired to plug to socket outlet at a convenient location near the fan. Wires shall be connected to all fixtures through connector blocks. All the necessary works and extra materials for fixing shall be provided.

Cutting and Patching

Cutting and patching required for the proper installation and completion of works including false ceiling cutting, plastering, masonry work, concrete work and painting shall be done by the contractor himself and skilled labour shall be provided for the same.

320 Lighting Protection System

General

The Electrical Contractor shall be responsible for the supply and installation of the complete lightning protection system, which may be carried out by a specialist sub-contractor. The installation shall consist of Lightning protection device based on E.S.E. technology. The Lightning conductors shall consist of Air Terminal, Ion Generator, Accelerator & atmospheric Electrodes and Ground terminal along with down conductor and finally terminated to the earth electrode via suitable test points, all in accordance with details as indicated on the drawings.

Lightning Conductors

The Lightning conductors shall base on E.S.E. technology and consist of Air Terminal, Ion Generator, Accelerator & atmospheric Electrodes and Ground terminal. With protection level 1 at $\Delta T = 30\mu s$ with protection radius of 30m. Lightning Conductors shall be installed at mast of height 6 metre. There will be two (2) numbers of Lightning Conductors installed at the top of building. Shall be installed as per drawing.

Lightning Strike Counter

The Lightning strike counter shall count the number of strikes. It shall be of inductive record for the count. The number of events/counts shall be monitored by a mechanical counter display. The counter shall include high frequency transformer able to detect 2 to 100kA current. It shall of outdoor type of with IP 67 and testable with 9V or low voltage batteries.

Down Conductors

From the air termination's 25 x 3 mm down conductors shall be installed and fixed to the structure as indicated on the drawings. The conductors shall follow the most direct route to avoiding unnecessary bends and loops to reduce the impedance to the

lightning surge earth rod or earth network. The down conductors shall be as short and straight as possible. The down conductor strip shall be clamped to the vertical wall by means of two saddles/clamp at an interval of one metre or as required.

Joints in down conductors shall not be permitted and provision shall be made for expansion and contraction of conductors. In case of any joints made exothermic welding must be done. Special care being taken in the fixing of support to allow for movement.

Earthing Arrangement

Earth tapes of 25 x 6mm minimum size shall be connected to the down tapes at the test clamps and routed to the earth rods as indicated on the drawings. The Earth tapes shall be buried at not less than 0.5 metres below ground.

The arrangements shall conform with the earthing section of this specification.

Test Clamps

Test clamps shall be manufactured from phosphor bronze, admiralty brass or approved equivalent with two fixing holes suitably counter sunk to receive No. 8 screws. Copper bonding tapes shall be tinned prior to bolting to test clamps and connected surfaces of all tapes shall be treated with an approved petroleum jelly or grease.

Tape conductors shall be fixed to flat roof surfaces by means of suitable felt pads, fused to the bitumen felt covering or asphalt, alternative fixing arrangements may be used subject to the approval of the Design Engineer. Where tape conductors are fixed to walls or structural work they shall be fixed by means of distance type saddles or hold fasts, as detailed. They shall be not less than 19mm wide by 6 mm thick of phosphor bronze, admiralty brass or hard drawn copper for copper taped. Conductors shall be supported by saddles at the following spacing:

- Vertical runs at 0.7mm centre
- Horizontal runs on horizontal surfaces at 0.6 centres
- Horizontal runs on vertical surface at 0.6 centres.

All fixing screws shall be brass and the minimum size used shall be 31mm*8mm. Round headed shall be used generally by where necessary counter sunk screws shall be used.

Testing

All system shall be tested in accordance with the I.S. code of practice for lighting protection, as well as the I.S. code of practice for earthing. The resistance of each metallic conducting path, including all joints shall not exceed the calculated resistance of the tape itself by more than six percent.

Earthing

Maintenance free Chemical Earthing set will be used. Earthing for LA shall completely separate from others. The pit shall be facilitated with treatment pipe and hand hole with hand hole cover. Earthing system shall be at least 1 meter away from the building

foundation and as shown in the drawing. The earthing resistance for the single pit must be as per IS 3043 (1987): Code of practice for earthing.



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321 Power Cables

General

The cables shall be supplied inspected, laid tested and commissioned in accordance with drawings, specifications, relevant standard specifications and cable manufacturer's instructions. All wires and cable for feeder circuits shall be as per latest IS/BS/CMA specifications.

Material

The LV cables shall be as mentioned on BOQ of 1100 volts grade.

Inspection

All cables shall be inspected upon receipt at site and checked for any damage during transit.

Joints in Cables

The Contractor shall take care to see that all the cables received at site are apportioned to various locations in such a manner as to ensure maximum utilization and avoidance of cable Jointing. This apportioning shall be got approved by the Consultant /Engineer before the cables are cut to lengths. Where Joints are unavoidable, the location of such Joints shall be got approved. There shall not be any joint in the cables from MDB-SDB, SDB-FDB and FDB-Type DB.

Jointing Boxes for Cables

Cable Joint boxes shall be of appropriate size, suitable for PVC insulated armoured cables of particular voltage rating.

Jointing Cables

All cable joints shall be made in suitable, approved cable joint boxes. Jointing of cables in the Joint boxes and the filling in of compound shall be done in accordance with manufacturer's instructions and in an approved manner. All straight T-joints shall be done in epoxy mould boxes with epoxy resin.

All cables shall be joined colour to colour and tested for continuity and insulation resistance before jointing commences. The seals of cables must not be removed until preparations for jointing are completed. Joints shall be finished on the same day, as commenced and sufficient protection from the weather shall be arranged. Joints shall be made by means of suitable solder for conductors, the conductors being firmly butted into the connections or thimbles or ferrules and the whole soldered with proper solder and soldering flux. The conductors shall be efficiently insulated with high voltage insulating tape and by using of spreaders of approved size and pattern. The joints shall

be completely topped up with epoxy compound so as to ensure that the box is properly filled.

Cable Terminations

Cable termination shall be done in cable terminal box using cable glands and the cable ends sealed with sealing compound.

Bonding of Cables

Where a cable enters any piece of apparatus, it shall be connected to the casing by means of an approved type of armoured clamp and gland. The clamps must grip the armouring firmly to the gland or casing, so that no undue stress is passed on to the cable conductors due to vibrations. The glands shall be fixed to the lead sheath by means of either a "Plumbing Joint" or a cone of approved material, capable of being compressed into lead sheath. The gland or cone shall be capable of effecting a good electrical bond between both the armouring of the cable, and the casing.

Laying of Cables

Cables shall be laid by skilled and experienced workmen using adequate rollers to minimise stretching of the cable. The cable drums shall be placed on jacks before unwinding the cable. Great care shall be exercised in laying cables to avoid forming kinks. The relative position of the cables, laid on the cable tray shall be preserved and the cables shall not cross each other. At all changes in direction in horizontal and vertical planes, the cable shall be bent smooth with a radius of bend not less than 12 times the diameter of cable.

Distinguishing marks shall be made on the cable ends for identification. Insulation tapes or appropriate voltage and in red, yellow and blue colours shall be wrapped just below the sockets for phase identifications.

Testing of Cables

Test shall be conducted for insulation between phases and between phase and earth for each length of cable, before and after jointing. On completion of cable laying work, the following tests shall be conducted in the presence of the Consultant /Engineer:

- a. Insulation resistance test (sectional and overall)
- b. Continuity resistance test
- c. Sheathing continuity test
- d. Earth test

All tests shall be carried out in accordance with relevant Standard Code of Practice and Electricity Rules. The Contractor shall provide necessary instruments equipment and labour for conducting the above tests and shall bear all expenses in connection with such tests. All tests shall be carried out in the presence of the Consultant /Engineer.

322 Distribution Panels / Boards

Main Distribution Panels/Boards, Sub-Distribution Panels/Boards, Floor Distribution

Panels/Boards and Distribution Panels shall be suitable for operation on 3 phase/single phase, 400/230 volts, neutral grounded at transformer and short circuit level not less than that mentioned on BOQ at 400 volts side of the Transformer.

The Distribution Boards shall compile with the latest relevant Indian Standards and Electricity Rules and Regulations.

Construction Features

The Distribution Boards shall be CRCA sheet steel cabinet for indoor installation, dead front, floor mounting/wall mounting type. The Distribution Boards shall be totally enclosed; completely dust and vermin proof with Gaskets between all adjacent units and beneath. All doors shall have rubber strips and shall be lockable. Steel sheets used in the construction of Distribution Boards shall be 2mm thick and shall be folded and braced as necessary to provide a rigid support for all components. Joints of any kind in sheet metal shall be seam welded, all welding, slag shall be grounded off and welding pits wiped smooth with plumber metal.

All panels and covers shall be properly fitted and square with the frame, and holes in the panel correctly positioned. Fixing screws shall enter into holes tapped into an adequate thickness of metal or provided with wing nuts. Self-threading screws shall not be used in the construction of Distribution Boards. A base channel of 75mm x 75mm x 5mm thick shall be provided at the bottom for floor mounted boards. Minimum clearance of 200 mm shall be provided between the floor of Distribution Board and the lowest unit.

The Distribution Boards shall be of adequate size with a provision of 25% spare space to accommodate possible future switchgear. Switches shall be arranged in multi-tier. Knockout holes of appropriate size and number shall be provided in the Distribution Board in conformity with the location of cable/conduit connections. Removal sheet steel plates shall be provided at top and bottom to drill holes for cable entry at site if required. The Main Distribution Panels must be provided with the provision of capacitor bank provision.

All the panels must be processed through 7 tank process of degreasing, de-rusting, surface activation, phosphating and passivation conducted in the fabricated enclosure to ensure elongated lifetime of finished product after painting. The enclosure shall be dried and coated with powder of shade desired.

Bus Bar Connections

The bus bar and inter-connections shall be of copper and of rectangular cross section suitable for full load current for phase bus bars and neutral bus bar and shall be extendable on either side. The bus bars and interconnections shall be insulated with PVC sleeve and shall be colour coded. The bus bars shall be supported on unbreakable, non-hygroscopic insulated supports at regular intervals to withstand the force arising from in case of short circuit in the system. All bus bars shall be provided in a separate chamber. All connections between bus bars and switches shall be through

solid copper strips of proper size to carry full rated current and insulated with insulating tapes.

All Distribution Boards shall be provided with Moulded case circuit breakers of appropriate capacity with handles where necessary. All final Distribution Boards shall be provided with Miniature Circuit Breakers. Final single phase Distribution Board shall be connected to the incoming supply through double pole MCB units. All wiring for final Distribution Boards shall be concealed behind 5mm thick Bakelite sheet. All Distribution Boards shall be completely factory wired, with colour code and tagging; ready for connection. All the terminals shall be of proper current rating and sized to suit individual feeder requirements. Each circuit shall be clearly numbered from left to right to correspond with wiring diagram. All the switches and circuits shall be distinctly marked with a small description of the service installed.

Cable Compartments

Cable compartment of adequate size shall be provided in the Main Distribution Panels/Distribution Board for easy termination of all incoming and outgoing cables entering from bottom or top. Adequate supports shall be provided in cable compartment to support cables. All incoming and outgoing switch terminals shall be brought out to terminal blocks in cable compartments.

Moulded Case Circuit Breakers

Moulded case circuit breakers shall be of approved make with visible contacts, large contact separation and indication of switch position; shall have adequate breaking capacity, fit for manual operation with a suitable handle; with automatic bimetallic and electromagnetic tripping mechanism having adjustable setting ranges as required. All MCCB shall conform to IEC 60947-2 / IS 13947 the entire range of MCCB shall have $I_{cs} = 100\%$ of I_{cu} for 1 sec @ 440V AC conform to IEC-60947. All the MCCB's are of 'C' curve hereon by if not mentioned. The current rating and fault current rating mentioned must be as per BOQ.

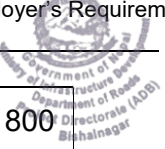
Miniature Circuit Breakers

Miniature circuit breakers shall be quick make and break type, and shall conform to relevant Indian Standards. The housing shall be heat resistant and having high impact strength. The fault current shall not be less than 10 KA at 230 volts. MCB's shall be flush mounted and shall be provided with trip free manual operating lever and "ON" and "OFF" indications. The contacts shall be provided to quench the arc immediately. MCB shall be provided with thermal and magnetic releases for over current and short circuit protection. The over load or a short circuit device shall have a common trip bar in the case of DP and TPN Miniature circuit breakers. All the MCCB's are of 'C' curve hereon by if not mentioned. The current rating and fault current rating mentioned must be as per BOQ.

The loading of MCB's shall be as:

S.N.	MCB	No. of points

1	6 A SP MCB	Max. 10 nos. of light points or max 800 W
2	10 A SP MCB	Max 3 nos. of 13A 3 pin for computer
3	16 A SP MCB	Max 3 nos. of 15 A 3 pin power points & 3 nos. of work space (for computers)
4	20 A DP MCB	1 no. of AC point.


Ministry of Infrastructure, Planning and Construction
Department of Roads
Directorate (ADB)
Bhaktapur

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Meters

All meters shall be housed in a separate compartment and accessible from front only. Lockable doors shall be provided for the metering compartment. The main Distribution Boards shall be provided with indicating panel comprising one number (0-500 V) voltmeter with 3 way "ON" and "OFF" selector switch and CT operated ammeter with 3 ways and neutral selector switch of appropriate range and scale. Wiring for meters shall be colour coded and labelled with approved plastic beads for identification.

Miniature circuit breaker shall accommodate the fork as well as pin type bus-bar circuit breaker shall have terminal capacity of 35 sq mm making it suitable for both Copper and Aluminium. The terminals shall have less temperature rise.

Current Transformer

Current transformer shall be provided for Distribution Boards where mentioned. All phases shall be provided with current transformer of accuracy class 1 and suitable VA burden for operation of associated metering.

Indicating Panel

All meters and indicating instruments shall be in accordance with relevant Indian Standards. The meters shall be flush mounted and draw out type. Indicating lamps shall be neon type and of low burden, and must be backed up with 2 amps MCB hereon by if not mentioned.

Earthing

25mm x 3mm copper tapes shall be provided for earthing of main Distribution Boards and connected to the framework of the Distribution Boards. Provision shall be made for connection from this earth bar to the main earthing bar on both sides of Distribution Board.

Painting

All sheet steel work shall undergo a process of decreasing, pickling in acid, cold rinsing, phosphating, passivizing and then sprayed with a high corrosion resistant primer, and then baked in an oven (Seven Tank Process). The powder coat shall be between 70-100 macron. The finishing treatment shall be by application of two coats of synthetic enamel paint of approved colour. Inspection of the panel before the painting and after

the dispatch will be done by Consultant/Engineer to ensure the sheet thickness and quality of wiring and material.

Labels

Cross reference ferruling shall be used for the labelling. Engraved PVC labels shall be provided on all incoming and outgoing feeder switches. Circuit diagram showing the arrangements of the circuit inside the Distribution Board shall be pasted on inside of the panel door and covered with transparent plastic sheet.

Testing

All the Distribution Boards shall be subject to tests specified in relevant standards and test certificate shall be furnished.

Wiring

In wiring, a Distribution Board, it shall be insured that total load of various Distribution Boards and/or consuming devices is divided evenly between the phases and number of ways.

323 Telephone System

Floor distribution point shall consist of sufficient nos. of Krone / Pouyet type tag block with frame inside a metal box with cover and locking arrangement. There must be sufficient space for cable termination inside the box. DP shall be flushed inside a wall mounted at a height of DB.

Telephone cables of appropriate pair from main exchange to DP and to each telephone outlet including extra spare pair as per above specifications, BOQ and drawings.

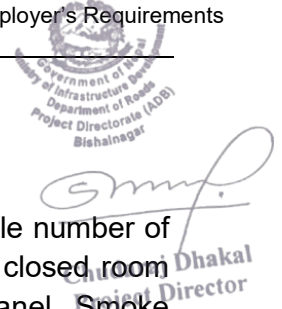
HDP pipe of various sizes in which the telephone cables will be run. There shall be at least 30% extra space inside the HDP pipe after the cable shall run for the ease of pulling cables.

It is the full responsibility of contractor to terminate all the cables in telephone socket, DP and MDF and provide complete and correct tag data to the owner.

324 EPABX System

Supplier shall supply, deliver, install and commission of required extension line EPABX system as mentioned at BOQ. Telephone wiring will be done for both EPABX extension lines and direct co lines. EPABX of extension line capacity will be installed. Every working table, guard room, maintenance room, canteen & day care as well have extension lines.

Separate earthing shall be provided for telephone system and the earth resistance shall not exceed 5 ohm for this purpose. Specification of earthing is same as in earthing for electrical distribution system.



325 Fire Alarm System

General

The total building shall be divided into zones; 2 zone for each floor. Suitable number of smoke detector and heat detectors shall be provided at the ceiling. Each closed room shall have a response indicator. All the Fire Alarm Panel, Repeater Panel, Smoke detector, Heat detector, manual call point unit, response indicator unit, hooter and all the accessories shall be of a single manufacturing brand of standard product with ISO certification.

Fire Alarm Panel

The Main Fire Alarm Control Panel shall be zone as per in BOQ and expandable. It shall be backup with the battery backup. The fire alarm control panel will be of External Touch Switch Control type. Featured with Reset, silence alarm, evacuate, disable, one-man test, sounder isolate, sounder delay facility. It shall be according with BS/EN4 standard approval.

It will be located Ground Floor of the electrical room however the location might be changed as per conditions.

Fire Alarm Repeater Panel

The Main Fire Alarm Control Panel will be linked up with Repeater Panel of same zone as per of Main Fire Alarm Control Panel. It will be at Guard House so that continuous monitoring can be done. It shall be backed up with battery backup.

Smoke Detectors

Smoke Detectors shall be of two wire connection system with base. The smoke detectors shall have the indicator lamp (flashing LED) for its operation status and of ionization type.

Heat Detectors

Heat Detectors shall be of two wire connection system with base. The heat detectors shall have the indicator lamp (flashing LED) for its operation status and of ionization type.

Manual Call Point/ Smash Glass

Manual Call point shall be surface mounted type. It shall be able to perform test & to reset the call point after fire alarm event. LED indication shall be provided for the fire alarms event. Manual Call Point shall be as per BS standard.

Sounder with Flash Light

Sounder shall be in a same zone as per others and during the fire alarm event it shall give sound as well as it shall flash up lights.

Testing and Installation

All tests shall be carried out in accordance with relevant Standard Code of Practice. The Contractor shall provide necessary instruments equipment and labour for

conducting the above tests and shall bear all expenses in connection with such tests. All tests shall be carried out in the presence of the Electrical Consultant/Engineer. The testing will be carried out for three (3) or more times for individual zones and whole system until the Engineers get satisfied. During the type of testing physical test is compulsory i.e. with heat and smoke.

The location of the smoke detector, heat detectors, Manual Call Point and Hotter might be changed as per site conditions and coverage area since its only design drawing. The final location shall be purposed before installation and shall be approved by the Consultant/Engineer.

A brief description are mentioned in Annex 2.

326 CCTV/ Surveillance System

CCTV camera shall be installed in basement, passage areas, outdoor, gates and places where security is required. CCTV shall include both indoor and outdoor type. All cameras will have POE (Power over Ethernet) power supply so that separate electrical point are not required.

The location of the CCTV might be changed as per site conditions and coverage area since its only design drawing. The final location shall be purposed before installation and shall be approved by the Consultant/Engineer.

A brief technical specification is in BOQ.

327 Distribution Transformer and HT line works

Distribution Transformer

The transformer shall be of required rating suitable for operation on 11KV/400 volts, 3 phase 50 Hz AC supply delta/star connected, copper wound for outdoor installation as per following specifications confirming to IS publications and as per the following specifications in Annex 3.

The transformer shall be laid in foundation as per location in the drawing. Nearby the transformer.

The transformer shall be delivered to site with satisfactory NEA test certificate.

Transformer Installation Works

The transformer shall be installed outdoor on foundation. The tapping point on H-type steel tubular pole structure at a location as shown in the drawing will consist of CT, PT and HT meter with necessary accessories. Installation shall be complete with DO fuse set, Lightning arrestor set, platform for mounting accessories, earthing, XPLE outdoor jointing kit etc. all complete and as per the BOQ and complete with HT and LT connection.

HT Cable

The 11 KV HT cables shall be of aluminium conductor; Cross Linked Polyethylene (XLPE) insulated type suitable for earthed system and shall be run from nearest 11 KV

feeder NEA pole up to the transformer and confirm to IS 7098 part-2, 1985 with latest revisions and amendments. The cable shall be run underground inside PVC pipe at a minimum depth of 900 mm as per trench drawing covered with sand and back-filling. End Termination of all HT cables shall be done with HT terminal Kit especially suitable for XLPE type of cables. HT cables, if provided in open accessible or road crossing space, must be run in GI pipe of suitable size.

Connection to NEA feeder

It is the obligation of the contractor to get the 11 KV line connection from NEA and ensure the transformer works satisfactorily after the connection. The contractor shall bear all the necessary cost for getting this NEA connection.

Installation of High Tension Equipment and Accessories

327.1.1 HT switchgear

The electrical power receiving and distribution system shall be designed for solidly grounded neutral on LT side. HT incoming supply line fault level shall be got confirmed with the local electricity authorities and the HT equipment to be installed must be suitable to withstand a fault current. The entire electric load shall normally run on NEA supply and in the event of power failure, load shall be transferred onto standby diesel generating set. The load change-over shall be performed automatically. The incoming NEA 11KV supply shall be taken 50 sq. mm. XLPE cable laid underground in PVC conduit to the distribution transformer mounted on H- type pole structure by the size of generator house inside the premises. Lightning Arrester (LA) rated at 9 kV (RMS) at the tapping point of HT line as well as at the HT intake point of distribution transformer, if exposed to air, shall be installed and be confirming to IS 2309-1969. The set of HV drop out (DO) fuse shall be of appropriate rating, with lift off type fuse link consisting of 1 or 2 insulators per phase; and the fuse carrier shall be made of Bakelite tube with heavily tinned non-ferrous metal parts and spring loaded phosphorous bronze.

328 Diesel Generator Set

Supplier shall supply, deliver, install and commission two numbers of different capacity Generator set. 200KVA Generator (with acoustic enclosure) will be installed for supplying full building loads only, another 62.5 KVA genset will be installed for the supply of AC System. Normally bigger capacity will run. In the night, morning, holiday and during the time with less load demand 62.5KVA will be sufficient for lift, pump, passage lights, outdoor lights etc. Provisioning of two generators will ensure supply loads at all times even if one generator fails. DG will be installed at Generator House with the Diesel tank nearby for the easy filling up the Generator Set. There must be provision of exhaust pipe for all the Generator Set from DG room to outside where required.

A brief descriptions and acceptable brands are mentioned below for various requirements in Annex 4.

Engine: Heavy duty, 4 strokes continuous power generation duties with:

Forced feed lubrication system, large capacity oil sump, gear driven lube oil pump, suction strainer fuel flow lube-oil filters, high pressure direct fuel injection system with individual injectors for each cylinder, full flow fuel oil filters with air intake system with cooling fan, close tolerance engine speed governing system, Engine starting motor, battery charger, all complete with fuel shutdown solenoid, oil pressure switch & engine temperature switch, heavy flywheel assembly and flywheel housing, radiator with air blast, fin and tube radiator assembly, rated for the specified duty and mounted at the front of the engine ail complete with all necessary pipe-work, houses and connections to form an integral pack.

Alternator: The alternator shall be of brush less type diesel generator 3 phase, 415 volt, 50 Hz, 1500 rpm with rotor assembly supported by ball or roller bearings mounted in the end shields, fan ventilated type, with protection screen and louvered openings. A built in solid-state automatic voltage regulator will maintain a close tolerance output under all conditions. Transient response shall meet the requirements of B.S. 4999, part, 40. The alternator shall be complete and supplied with adapter flattop flange for direct coupling to the diesel engine and a flexible drive coupling, filled to the alternator shaft and bolted to the engine flywheel. The base frame shall be made of electrically welded sled channel section to provide a strong under skid with lifting points for carnage.

Control & instrument panel: The control panel shall be mounted at the alternator end of the generating set and shall include Start/ Stop/ Reset controls. The panel shall be made of cold rolled steel sheet and shall include ammeter, voltmeter, frequency meter; hours counter instruments & selector switch. It shall comprise fault protection for Low oil pressure, High engine temperature. Over speed and over crank to shut down the generating set in case of abnormal operation & indicators shall illustrate the nature of the fault. A line circuit breaker shall be provided for isolation and trips for overload and short circuit protection.

Anti-vibration mounts: The generating set shall be provided with ant-vibration mounting pad to stop the transmission of vibration to the building structure.

329 Elevator System

Contractor shall supply, deliver, install and commission a four no's of elevator. The capacity of each elevator/lift will be as shown in the BOQ/ Drawing. The size of lift well will be as per the structure and architecture final drawing accordingly. Lift will be accessible from Basement to Sixth floor. Separate MCCB shall be given in the Machine Room for the incoming of the power form respective electrical room.

A brief descriptions and acceptable brands are mentioned below for various requirements in Annex 5 for Elevator System.

330 Air Conditioning System

Contractor shall supply, deliver, install and commission a VRF/VRV based Air conditioning system. VRF/VRV system modulates the flow of refrigerant depending upon the capacity requirement of the building. VRF/VRV system shall comprises of an

air-cooled outdoor unit and a series of indoor units that regulate the air temperature inside an internal space. The compressor of the VRF/VRV shall be based on inverter driven technology. Each duct able indoor unit should have included drain pump inbuilt. Above the 12 HP outdoor unit the compressor shall have double/multiple compressor each compressor should be inverter. Compressor motor should be 6 pole, 960 RPM and the compressor material should be Thexo Casting.

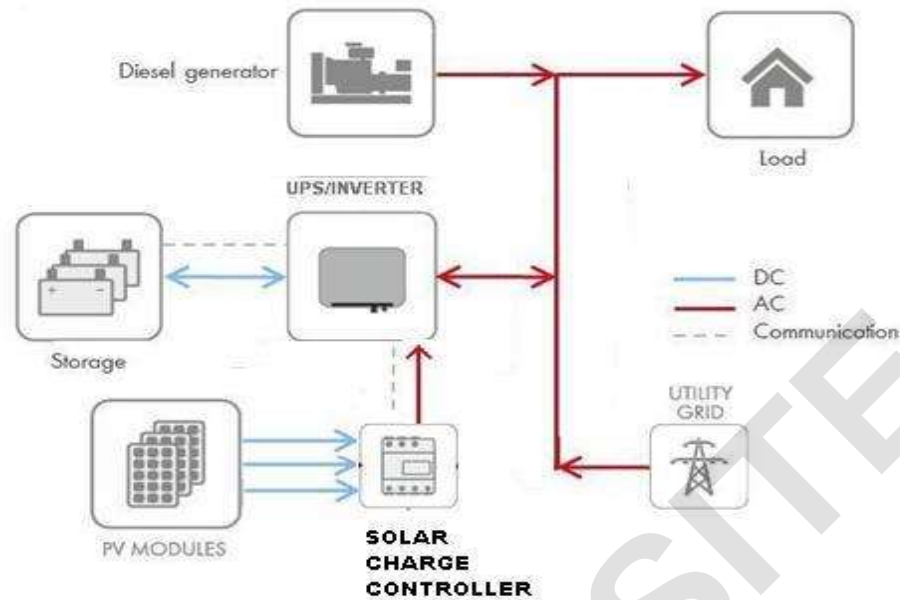
Single Split type air conditioning system shall be installed in the server room and battery room.

The VRF/VRV Outdoor unit shall be installed on top of building and placed it in the foundation. For the VRF/VRV flushing the entire system with dry nitrogen shall be done. The complete Air Conditioning System of VRF shall be vacuuming and pressure tested with testing and commissioning of entire system with required refrigerant R410A in the presence of the Employee Engineer and Design Engineer. GSS ducting work shall be properly done with necessary hangers and rods as per site condition. The Duct must be insulated with thermal insulation of Nitrile Rubber Insulation Sheet (min 13 mm thickness) with wrapping of Al. Foil at one side to make a vapour barrier. Return Air Grill shall be made of extruded aluminium powder coated with Volume Control Damper. The Fresh Air Assembly shall be Bird Screen Grill of required size.

331 Grid-tie Hybrid Solar Power System

Contractor shall supply, deliver, install and commission one (1) set of Grid-Tie Hybrid Solar PV system. It shall be based on Hybrid solar systems to utilize better-based grid-tie inverters. These devices shall combine can draw electrical power to and from battery banks, as well as synchronize with the utility grid. Solar panel with PV Inverter, regulator, battery and UPS/hybrid/dual inverter with dual charging source (AC and Solar Panel) shall be designed for all light loads and other essential loads. Battery will have charging system on cloudy days and night time from AC mains. Lighting in basement parking, passage, outdoor premises, Surveillance System, Fire Alarm System, EPABX and Critical Load will be supplied from hybrid/dual inverter.

In this system solar PV inverter converts the variable direct current (DC) output of a photovoltaic (PV) solar panel into a utility frequency alternating current (AC) that can be fed directly into electrical grid or consumed by the building. Solar power inverters have special functions adapted for use with photovoltaic arrays, including maximum power point tracking and anti-islanding protection.



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Project Director

Figure 35: Block diagram for Grid-Tie Hybrid Solar PV System

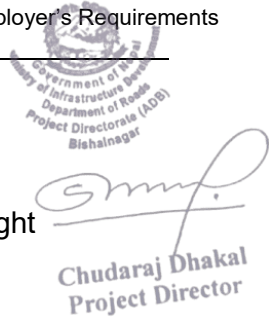
The details of the Grid-Tie Hybrid Solar PV are in Annex 6.

332 Outdoor Street Light Works

Steel Tubular Pole

Overall Length	11 meter	9.5 meter
Length of sections (m)		
Bottom	5.8	5.0
Middle	3.1	2.25
Top	3.1	2.25
Outside Dia and Thickness (mm)		
Bottom	165.1/5.4	165.1 x 4.5
Middle	139.7/4.5	139.7 x 4.5
Top	114.3/3.65	114.3x3.65
Breaking Load (Kg)	469	
Crippled Load (Kg)	333	
Approx. Weight (Kg)	200	153

Planting Depth(m)	2.5	1.8
Height above the ground	9.5 (m)	
Type of Electric-Line	11 kV HT	street light
Tensile strength	42 Kg/mm Sq.	



The pole underground shall be coated with black bituminous paints confirming IS 158 and the remaining portion of the exterior shall be painted with two coats of red oxide primer as specified in IS: 2074. Pole cap and base plate of minimum (300 x 300) mm size shall be provided for each pole.

Pole Erection

- Extreme care shall be taken to avoid the damage to poles during transportation to site.
- Poles shall be embedded in the ground to a depth equivalent to 1/6th of the overall pole length or as shown in the drawings. However, where topographical and geological conditions merit so doing, the length of the poles to be embedded may be appropriately increased or reduced.
- Poles base with base plates shall be of concrete using plain cement concrete M15 (1:2:4) mix.

Pole Fittings

- Pole cross arms shall be anchored with pole clamps and suitable nut bolts in accordance with drawings/ specifications.
- Insulators 11 kV pin/ disc/ shackle, etc., shall be selected on the basis of conditions and requirements of the installation locations.
- Lock nuts shall be used to secure all bolts employed in fittings.

Street Light Control Box

- The street light controls switch board shall be outdoor type totally enclosed metal clad dead, wall mounting and shall be weather/dust proof IP65. The design shall be fixed on a modular construction. The Control Box must have light sensitive self-actuated switch with timer. One copy of the control and power diagram of the panel shall be placed inside the box door.
- Adjoining surface of the door and covers shall be gasketed.
- The recommended MCCBs/MCBs/Contactors are for the switching and protection purpose and the quality and characteristics will be as approved by the Consultant.
- All the street lights shall be automatically switched ON or OFF by means of light sensitive switch with timer. Necessary switching shall be provided to control required lighting load. As soon as day light level goes down, the relay of switched shall get energized and switch off the connected lightning.

The entire equipment shall be suitable for connecting to 230 volts, 50 cycle A.C. supply and shall be enclosed in a weather proof enclosure.

Manhole and Hand hole

Manhole for underground cables shall be as per following specification:

Size (internal): 24" x 24"

Depth (internal): 30"

Wall thickness: 9" with handmade bricks

Internal wall: Plastering with punning

Bottom: 3" thick PCC slab (1:2:4) of size 42" x 42"

Top: 3" thick RCC slab (1:2:4) of size 42" x 42".

Hand hole for underground cables shall be as per following specification:

Size (internal): 12" x 12"

Depth (internal) : 30"

Wall thickness: 9" with handmade bricks

Internal wall: Plastering with punning

Bottom: 3" thick PCC slab (1:2:4) of size 30" x 30"

Top: 3" thick RCC slab (1:2:4) of size 30" x 30".

333 Standard and Make

All materials intended for light fixtures and fan shall be all new and as per specifications laid herein. The contractors must provide authorisation from manufacture and before installation must provide test certification and manufacture supply certificate. Where equivalent types are available, samples must be submitted to the project for formal approval before procurement is made.

A brief descriptions and acceptable brands are mentioned below for various requirements in Annex 7.

334 Factory Inspection

Successful bidder shall arrange factory visit at manufacturer's premises for following items in order to verify specification and ensure quality items before despatch of goods.

- a. Air-conditioning System
- b. Elevator
- c. Generator
- d. Cables
- e. Solar PV Inverter System
- f. Transformer
- g. Light Fixtures



- h. Distribution Box/Panels
- i. Busbar Trunking System

The purchase shall depute two technical personnel representing Consultant and Client for each item stated above. The two way air-fare and per day allowance of US \$ 100 (for outside Nepal) and Nrs. 5,000 (with in Nepal), accommodation, local transportation for each inspector shall be borne by the contractor and amount shall be included in main bid offer. The working days for factory inspection shall be at least 3 days excluding travel days.

The inspectors shall issue Factory Inspection Certificate for all items after verification of specification before despatch by third party inspection organization.

335 Sample Submission

The successful bidder shall submit sample of all items including light fixtures, switch sockets, switch gears, bus bar trunking, cables, DB, CCTV etc. before the installation for approval by the purchaser/consultant.

Drawings and samples shall be submitted by the contractor and shall not be deviated from actual samples submitted without the written instructions from the consultants. Non approval given by the consultants to any drawings or sample submitted by the contractor shall in any way exonerate the contractor from his liability to carry out the work in accordance with the terms of the contract.

336 Testing of Installation

General

At the completion of the work, the entire installation shall be subject to the following tests:

- Wiring continuity test
- Insulation resistance test
- Earth continuity test.
- Earthing resistance test

Besides the above, any other test specified by the local authority shall also be carried out. All tested and calibrated instruments for testing, labour materials and incidentals necessary to conduct the above tests shall be provided by the Contractor at his own cost.

Testing of Wiring

All wiring systems shall be tested for continuity of circuits, short circuits, and earthing after wiring is completed and before installation is energised.

Insulation Resistance Tests

The insulation resistance shall be measured between earth and the whole system of conductors, or any section thereof, with all fuses in place and all switches closed and

except in concentric wiring, all lamps in position of both poles of the installation otherwise electrically connected together, with a direct current pressure of not less than twice the working pressure provided that it does not exceed 660 volts for medium voltage circuits. Where the supply is derived from AC three phase systems, the neutral pole of which is connected to earth, either direct or through added resistance, pressure shall be deemed to be that which is maintained between the phase conductor and the neutral. The insulation resistance measured, as above shall not be less than 50 divided by the number of points provided on the circuit, the whole installation shall have an insulation resistance greater than One Mega Ohm.

The insulation resistance between the frame work of housing of power appliances and all live parts of each appliance shall not be less than that specified in the relevant standard specification or where there is no such specification, shall not be less than half a Mega Ohm.

Testing of Earth Continuity Path

The earth continuity conductor, metallic envelopes of cables shall be tested for electric continuity; and the electrical resistance of the same, including the earthing lead but excluding any added resistance or earth leakage circuit breaker, measured from the connection with the earth electrode to any point in the earth continuity conductor in the completed installation, shall not exceed one ohm.

Testing of Polarity of Non-Linked Single Pole Switch

In a two-wire installation a test shall be made to verify that all non-linked single pole switches have been connected to the same conductor throughout, and such conductor shall be labelled or marked for connection to an outer or phase conductor or to the non-earthed conductor of the supply. In the three or four wire installation, a test shall be made to verify that every non-linked single pole switch is fitted to one of the outer or phase conductor of the supply.

Acceptance of the Installation Work

The entire electrical installation shall be subject to the final acceptance of the Engineer as well as the local authorities.

337 Completion Drawings (As-built Drawing)

On completion of the job and before issuing of certificate of virtual completion, the contractor shall submit to the Consulting engineer general layout drawings, drawn at approved scale indicating panel, distribution board, Fire Fighting System, Light & Power Layouts, Network Layout diesel generating set and its accessories as installed". These drawings shall in particular give the following:

- i. General Layout of fixtures and accessories
- ii. Cable laying location with detail as size, numbers, and depth
- iii. Locations of DB's, sub DB's, junction boxes etc.
- iv. Main panel board, distribution board details
- v. Panel and other equipment locations and size etc.



- vi. Details of earth pits, connections and locations
- vii. Connection drawing of all electrical connections
- viii. Details of trench layout
- ix. Detail section drawings where required by Consultant/Engineer

338 Relevant Standards

Following specifications and code or their latest revision shall apply under all circumstances.

- i. Low voltage Molded Case Circuit Breaker - IS 2516,1977
- ii. Transformer - IS 2026,1962
- iii. Earthing - IS 3043,1966
- iv. Wiring installation - IS 732,1963
- v. PVC cable - IS 1554,1964
- vi. Distribution boards - IS 2675,1966
- vii. Bus bars and Bus chambers - IS 375,1963
- viii. Switch fuse units on cubicle switch boards - IS 4047-1968
- ix. Switch gear bus bars - IS 375-1963
- x. H.R.C. Fuse links - IS 2208-1962
- xi. Distribution fuse boards - IS 2675-1966
- xii. Tubular fluorescent lamps for general lighting service - IS 2418-1965
- xiii. Tungsten filament lamps for general service - IS 418-1963
- xiv. Industrial light fittings with metal reflectors - IS 17-1961
- xv. Water light electric light fittings - IS 3553-1966
- xvi. Switch socket outlets - IS 4615-1968
- xvii. Three pin plug and socket outlets - IS 1293-1967
- xviii. Switches for domestic and similar purpose - IS 3854-1966
- xix. Ceiling fans - IS 374-1966
- xx. 1100 volt cable - IS 692-1965
- xxi. Low tension circuit breaker - IS 2516-1965
- xxii. Steel boxes for enclosure of electrical accessories - IS 5133-1969

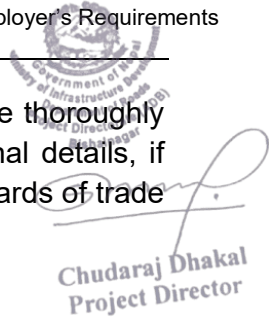
339 Standard and Make

All materials intended for this project shall be all new and as per specifications laid herein. Where equivalent types are available, samples shall be submitted to the project for formal approval before procurement is made. A brief descriptions or acceptable brands are mentioned below for various requirements on Annex 7.

340 Co- ordination with other Trades

Since the electrical works will have to be carried out simultaneously with other trades, specially building construction works, proper coordination with this trade shall be maintained throughout the duration of works, so as to avoid any disputes or

unnecessary increase in labour and materials. Hence the drawings shall be thoroughly studied and marked with necessary information laid along with dimensional details, if any, for other trades as well as for electricians. This is to ensure high standards of trade practice based in Codes of Practices.



341 Guarantee

After the completion of the work and before issuance of final certificate of virtual completion the contractor shall furnish a written guarantee by his acceptance of the contract that all work installed will be free from any defective materials and all defects and that all apparatus will develop capacities and characteristic specified and that if during a period of twelve (12) months from date of completion and acceptance work any such defects on workmanship or defective material, repair or otherwise correct the defects of deficiency without cost to the owner within a reasonable time. In the event of default on this guarantee by the contractor, the owner may have works done as required and charge the cost to the contractors.

342 Warranty

All the materials and equipment supplied and installed shall have a warranty period of at least 18 months from the date of official handover and commissioning. Within this period contractor shall repair or replace any faulty materials or equipment by new one if necessary.

Important Notice to Bidders:

1. Bidders are requested to quote prices of genuine and good quality products only. Any samples submitted if found duplicate and inferior quality will be rejected outright by concerned authority/consultant. Hence it is requested to take utmost care in filling up BOQ to avoid use of duplicate and inferior quality products.
2. Make and model no. of quoted items shall be mentioned in BOQ and a set of original catalogues of the quoted items shall be submitted along with the bid.

Designs are subject to change during contract negotiation and during implementation period due to site conditions and other reasons. In such cases amount of additional or deleted works shall be determined by as per clause 1 of this specification.



ANNEX 1 - Light Fixtures

S.N.	Light Fixtures	Approved Make	General Specification
i.	6/9W LED light	Legero, Philips, Oshram & GE	Shape: Square, IP≥20, Finish: Powder Coated, Mounting: Surface/ Recessed, lumen efficacy: >90lumen/watt, Lamp Life: 50,000 hrs., CRI≥80, Voltage Range: 160V-270V, high efficient low glare, PMMA diffuser, Fixture made of die-cast aluminum, powder coating, Current Driver with THD ≤ 15% Power Factor above 0.9, 6000K
ii.	12/15 W LED light	Legero, Philips, Oshram & GE	Shape: Square, IP≥20, Finish: Powder Coated, Mounting: Surface/ Recessed, lumen efficacy: >90lumen/watt, Lamp Life: 50,000 hrs., CRI≥80, Voltage Range: 160V-270V, high efficient low glare, PMMA diffuser, Fixture made of die-cast aluminum, powder coating, Current Driver with THD ≤ 11% Power Factor above 0.9, 6000K
iii.	18 W LED light	Legero, Philips, Oshram & GE	Shape: Square, IP≥20, Finish: Powder Coated, Mounting: Surface/ Recessed, lumen efficacy: >90lumen/watt, Lamp Life: 50,000 hrs., CRI≥80, Voltage Range: 160V-270V, high efficient low glare, PMMA diffuser, Fixture made of die-cast aluminum, powder coating, Current Driver with THD ≤ 11% Power Factor above 0.9, 6000K
iv.	24 W LED light (1ftX1ft)	Legero, Philips, Oshram & GE	Shape: Square, IP≥20, Finish: Powder Coated, Mounting: Surface/ Recessed, lumen efficacy: >1600 lumen/, Lamp Life: 50,000 hrs., CRI≥80, Voltage Range: 160V-270V, high efficient low glare, PMMA diffuser, Fixture made of die-cast aluminum, powder coating, Current

S.N.	Light Fixtures	Approved Make	General Specification
			Driver with THD $\leq$ 11% Power Factor above 0.9, 6000K
v.	36 W (2"X2") LED Panel light	Legero, Philips, Oshram & GE	Shape: Square, IP $\geq$ 20, Finish: Powder Coated, Mounting: Surface/ Recessed, lumen efficacy: >90 lumen/watt, Lamp Life: 50,000 hrs, CRI $\geq$ 80, Voltage Range: 160V-270V, White Powder Coated and enclosed with high efficient UV resistance flat low glare diffuser assembled with low trim metal frame, Constant Current Driver with THD $\leq$ 11% Power Factor above 0.9, 4000K
vi.	Mirror Light/ Decorative/ Garden/ Bulk Head light	Legero, Philips, Oshram, EGLO & GE	High Quality
viii.	Ramp Light	Legero, Syska Philips, Oshram, EGLO & GE	Shape: Square, IP $\geq$ 20, Finish: Powder Coated, Mounting: Surface/ Recessed, lumen efficacy: >80 lumen/watt, Lamp Life: 50,000 hrs, CRI $\geq$ 80, Voltage Range: 160V-270V, Fixture made of die-cast aluminum, powder coating, Current Driver with THD $\leq$ 15% Power Factor above 0.9, 3000K/4000K
ix.	160W Flood Light	Legero, Syska, Philips, Keslec, Crompton, Oshram & GE	Shape: Rectangle/Square, IP $\geq$ 65, Finish: Powder Coated, Mounting: Pole/Wall/Ground, lumen efficacy: >100 lumen/watt, Lamp Life: 50,000 hrs, CRI $\geq$ 70, Voltage Range: 160V-270V, Fixture made of die-cast aluminum, powder coating, Current Driver with THD $\leq$ 20%, Power Factor above 0.9, 3000K
x.	75W Street Light	Legero, Syska, Philips,	Shape: Rectangle/Square, IP $\geq$ 65, Finish: Powder Coated, Mounting:

S.N.	Light Fixtures	Approved Make	General Specification
		Oshram, Keslec, Compton & GE	pole/, lumen efficacy: >100 lumen/watt, Lamp Life: 50,000 hrs, CRI≥70, Voltage Range: 180V-270V, Fixture made of die-cast aluminum, powder coating, Current Driver with THD ≤ 20%, Power Factor above 0.9, 3000K
xi.	2x18W LED Tube Light	Legero, Philips, Oshram & GE	IP≥20, Finish: Powder Coated, Mounting: pole/, lumen efficacy: >100 lumen/watt, Lamp Life: 50,000 hrs, CRI≥80, Voltage Range: 180V-270V, Current Driver with THD ≤ 11%, Power Factor above 0.9 6000K



Gmuf.
Chudaraj Dhakal
Project Director

ANNEX 2 - Fire Alarm System

Cl. No.	Item	General Specification
1	Smoke Detector	2 wire connection, Ionization type with base and Flashing LED
2	Heat Detector	2 wire connection, Ionization type with base and Flashing LED
3	Manual Break Glass	Surface Mounted, Special key to perform test and reset the call point after fire alarm event, Led indication for the fire alarms event
4	Hooter/ Sounder	With Flasher inbuilt
5	Fire Alarm Panel	28 zone expendables up to 32 zone, External Touch Switch Control of Reset, Silence alarm, evacuate, disable, one-man test, sounder isolator, sounder delay facility, Battery Backup
6	Fire Alarm Repeater Panel	28 zone expendables up to 32 zone, External Touch Switch Control of Reset, Silence alarm, evacuate, disable, one-man test, sounder isolator, sounder delay facility, Battery Backup



ANNEX 3 - Transformer

Cl. No.	Technical Requirement	Required Values
1	Capacity	250 KVA
2	Voltage Ratio	11 KV/400 Volts
3	Phases	3
4	Winding Connection	Delta/Star, DYn-11
5	Rated Frequency	50 Hz
6	Service type	Outdoor
7	Full load loss	<2550 W
8	No load loss	<455 W
9	Tap Changer	'On Load Type'
10	Voltage regulation	Better than 4.5%
11	Efficiency	>97% (at full load)
12	Impedance	<4%
13	Oil volume	As per company
14	Tapping points	+/-2.5% , +/- 5%, 0
15	Cooling	ONAN
16	Duty	Continuous
17	Relevant Standard	IS-2026-1962 with latest revised and Nepal Electricity Authority
18	Approved Make	NEEK, Transweld, ABB and Simens



ANNEX 4 - Generator

Technical Specification for 200 & 62.6 KVA DG

Cl. No.	Technical Specification	Required Value
1	Generator Capacity	200 KVA/ 62.5 KVA (Continuous)
2	Output Voltage	400V, 3 Phase
3	Frequency	50 Hz at 1500 RPM
4	Speed Governor	Electronic for both
5	Power factor	0.8
6	Mounting type	Open skid with anti-vibration pad and Sound proof Canopy
7	Engine	
7.1	Fuel	Diesel
7.2	Fuel tank Capacity	Shall be sufficient enough for 10 hours of continuous operation at full load
7.3	Fuel pre-heating	Shall be provided to prevent paraffin separation in winter
7.4	Cooling type	Water cooled
7.5	Engine Exhaust	Shall be provided
7.6	Engine Safety Shutdown Controls and Alarm	Both audio and visual alarms shall be provided.
7.7	Sound level	Less than 75 dBA@ 1 m with canopy.
8	Generator	
8.1	Engine Speed Governing System shall be electronic.	Generator frequency shall be maintained within 2 Hz of normal frequency between no-load and full load condition)
8.2	Over speed Shutdown Device	Shall be provided
8.3	Voltage Regulator	Generator safety shutdown controls and Alarm control shall immediately shut off delivery of fuel to engine cylinders during under and overvoltage (380 +/- 10% V)
8.4	Over and under frequency Cut-off	Beyond 50 +/- 3 Hz.
9	Control Cubicle	
9.1	Analogue Ammeters	Digital ammeter shall be provided with selector switch to monitor load current

Cl. No.	Technical Specification	Required Value
9.2	Analogue Voltmeter	Digital voltmeter with selector switch shall be provided to monitor both city supply and generator output voltage.
9.3	D. C. Voltmeter	D. C. Voltmeter shall be provided to monitor starter battery voltage
9.4	Frequency Meter	Shall be provided to monitor both city supply and generator output.
9.5	Cumulative Running hour meter	Shall be provided
9.6	Indication lamps	Shall be provided to indicate presence of voltages of city supply and generator supply and different fault conditions.
9.7	Automatic load transfer switch	Shall be provided
9.9	Mains Bypass switch	Shall be provided to bypass generator control cubicle
9.10	Auto Mains failure	Generator shall start automatically when city supply fails and shutdown when city supply is restored.
9.11	The generator shall automatically start in either of the conditions	a. When one or more phases of mains supply fails or phase unbalance is greater than 10%.
		b. When line voltage and frequency of mains supply is beyond specified range(adjustable).
		c. When phases are out of sequence.
		d. When the city supply is beyond the range specified the city supply contactor shall trip immediately, genset get started automatically, genset supply contactor closed.
9.12	Start and stop delay	Generator start and stop delay shall be adjustable from 5 secs. to 5 minutes.
9.13	Operation switches	There shall be switches for system test, reset, manual operation, auto operation and emergency stop.
9.14	Alarms	Both audio and visual alarms shall be provided whenever there is any fault in the engine, generator and control cubicle.
9.15	Starter battery	Shall be provided

Cl. No.	Technical Specification	Required Value
9.16	Battery Charger	Shall be provided
10	Warranty	Min. 18 months from date of commissioning
11	Spare Parts	Spare parts shall be easily available locally.
12	ISO 9000 certification	Mandatory
13	Enclosure	Acoustic Enclosure with 16 SWG CRC MS sheet, shall not be of bolt type, Minimum four hinged doors shall be provided to canopy, one door will have glass window for control panel.



ANNEX 5 - Elevator

Cl. No.	Technical Specification	Required Value
1	Passenger Capacity	13 persons
2	Number of stops and opening	8 stops, 8 Opening
3	Number of Access Sides	1
4	Speed	1.6/1.75 m / sec
5	Drive	V3F Drive
6	Control System	Microprocessor based smart integrated control system with direct landing system
7	Power supply	380-400V AC/3 phase, 50Hz.
8	Total Travel Height	32m (approx.)
9	No. of floors to be served	8
10	Car enclosure and car door	S.S. Car with Hairline Finish with flooring of Hard Wearing Vinyl/ Polyvinyl Flooring
11	Rescue Device	Automatic
12	Machine	Gearless Traction machine
13	Emergency Light & Alarm	Needed with battery operated
14	Elevator Belt	Flat cable with Pulse system for monitoring of the elevator's coated steel belts to ensure their integrity, ensuring safe, efficient operation and reducing inspection downtime.

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Project Director



ANNEX 6 - Hybrid Solar Power System with PV Inverter

Cl. No	Item	Approved Make	General Specification
1	Solar PV Module	German Power, ATONE, Bluebird or equivalent	Mono-crystalline 300 WP, Class:Tier1manufacturer, Efficacy: $\geq 16\%$ Number of Cell ≥ 72 , Voc=43.68, Isc=9.36A, Certification: ISO 9001, ISO: 14001, RETS Certified with PIT, Warranty 20 years
2	Grid-Tie Hybrid Solar Inverter	Victron, ABB, Hitachi, or equivalent	10 KVA/48V, Output voltage 230 VAC+ ₋₂ %, Frequency 50Hz, Three Phase, Anti-island Effect along with essential protection system, Compatible for monitoring and control system, Warranty 5 years
3	Solar Gel Tubular Battery	Ritar, Exide, Sukam or equivalent	12V, 100AH@C10 battery, minimum 1500 cycles @ 80% DoD, Certification: ISO 9001, ISO: 14001, RETS Certified with PIT, Warranty 5 years
4	Charge Controller		70A, Nominal battery voltage 12 / 24 / 36 / 48V Auto Select, Compatible for monitoring and control system, Warranty 5 years
5	Battery Management System		Warranty 5 years

Chudaraj Dhakal
Project Director



ANNEX 7 - Standard and Approved Make

Cl.N	Item	Approved Make	General Specification
1	MCB	Schneider Acti-9, Legrand DPX3, Siemens 3VL, Hager	Icu=Ics, KA rating=10, 16, 25, Curve = "C", frequency= 50 Hz
2	MCCB	Schneider NSX, Legrand DPX3, Siemens 3VL, Hager	Icu=Ics, KA rating=16, 25, 36, 50, 70,100 Curve = "C", frequency= 50 Hz
3	RCCB	Schneider ACTI9, Legrand DPX3, Siemens 3VL, Hager	Fault Current: 30mA, 100mA
4	Switch & Outlets	Legrand (Myrius), Schneider (Clipsal X), MK and Skava	Modular Switch, Color: White, marked with ISI as per IS 3854:1997 and for sockets as per IS 1293:2005 and shall be Universal Socket
5	Light Fixtures	Leggero, Philips, Oshram & GE	
7	Cable Shoes	HEX, Erico or Equivalent	Cu for Cu cable and Al for Al cable
8	ATS	Socomec, Schneider, and Legrand	Type: ATyS, 630A, 4P, enclosure: same make as per as per change over; remotely operated transfer switching feature with bypass provision
9	Power Cables	Mahalaxmi, Prakash, Litmus, Pioneer, Suraksha and Arihant	Must be according to latest IS, must not be under gauge and insulation as per IS standard
10	Wires (2.5sqmm & 4sq mm)	Mahalaxmi, Prakash, Litmus, Pioneer, Suraksha and Arihant	Must be according to IS, must not be under gauge and as per IS standard
11	CAT-6 Cables	Legrand, AMP, Schneider and Penduit	

CI.N	Item	Approved Make	General Specification
12	Electrical Panel/ Distribution Box	AVONE, Hyonjan and Ankur Metal	Must be processed through Seven Tank Process and Powder Coating
13	Air Condition	Trane, O General, Daikin and York	Compressor motor shall be based inverter driven technology, with its motor of 6 pole, 960 rpm and compressor material of Thexo Casting. Each ductable indoor unit should have inbuilt drain pump. Above 12 HP outdoor unit the compressor shall have double/multiple compressor each compressor should be inverter.
14	Fire Alarm System	Cooper, Bosh, Honeywell, System Sensor and Simplex	
16	CCTV	Tiandy, Honeywell, Sony, Axis and Bosch	
17	TV	Sony, LG, Panasonic, Samsung or Korean equivalent	
20	EPABX System	Alkatel; Siemens, Panasonic and Mite	
23	Generator	CAT, Greaves, Kiloskar, Ashok Leyland, Cummins and Perkins	
25	Lift	Otis, KONE and Schindler	
26	Others	As per approval by Designer/Engineer	

Initial Environmental Examination




Chudaraj Dhakal
Project Director

June 2018

NEP: SASEC Highway Improvement Project

ADB Project Directorate Office Building Subproject

FOR WEBSITE

Prepared by the Department of Roads, Ministry of Physical Infrastructure and Transport,
Government of Nepal for the Asian Development Bank

CURRENCY EQUIVALENTS

(As of 20 May 2018)

Currency Unit		Nepalese Rupee (NRs)
\$1.00	=	NRs 108.75
NRs 1.00	=	\$ 0.00919

ABBREVIATIONS

ADB	-	Asian Development Bank
AP	-	Affected People
BOD	-	Biological Oxygen Demand
CBS	-	Central Bureau of Statistics
CITES	-	Convention on International Trade in Endangered Species
CO	-	Carbon Monoxide
COI	--	Corridor of Impact
CSC	-	Construction Supervision Consultant
DG	-	Diesel Generating
DoHM	-	Department of Hydrology and Meteorology
DOA	-	Department of Archaeology
DOF	-	Department of Forest
DoR	-	Department of Roads
EA	-	Executing Agency
EIA	-	Environmental Impact Assessment
EMG	-	Environmental Management Guidelines
EMP	-	Environmental Management Plan
EPR	-	Environment Protection Rules
ES	-	Environmental Specialist
FIDIC	--	Federation Internationale des Ingenieurs Conseils
GHG	-	Green House Gas
IA	-	Implementing Agency
IEE	-	Initial Environmental Examination
IUCN	-	International Union for Conservation of Nature
KUKL	-	Kathmandu Upatyaka Khanepani Limited
LPG	-	Liquefied Petroleum Gas
MoFE	-	Ministry of Forest and Environment
MoPIT	-	Ministry of Physical Infrastructure and Transport
NAAQS	-	Nepal Ambient Air Quality Standard
NEP	-	Nepal
NOx	-	Nitrogen Oxide
PD	-	Project Directorate
PIU	-	Project Implementation Unit
PPE	-	Personal Protective Equipment
REA	-	Rapid Environmental Assessment
RoW	-	Right of Way
SASEC	-	South Asia Sub-regional Economic Co-operation
SEIs	-	Significant Environmental Impacts
Sq.ft.	-	Square Feet
SSEMP	-	Site Specific Environmental Management Plan
SRN	-	Strategic Road Network
ZOI	-	Zone of Influence

WEIGHTS AND MEASURES

dBA	-	decibels A
KWH	-	Kilowatt-Hour
K VA	-	Kilo-Volt- Ampere
MLD	-	Millions of Litres Per Day
ppb	-	Parts Per Billion
pph	-	Persons Per Hectare
ppm	-	Parts Per Million

NOTES

The Nepalese calendar year (B.S) runs from mid-April to mid-April. Unless otherwise stated, year ranges written in the form 2015/016 denote a single calendar year.

The fiscal year (FY) of the Government ends on 15 July. FY before a calendar Year denotes the year in which the fiscal year ends (For example, FY 2018 begins on 16 July 2017 and ends on 15 July 2018).

Acts and Regulations are cited under the name of the ministry from which they originate. The official version of Acts and Regulations is published in the Nepal Gazette (in Nepali). Some Acts and Regulations are published by other Government agencies in English (Unofficial translations).

This initial environmental examination is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

In preparing any country program or strategy, financing any project, or by making any designation of or reference to a particular territory or geographic area in this document, the Asian Development Bank does not intend to make any judgments as to the legal or other status of any territory or area.

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Chudaraj Bhakal
Project Director

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Chudaraj Dhakal
Project Director

FOR WEBSITE

EXECUTIVE SUMMARY

1. The South Asia Subregional Economic Cooperation (SASEC) Highway Improvement Project (SHIP) proposed to be financed by the Asian Development Bank (ADB) will support the improvement of the East–West Highway (EWH), which is the main domestic and international trade corridor of Nepal and forms part of SAARC and SASEC corridor 4 linking Kathmandu to Dhaka and Chittagong through India. The project will also improve the efficiency and adequacy of the transport system by addressing the deterioration of road asset conditions, the poor safety of the transport network, and the limited cross-border connectivity. The project has two outputs: 1) Rehabilitation and upgradation of about 87 km of road between Kanchanpur and Kamala on the EWH to a 4-lane standard with a design speed of 100 km/h. Civil works contracts will include a performance-based maintenance period of 5 years after completion of construction; and 2) Implementation of activities to improve the planning and management of road safety including capacity enhancement of the Department of Roads (DOR).

2. One of the activities under output 2 is construction of a new, well equipped, environment friendly office building at Bishalnagar in Kathmandu Metropolitan City for the Project Directorate (ADB), DOR. Accordingly the Project Directorate (ADB), DOR, Bishalnagar, Kathmandu is the proponent of this Initial Environmental Examination (IEE) study.

3. The proposed building is located in Bishalnagar, Ward number 5 of Kathmandu Municipal area. Various offices of central and district line agencies of Government of Nepal as well as offices of Commercial Bank, Insurance and other private companies are located in the vicinity of the proposed PD-ADB building. The project will be implemented in an area of 21,826.28 sq. ft. of land in Bishalnagar, out of which 9,277.89 sq. ft. shall be used for office building. The land belongs to Government of Nepal. All required basic amenities like motorable road, electricity, sewerage, water supply etc are available on the site. This area has one approach from the main road in the west direction. Total built up area of the building will be 4997.19 sq. m.; 6 storey and total project cost will be NRs. 242.6 million.

4. The ADB SPS, 2009 aims to avoid, minimize or mitigate harmful environmental and social impacts and help the borrower strengthen their safeguard system. It also provides a platform for participation by affected community in project design and implementation. The office building proposed to be constructed was screened and categorized using Rapid Environmental Assessment (REA). The REA consist of questions relating to: (i) the sensitivity and vulnerability of environmental resources in the project area, and (ii) the potential for the sub-project to cause significant adverse environmental impacts. This project has been classified as Category “B”.

5. The Project site is located in generally flat area. According to the National Building Code of Nepal, the Kathmandu Valley falls under the Seismic Zone “A”. The land is occupied by Project Directorate (ADB), Department of Roads with office building, which will be dismantled for the construction of new building. This is mainly the administrative area with various government and private offices. It is well connected with city road network. Climate and geology of the area is same of Kathmandu valley. No major water bodies are located near the project site. Electricity, sewerage, drinking water supply, communication facilities are available in the project site. No major vegetation is found in the project site. Similarly, no endangered species of birds, reptiles, and amphibian were seen in the project area. No aquatic life exists within the project periphery.

6. The population of the ward no. 5 of Kathmandu Municipality as per census 2011 is 18,320 among which male and female population were 9,337 (50.97%) and 8,983 (49.03%) respectively. Number of households in the ward was 4,774 (*Source: CBS 2011*). Major ethnic groups residing

in this ward are Newar, Brahmin, Chhetri and others. Most of the people are engaged in occupations like trade and business, service and others. Some temples of local importance are also located in this ward.

7. There will be minimum impact to the existing physical environment due to the construction of building. Some minor adverse impacts are anticipated mainly during the construction stage, but can be easily managed by mitigation measures. Large numbers of workers will be required to construct the building. Thus, the project will generate employment opportunity to the local people as well. The project requires large quantities of different type of construction materials such as cement, sand, aggregate, wood, steel reinforcement, electrical fittings, sanitary fittings, enamel paints etc. The workers shall be getting experience to work in high-rise buildings and their skill shall be enhanced. The skill of the plumber, electrician as well as technical staffs shall be also enhanced due to exposure in this the project. No significant impact has been seen in the biological environment. Limited open space shall be converted into built up area.

8. During construction stage, identified and predicted adverse impacts in physical environment are landscape disturbance, decline in air quality due to dust, emissions of gases in construction activities, impact on depth of ground water table, noise pollution, management of solid waste generated by construction workers, traffic management, drinking water supply etc. During operation and maintenance stage of the project, predicted impacts on physical environment are decline in ground water table, management of solid waste, impact on health and security, management of surface drainage. Similarly, there is permanent loss of open land under biological environment.

9. The project shall adhere with National Building Code of Nepal. The project shall strictly adhere with the National Rules, Regulation and Guidelines for the protection of the environment. This IEE study has analyzed the environmental issues and predicted the environmental impacts and suggested Mitigation Measures for each of the identified impacts.

10. The purpose of IEE is to identify, predict and evaluate impacts of the project on the environment and to formulate mitigation strategies to minimize adverse impacts that are likely to occur during the project implementation and operation. In the process of IEE, the formulation and implementation of an EMP lays the framework for continued assessment of potential impacts through the application of monitoring Plan. An Environmental Management Plan has been proposed with necessary organization, manpower and budget. A sum of USD 2,000 has been allocated for implementation of the EMP.

11. Grievance Re-dress mechanism will be established to resolve grievances from public or stakeholders concerning the project. This mechanism will be made effective by establishing mandatory grievance register book at the office of PIU. The grievances in the register book will be assessed in the case of genuine grievance or acceptable suggestion. Accordingly, the response will be given by the concerned PIU in consultation with supervision consultant if the supervision consultants and contractor are unable to resolve the issue. The outcome will also be included in the quarterly report of ADB.

12. Most of the adverse impacts identified and predicted are of minimal scale, temporary, short term and reversible in nature associated with construction stage. The project will be implemented with strict adherence to the mitigation measures as prescribed in the Environmental Management Plan which will be a part of the Bidding Document.

13. The proposed office building construction works do not exceed any of the prescribed thresholds by EPA, EPR and other relevant Acts and Regulations. The IEE study has found beneficial and some adverse impacts to the existing physical, biological and socio-economic environment. Most of the adverse impacts identified in the study are of temporary natures and they will easily be mitigated through the proposed mitigation measures. With sincere implementation of mitigation measures and EMP the project will be successfully implemented.

Chudamani Chakal
Project Director

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Chudaraj Dhakal
Project Director

FOR WEBSITE

I. INTRODUCTION

A. Background/Purpose of the Project

1. The Government of Nepal (GoN) is working towards accelerating the economic development of the country while redressing regional imbalances and inequalities. GoN recognizes that access to road transport is a key determinant of economic opportunity and delivery of social service. The Asian Development Bank (ADB) has played a leading role in advancing Nepal's transport sector from the early 1970s, has instituted a comprehensive Country Partnership Strategy for Nepal that places at its core environmentally and socially responsible development of the transport sector. In this context, GoN has requested the Asian Development Bank (ADB) to finance the SASEC Highway Improvement Project (SHIP).

2. The South Asia Subregional Economic Cooperation (SASEC) Highway Improvement Project (SHIP) will support the improvement of the East–West Highway (EWH), which is the main domestic and international trade corridor of Nepal and forms part of SAARC and SASEC corridor 4 linking Kathmandu to Dhaka and Chittagong through India. The project will also improve the efficiency and adequacy of the transport system by addressing the deterioration of road asset conditions, the poor safety of the transport network, and the limited cross-border connectivity. The project has two outputs: 1) Rehabilitation and upgradation of about 87 km of road between Kanchanpur and Kamala on the EWH to a 4-lane standard with a design speed of 100 km/h. Civil works contracts will include a performance-based maintenance period of 5 years after completion of construction; and 2) Implementation of activities to improve the planning and management of road safety including capacity enhancement of the Department of Roads (DOR).

3. One of the activities under output 2 is construction of a new, well equipped, environment friendly office building at Bishalnagar in Kathmandu Metropolitan City for the Project Directorate (ADB), DOR. Accordingly the Project Directorate (ADB), DOR, Bishalnagar, Kathmandu is the proponent of this Initial Environmental Examination (IEE) study.

4. The Subproject aims to build a modern multi-storeyed office building to provide all administrative and other logistic services to make plans, improve and maintain major transportation network system of Nepal. The construction of this office building will facilitate PD-ADB to administer all sorts of activities from its headquarter by accommodating optimum numbers of components and relevant offices in one place. With this added facility it is expected that efficiency level of PD-ADB will also increase and contribute more in road transportation development of Nepal. The goal of the subproject is to provide improved, efficient, safe, and environmentally sustainable road transport facilities in all over the country.

B. Purpose of IEE Study

5. The purpose of this IEE is to: assess relevant potential impacts and risks associated with the construction and operation of the office building for PD-ADB, assess the compliance of the proposed project against applicable ADB requirements and domestic environmental laws and regulations, incorporate impact avoidance and mitigation measures early into the project design process, and incorporate cost effective mitigation and monitoring measures in the civil works contract, and require the implementing agencies to organize needed institutional mechanism for effective environmental management plan (EMP) implementation.

6. Specific environmental screening was carried out using ADB's Rapid Environmental Assessment (REA) for buildings. The completed REA checklist for the project is provided in

Appendix 1. According to the ADB Safeguard Policy Statement (SPS) 2009, this project is considered as "Category B". Therefore, an IEE is adequate to meet ADB's environment safeguard requirements.



C. Methodology

7. The IEE has been carried out for the proposed PD-ADB office building following the steps as given below:

- Review of relevant documents;
- Review environmental requirements of ADB and GON;
- Collection and analysis of baseline information on environment;
- Identification/screening of potential environmental impacts using ADB REA Checklist; and
- Conduction of consultation with relevant stakeholders
- Impact Assessment
- Recommendation of mitigation measures to address the impacts

D. Data Collection

8. Two recognized sources of data are used:

- Secondary sources; and
- Primary sources (from field surveys).

1. Secondary Sources

9. Secondary data/information have been collected on the following environmental components of the project:

- **Physio-Chemical Environment:** (Topography, climate, drainage, traffic, environmental pollutions such air, noise, ground water etc.);
- **Biological Environment:** (Trees and wildlife, environmentally sensitive and protective areas etc.);
- **Human Environment:** (Population, socio-economic condition, utilities such as water supply and sewerage, electricity and gas supply etc.)

10. The secondary data has been obtained from the following agencies/organizations:

- Department of Roads (DoR);
- Ministry of Forest and Environment (MoFE);
- Kathmandu Metropolitan City (KMC);
- Department of Hydrology and Meteorology (DoHM);
- Ward 5 Office, KMC;
- Department of Railways;

2. Primary/Field Data

11. The primary/field data/information on trees, drainage, utilities, infrastructure, cultural, communication, traffic, socioeconomic, etc. have been collected at the field to establish baseline condition of the proposed PD-ADB office building site in May 2018.

II. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

12. This chapter presents a review of the international agreements and commitments, existing institutions and legislations relevant to the project in Nepal and at the National and State levels in Nepal. The environmental assessment processes are based on environmental regulations and guidelines of Government of Nepal and ADB SPS 2009 requirements.

B. Nepal's Legal Framework and Regulatory Requirements for the Project

13. In Nepal, various legal instruments are in place to ease the integration of environmental aspects in development proposals. The study team has reviewed, but not limited to the following legislative provisions and guidelines of Nepal.

1. Plan and Policies

14. **Constitution of Nepal.** Article 25 (2) has mentioned that the state shall acquire legal private property only for public interest, and Article 25 (3) has mentioned that compensation shall be provided for such acquired property on the basis of compensation as prescribed by law. Article 30 (1) has mentioned that every citizen has the right to live in a clean and healthy environment. Under state policy, Article 51 (f) clause (2) has mentioned that state is to develop balanced, environment friendly, quality and sustainable physical infrastructures, while according priority to the regions lagging behind from development perspective, and clause (3) mentions that state is to enhance local public participation in the process of development works. Article 51 (g) explains about applying appropriate minimization or mitigation measures for negative impact on nature, environment or biodiversity.

15. **Fourteenth Plan (2073/74–2075/76 BS), 2017 AD.** The Fourteenth Plan (2016/17–2018/19) has identified EIA as a priority area, and it emphasizes on environmental monitoring of projects that are covered by the GoN EIA process. The Plan focuses on the need for setting-up national environmental standards with the strategy of internalizing environmental management into the development programmes. The Plan has also realized to carry out Strategic Environmental Assessment (SEA) with the long-term policy of promoting environmental governance. The Plan emphasized on the local participation in environment conservation, according to the Local Self Governance Act 2055, through the local bodies and making them responsible and capable to manage local natural resources.

16. The objective of Nepal's Three-Year Plan (FY2014–FY2016) is to achieve sustainable, broad-based, inclusive economic growth. It has five priority areas. The plan aims to develop energy, transport, and urban services infrastructure as a means to underpin growth and inclusion. The plan aims to expand the strategic and rural road networks and air transport capacity to increase connectivity, provide greater access to basic services and markets, and promote tourism and trade. The plan addresses climate change adaptation and mitigation and overall environmental protection.

17. The environmental strategies of the Interim Plan are to launch development programs by internalizing environmental management; mobilize non-government private sector, local agencies and the public in increasing public awareness on environment; determine and implement additional by -laws on air, water, soil and sound pollution; and make action plans that prioritize and implement Treaties and Conventions on environment, which Nepal has endorsed.

2. Acts and Rules

18. **Environment Protection Act, 1997.** The Environment Protection Act, 1997 contains several provisions to institutionalize the integration of environmental aspects in development projects including road sector, and empowers Ministry of Forest and Environment approve EIA report. Similarly, in case of IEE level study, line Ministry, which is Ministry of Physical Infrastructure and Transport is authorized to approve the Final IEE Report. The following are the highlights of the EPA, 1997;

19. The Act recognizes the interdependence between development and the environment and shows the concerns for minimizing the impacts of environmental degradation on people, animal, and plant species and their physical surroundings. The Act obliges the proponent to undertake IEE and EIA of proposal, plans or projects which may cause changes in existing environmental condition and authorizes Ministry of Environment to clear all EIA and line Ministry for IEE study,

20. The Act empowers Ministry of Forest and Environment to prohibit the use of any matter, fuel, equipment or plant, which has adverse effects on the environment. The Act has provisions for polluters to compensate affected persons from polluting activities and empowers government to provide additional incentives to any industry, occupation, technology or process, which has positive impacts on environmental conservation. It provisions to establish an Environmental Protection Fund to be used for environmental protection, pollution control and heritage conservation, and it gives the government authority to declare specific area as environmentally protected areas.

21. Nepal is the first country in South Asia to ban Import, Sale, Distribution & Uses of Asbestos. National blanket ban of Import, Sale, Distribution and Uses of all form of Asbestos (Corrugated / Non-corrugated Sheet, Tiles, Insulators etc.) and Asbestos containing products except lining of break shoe and clutch plates on 22 December 2014 through publishing a Gazette Notification by the Government of Nepal, Ministry of Population and Environment (MOPE) as per the provision of Environment Protection Act 1997 (Section 7 and Sub-section 3) with an effective dates after 181 days from the date public notification.¹ This took affects from 20th June 2015.

22. **Environment Protection Rules, 1997 (with amendments).** In the process of implementing EPA (1997) effectively the Environment Protection Rule (EPR) came into force in 1997 and was amended in 1999. The EPR contains elaborate provisions for the process to be followed during the preparation and approval of projects requiring EIAs and IEEs including scoping documents, terms of reference, public consultations and hearings, and environmental monitoring and auditing. The environmental legislation empowers the concerned Ministry to monitor the environmental activities including mitigation measures and Ministry of Forest and Environment for environmental auditing. For IEE, the concerned Ministry, which is the Ministry of Physical Infrastructure and Transport in case of the road projects, is authorized to approve the Final IEE Report. The EPR also lists the types of development activities requiring IEE or EIA level Study. It also gives an outline of content of the terms of reference document, IEE and EIA report.

23. **Forest Rule, 1995.** The Forest Rules 1995 (with amendment) further elaborate legal measures for the conservation of forests and wildlife. Based on forest legislation, thirteen plant species are included in the level protection list. Of them, GoN has banned the felling, transportation and export of Champ (*Michelia champaca*), Khayer (*Acacia catechu*) and Sal

¹ National Asbestos Profile of Nepal, October 2016
http://www.takagifund.org/admin/img/sup/rpt_file10342.pdf

(*Shorea robusta*). The Rule also stipulates that the entire expenses for cutting and transporting the forest products in a forest area to be used by the approved project shall be borne by the proponents of the project.

24. **Local Government Operation Act, 2017.** The Local Government Operation Act describes the criteria to divide a state into municipalities or rural municipalities and respective rights, duties and responsibilities in various development and conservation sectors. It clarifies the rights of municipalities/rural municipalities to form local laws, regulations and criteria for conservation of environment protected areas and species; for environmental pollution and hazard control; solid waste management etc.

25. **Child Labour Prohibition and Regulation Act 2001.** Section 3 of the act prohibits a child from engaging in work, sub clause 1 of the clause 3 states “Nobody shall engage in work a child who has not completed fourteen years of age as a labour and sub clause 2 states “Nobody shall engage a child in a risk full occupation or work set forth in the Schedule”. The section 4 states “Child not to be engaged in work against his will by temptation or fear or pressure or by any other means”. Child labor will be strictly prohibited in the project work under SRCP.

26. **Solid Waste Management and Resource Mobilization Act, 2011.** This Act was exclusively formulated for the management of solid waste. The section 4.1 to 4.9 of Act and rule 2.1 to 2.10 is concerned with the management and control of the solid waste. The act instituted the Solid Waste Management and Resource Mobilization Center (SWMRMC) with the authority and responsibility to manage all aspects of solid waste including categorization of hazardous waste and collection, treatment, and disposal of solid wastes in the Kathmandu valley and other municipalities as well. This pioneering act was a positive step towards fulfilling the need of legal basis and regulation for solid waste management. The Local Self Governance Act (1999) also empowers the local bodies to manage their solid wastes independently.

27. **Water Resources Act, 1992.** Water Resources Act (1992) makes provision for the rational use of surface and underground water. The act seeks to prevent environment and hazardous effects from the use of water and prohibit water pollution by chemicals, industries waste. Water may only be used in manner that does not permit soil erosion, landslide or flood. Pollution of drinking water is prohibited under the Nepal drinking water corporation act (1989).

28. **Motor Vehicle and Transportation Management Act, 1993.** This act sets standard for vehicles emission and mechanical condition for vehicle registration by the Transport Management Office (TMO) and the TMO can deny a permit based on environmental factor. Standards are set for petrol and diesel engines under the Nepal vehicle mass emission standard 1999.

29. **Town Development Act, 1988 (2045).** Section 5 (Kha) authorizes Town Development Committees to keep clean and aesthetic beauty of town.

30. **Water Supply Management Board Act, 2005.** As per Sub-section 8 (ga) of section 7 Kathmandu Valley Water Supply Management Board is an authority to issue license for the use of underground water or to regulate, control and prohibit the use of underground water.

3. Norms and standards

31. **Planning Norms and Standards, 2013.** Formulation of Planning Norms and Standard has become necessary to manage an urban environment, improve an economic efficiency and the quality of life of urban area. It is for this reason that the Department has undertaken this

initiative. For the sake of this Planning Norms and Standards, the term "Norms" has been defined as the socially or institutionally set values which does shape and govern the behavior pattern including physical and social relations in a given space, while the term "Standards" has been defined as level and quality of infrastructure services that would be required to make the built environment functional and desirable. The main objective of this planning norms and standards are:

- To facilitate urban designers, planners and policy makers to identify and forecast essential infrastructure need of an urban area as well as help prepare urban plans and programs.
- To enrich understanding of urban form and land use and ensure balance between them.
- To guide the development and management of physical, social and economic infrastructure services in a planned manner.

32. **Kathmandu Valley Building Standards, 2007.** The Building Bylaws authorizes the local government for the conservation of natural resources, management & monitoring of the construction activities inside Kathmandu Valley.

33. **National Building Code, 2005.** The national Building Code of Nepal was endorsed after cabinet decision which deals primarily with matters relating to the strength of buildings, site considerations safety during construction and fire hazards, construction materials etc. The code believes in sincere code of ethics of the personnel involved in designing to implementation phase of construction activities so as to achieve a meaningful improvement in construction in Nepal.

34. **National Urban Development Strategy, 2015.** The objective of National Urban Development Strategy (NUDS) is to develop medium and long term strategic vision of a desirable national/regional urban system based on existing trends and regional resource potentialities. It assesses existing conditions of infrastructure, environment, economy and governance, establishes benchmarks and desirable standards and identifies prioritized strategic initiatives for investment in infrastructure and environment to realize the comparative advantages of urban areas. It also reviews the institutional framework to facilitate implementation and monitoring of National Urban Policy (2007) and proposed urban development strategies. The implementation of NUDS is also expected to complement Nepal's effort to graduate from Least Developed Country (LDC) to Developing Country (DC).

C. Initial Environmental Examination

35. Government of Nepal statutory requirements for environmental assessment, whether it is EIA or IEE, for any type of development activities is detailed in the EPA-1997, EPR-1997 with amendments. Under the act, it is also made mandatory to suggest and recommend suitable mitigation measures for the control and management of the environmental impacts ensuring minimum deterioration due to project implementation. Implementation of the environmental management plan (EMP) and environmental monitoring program is also considered important under the act.

36. Environment assessment requirements are clearly defined and explained including the scope of IEE study for the projects in the National Legislation of Government of Nepal, EPA-1997 and EPR-1997 Clause E (with amendment) which states:

- Construction of residential, commercial and their combination building having Built-up area or Floor area greater than 5000square meter and up to 10000 square meters requires IEE
- Construction of Cinema Hall, Theatre, Community Hall, Stadium, Concert Hall, Sport Complex with capacity of entrance and exit ranging from 1000-2000 people at once.
- Development ranging area from 1 ha to 4 ha.
- Implementation of land development project ranging area from 10 ha to 100 ha.
- Construction of hard surface pavement area greater than 10 ha (i.e. Dry Port, Bus Park, Parking Lot etc).
- Site development work by cutting or filling more than 20,000 cubic meter of soil.
- Construction of building ranging from 10 storeys or 20-meter-high to 16 storey or 50 m high building.

Table 1: Threshold value for the project requiring IEE based on National Legislation of GoN (EPA-1996, EPR-1997)

Threshold Particulars for IEE	Threshold Value	Value for proposed building	Range
Total built up area	5000 to 10000 sq. m.	4997.19 sq. m. (includes total of all floor area)	Below
Number of storey and height of Building	10 to 16 storeys	6	Below

37. The proposed building falls below the threshold mentioned in the Schedule 1 clause E 1 and 7, hence the proposal does not require IEE as per GoN regulations.

D. Asian Development Bank Policies

1. ADB Safeguard Policy Statement (2009)

38. The safeguard areas of the ADB include safeguard areas that seek to avoid, minimize, or mitigate negative environmental and social impacts, including protecting the rights of those likely to be affected or marginalized by the development process (ADB, 2009).

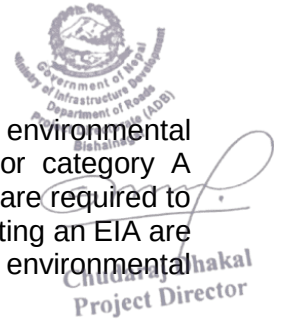
2. Three Key Safeguard Areas

39. ADB's safeguard policy framework consists of three operational policies on: (i) the Environment, (ii) Indigenous Peoples and (iii) Involuntary Resettlement. All three safeguard policies involve a structured process of impact assessment, planning, and mitigation to address the adverse effects of projects throughout the project cycle. The safeguard policies require that impacts are identified and assessed early in the project cycle; plans to avoid, minimize, mitigate, or compensate for the potential adverse impacts are developed and implemented; and affected people are informed and consulted during project preparation and implementation.

3. Project Category

- **Category A Projects:** Projects with potential for significant adverse environmental impacts. An environmental impact assessment and a summary EIA (SEIA) are required to address significant impacts.

- **Category B Projects:** Projects judged to have some adverse environmental impacts, but of lesser degree and/or significance than those for category A projects. An initial environmental examination and a summary IEE are required to determine whether or not significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.



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III. DESCRIPTION OF THE SUBPROJECT

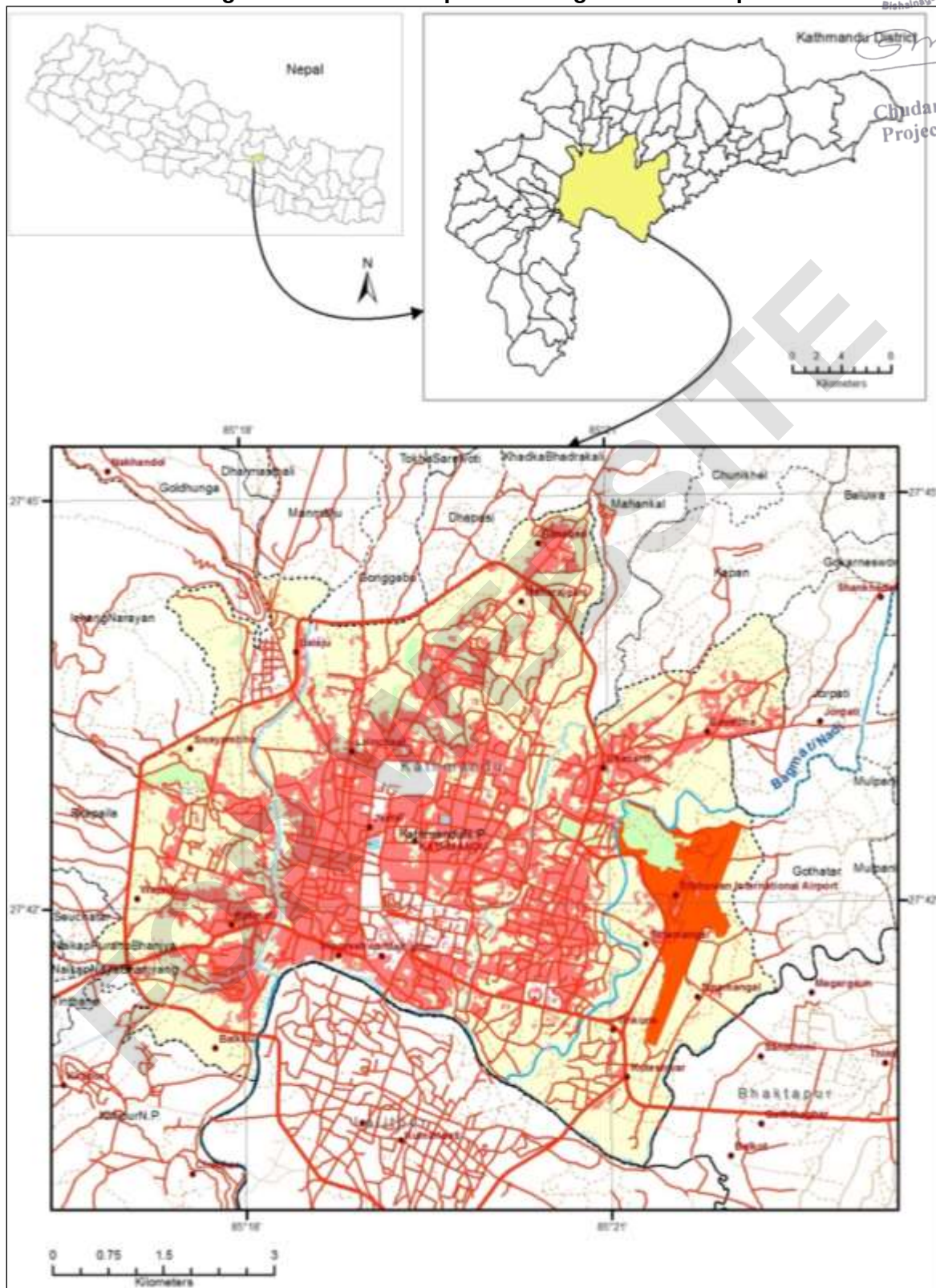
A. Project Description

40. The proposed Office building of ADB Project Directorate under Department of Roads will be located in Kathmandu Metropolitan City-5, Bishalnagar as shown in figure 1 and 2. The proposed location is connected via Bishalnagar Marga. The proposed location could be reached from 200 m from southeast from the Bhatbhateni and attached with the existing Department of Railways. The project will be implemented in an area of 21,826.28 sq ft. of land in Bishalnagar, out of which about 9,227.89 Sq. ft. shall be used for office building. The land belongs to Department of Roads, Government of Nepal. All required basic amenities like motorable road, electricity, sewerage, water supply etc are available at the site. It is an ideal location for the office building due to proximity of Singhdurbar and other important government offices.


Chudamani Bhakal
Project Director

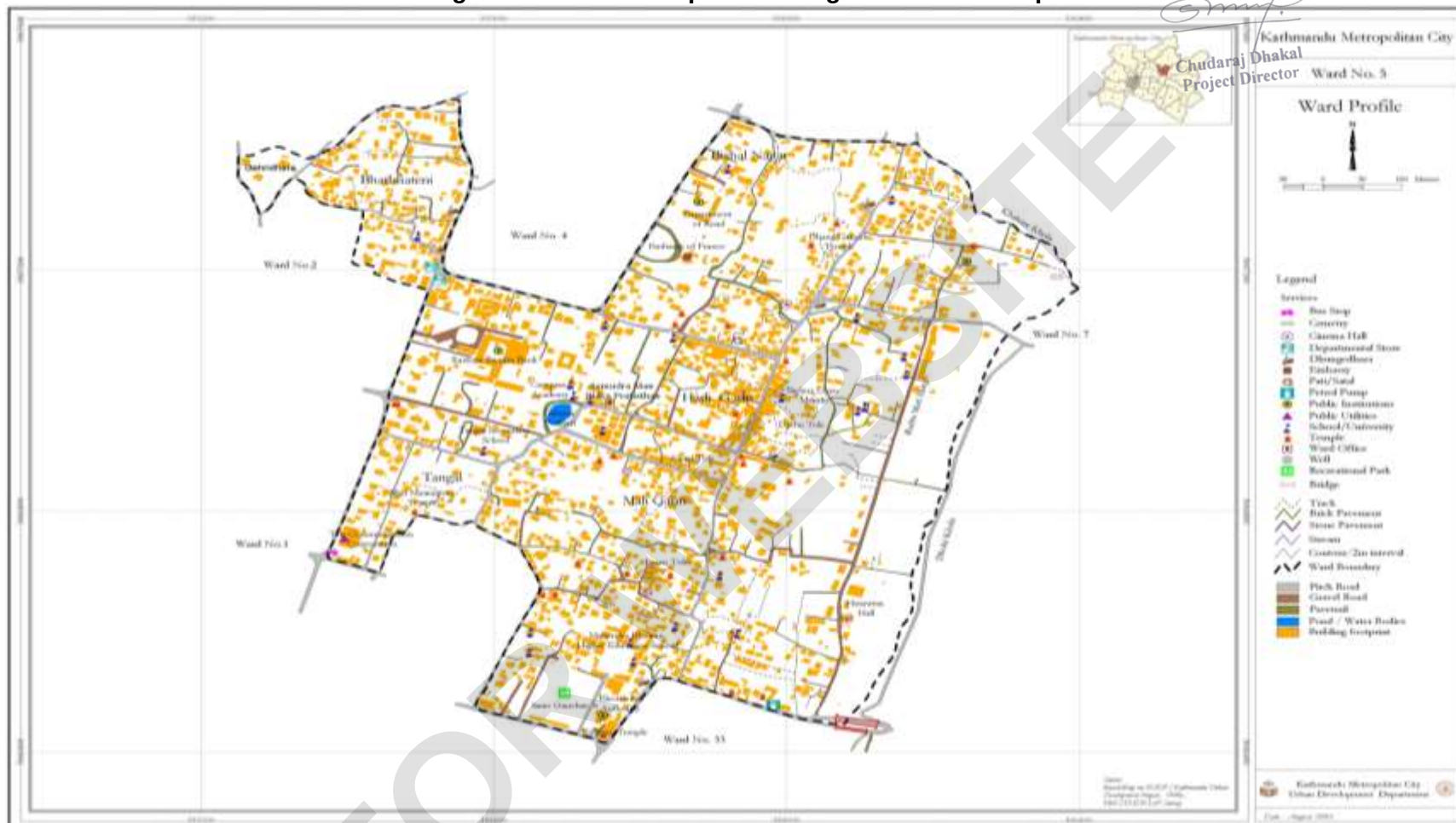
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Figure 1: Location Map of Building Site KMC Map



Chidaraj Dhakal
Project Director

Chudaraj Dhakal
Project Director



Chudraj Dhakal
Project Director

B. Salient features of the proposal

41. Salient features of the proposal are given below:

Table 2: Salient Features of the project

Item	Description	
Project Name	Construction of Office Building for Project Directorate-ADB, Department of Roads	
Location	Bishalnagar-5, Kathmandu Metropolitan City	
Plot Area	21826.28 sq. ft.	
	Permissible	Actual
Ground Coverage (sq. ft.)	10,913.14	9,277.89
Permissible Built Up Area (sq. ft.)	32,739.42	
Type of Building	RCC Frame Structure	
FAR	2.5	
Parking	50	
Basement Area (Parking)	Yes	
Total Built Up Area (sq. ft.)	53,769.78 (4997.93 sq.m)	
Total number of storey/Height	6/24.77 m	
Proposed green area (sq. ft.)	3467.42	
Proposed road + parking area		
Total Ground coverage area (sq. ft.)	9,277.89	
Total number of bike parking	22	
Total number of bicycle parking		
Number of block	1	
Type of construction	Mat foundation and RCC structure	
Construction material	Cement, Reinforcement bars, pre-fab, Aluminium, glass etc	
No. of Lifts	1	
Access Road	Main access 14m wide (existing 10.81m)	
Water tank capacity	-	
Set Back	3m min. in the front, 3m min. on east, west and south	
Other	24-hour electrical backup system, 24-hour security service, solar panels etc.	
Cost	NRs. 242.6 million	

Source: Preliminary Engineer's Estimate, 2018

C. Components of PD-ADB Office Building

42. The tentative components of the proposed PD-ADB office building are as follows:

- PD and other engineers' rooms;
- Consultants' rooms
- Admin and other staff offices;
- Design unit;
- Technical service unit;
- Project offices;
- Conference room;
- IT section;

43. In addition, the following facilities will be provided in the PD-ADB office building area:

- Cafeteria;


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- Parking area for 50 vehicles (may be in basement or open area);
- Internal paved roads;
- Piped water supply facilities;
- Sewerage connecting toilets and waste water;
- Power supply facilities including solar energy;
- Air condition, lift, generator, fire detection and fighting system;
- Internet facilities;
- Equipment (computers, photocopy machines etc.) and furniture
- Gas supply facilities;
- Telecommunication facilities;
- Storm water drainage facilities;
- Solid waste management;
- RCC or brick concrete boundary fence;
- Landscape/tree plantation;
- H&S measures;
- Security facilities; etc.

D. Planning and Design of PD-ADB office building

44. Currently, the building only has a conceptual design. The detail design and drawings are yet to be prepared. Next steps to finalize the building design and construction will include:

- Architectural planning;
- Structural design,
- Civil works including plumbing, sanitation, electrical works, water and gas supply;
- Installation of air condition, lift, generator, fire detection and fighting system;
- Networking the communication system (telephone, computer, internet etc.);
- Interior design including furniture and furnishing works;
- Landscaping/Tree replantation, etc.

45. The design of the building will be based on IS1893-2002 and IS456:2000. Type of Structure will be RCC Moment Resisting Frame. The following codes and standards will be followed:

- IS875 part 1, Code for design loads in building and structure
- IS 875 part 2, Code for design Imposed loads in building and
- IS1893-2002, Code of practice for design of Seismic Resistant Concrete structures.
- Design of Reinforced Concrete Structure – IS456:2000
- Ductility design for earthquake resistant structure IS13920

46. The building will include the following utility services:

- Water supply system
- Sanitation /Sewage System
- Electrical system
- Fire Detection and Alarm System
- Fire Fighting system
- Rain water harvesting system

- Solar panels for solar energy for electricity.

E. Materials Used

47. Raw materials used for building construction will have brick, cement, tiles, paints, varnish, and mild steel rods, deformed steel bar and wire for concrete reinforcement, galvanized steel and PVC pipes for water supply.

F. Waste generation due to proposal implementation

48. Huge amount of waste is not expected to be generated as it is a government office. However, provisions for management waste generated from office will be provided. Different types of diseases if allowed to decay at the open space for a long time. The building shall coordinate with Kathmandu Metropolitan City (KMC) for the disposal of waste effluents from the building. The effective measures shall be taken for the disposal of waste from the building keeping in mind the environment impact.

49. **Wastewater discharge.** Soil and waste water will be lead through different pipes to the manholes at ground and further lead through a simple PVC pipe. Sewage waste will be connected to municipal sewerage system. Adequate surface drainage shall be provided for storm water collection.

G. Manpower Requirement.

50. Project construction period will be approximately 24 months followed by 1-year defect liability period. During the construction period, about 350 people will be employed. All of them will be employed on contract basis until the completion of proposal. Whilst, security guards, electrician and gardener will be entitled as temporary or permanent employee based on mutual agreement with the proponent, the expected number of such employee will vary from 3 – 5 persons.

H. Proposal implementation requirement

1. Total investment

51. As per preliminary estimate, the expected total investment for the proposal is NRs. 242.6 million.

2. Machinery equipment

52. Types of machines and equipment required for proposal construction are Concrete pump, Excavator, loader, Mixer machine, Vibrator, Hoisting machine, Concrete testing machine, compressor, Jeep and trucks respectively.

3. Others

53. Since the nature of product is service oriented, it requires transformer, generator, fire extinguisher, lifts, and smoke control devices as the major equipment to be installed for service delivery to the families of unit holders.

I. Study Area and Study Area Delineation

54. The study area covers areas of Ward-5 of KMC. For the consideration of the study, the areas which are within 100 m from the boundaries of the building site have been defined as the Zone of Influence (Zol). Among this, the areas which are within 50m distance from the project site are considered as Direct Zol whereas the areas beyond the Direct Zol and up to 100m distance are considered as Indirect Zol.

Figure 3: Proposed Master Plan of Building



IV. DESCRIPTION OF THE ENVIRONMENT

A. Physical Resources

1. Topography and Land Use

55. The present proposal is construction and operation of the Project Directorate-ADB office building at Kathmandu Metropolitan City ward No: 5, Kathmandu District. The elevation of the project site lies at 1310 masl. There are no unique, fragile or difficult topography, elevations and slope characteristic in the proposed project area.

56. Existing land used around the proposal site is completely built up area. As it lies within the urban area, other form of land use such as farmland, forest or protected areas are not identified. Thus, the overall scenario of land use within the direct impact area is described as below.

Direction	Current Land Use
East	Residential Buildings
West	Road
North	Vacant plot and Road
South	Department of Railways

2. Climate

57. A temperate climate prevails in Kathmandu valley. There are three dominant seasons in the valley; winter, spring, summer and autumn; with three months each season and December is the harbinger of winter. The range of temperature is below 0°C in winter and reaches more than 30°C in summer. The Kathmandu Valley experiences four distinct seasons: pre-monsoon, monsoon, post-monsoon and winter. The rainy season is from June to September when 80% of the rainfall occurs. The annual rainfall of the valley is around 1900 mm.

3. Geology

58. The Kathmandu valley is a large intermontane basin carried above the Himalayan major detachment and it is the largest basin situated in the Lesser Himalaya of Nepal. It occupies the central portion of the nearly elliptical KCN towards the northern margin. It is limited southward by the Mahabharat Range, which forms the hanging wall of the Mahabharat Thrust (MT), and northward by the Shivapuri range, which belongs to transported sheet of the Higher Himalayan crystalline towards south along the MCT. This basin lies on the basement of crystalline rocks and Precambrian to Paleozoic meta sedimentary formations. It covers a part of the Mahabharat Synclinorium. It extends for about 30 km in the east-west direction and about 25 km in the north-south direction and has an almost circular shape. A lake is known to have filled most of the basin from Pliocene to Pleistocene age. The basin is filled with a very thick (more than 650m) sequence of fluvio-lacustrine sediments (Moribayashi and Maruo, 1980) that covers about 400 km² area. The drilling data shows that the thickness of sediment at Hyumat Tole at Kalimati, Bhrikutimandap, Bansbari, Gausala and Katunje are 504m, 550m, 79m, 113m, and 160m respectively. In this centripetal drainage basin, sediments were derived from the crystalline (schist, gneiss, pegmatite) and meta sedimentary (phyllite, siltstone, shale, meta sandstone and limestone) rocks. The semi consolidated sediments filling the basin mainly consist of muds, silts, sandy loam, fine to coarse sands, and gravel to cobble conglomerates.

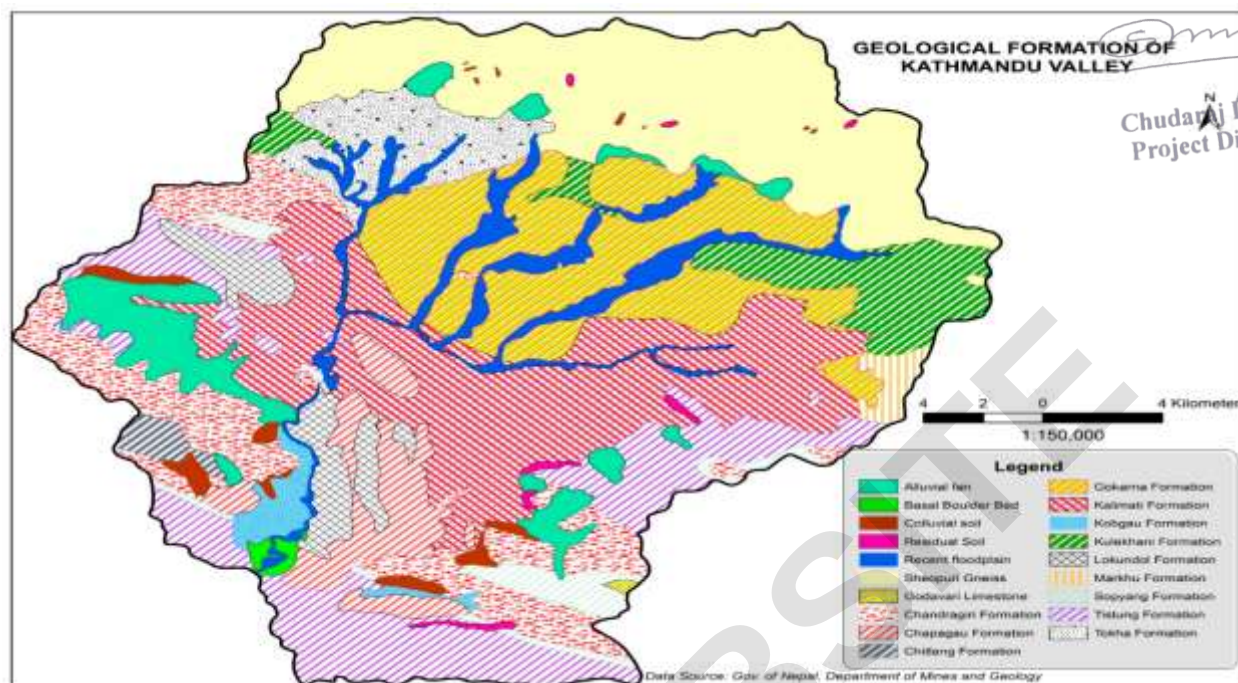
59. Many faults (main trend WNW-ESE) have been mapped that crosscut the meta

sedimentary basement. Previous studies have revealed the presence of geomorphic and structural features indicative of active faults including young fault scarps and displaced lacustrine sediments. In the south west part of the basin, NW/SE trending faults (Chobhar Fault, CF, and Chandragiri Fault, CGF) have been traced for about a length of 3-4 km and have contributed to the formation of the Kathmandu basin and the upliftment of the Mahabharat Range since Late Quaternary time.

60. Moribayashi and Mauro (1980) conducted gravity survey in Nov.1976 with 112 gravity stations to understand the basement topography of the Kathmandu Basin and concluded that the maximum depth of the basement below the sediments is a little more than 650 m. Judging on the basis of the borehole data of different agencies and the rock outcrops within the valley the basement contour map prepared by Moribayashi and Mauro (1980) fairly reflects the objective reality. The basement rock depth in the investigated area is around 400-450m from the ground. Geologically, Kathmandu valley is a synclinal tectonic basin consisting of fluvio-lacustrine deposit of Pleistocene age resting on the Precambrian metamorphic bedrock. In the North side of the valley, there is a thick formation of fluvial overburden whereas the South part of the valley comprises dominantly of lacustrine deposit formed by the mechanical and chemical weathering of rocks of surrounding hills of the valley. The products of the weathering were transported by various agencies and the weathering products finally were deposited on the bed of the lake. In general, the clay layer is capped by occasional sand and silt sedimentary layers. The clay deposit is occasionally organic in nature and is compressible. Organic content in the clay/silt layer increases with depth.

61. The project site lies at the interface of Kalimati Formation and Gokarna formation consisting of slightly consolidated sediments. It also consists of light to brownish grey, fine laminated and poorly graded silty sand with intercalation of clay of variable thickness. The thickness of the formation is as thick as 300 m at places.

Figure 4: Geological formation map of Kathmandu valley



4. Hydrology

62. The annual basin rainfall in the project area averages about 1900 mm of which 80% rain falls between June and September during the monsoon. Bagmati River and its tributaries, originating in the Mahabharat hills undergoes considerable seasonal fluctuation. This affects water availability during the winter months. There are almost 20 small rivers and rivulets in Kathmandu Valley. The project area lies in Bagmati river watershed, one of the major rivers in the Kathmandu valley. The latest available data of temperature, rainfall and humidity at the nearest meteorological station (Panipokhari) are given in the table below:

Table 3: Temperature, Rainfall and Humidity Data at Panipokhari Station, Kathmandu (2014)

Month	T _{max}	T _{min}	Rainfall (mm)	Relative Humidity (%)
January	19.3	3.8	0.0	84.3
February	23.7	8.0	0.0	85.7
March	25.7	9.0	22.5	84.2
April	28.1	10.8	129.8	85.6
May	28.2	16.6	165.7	87.9
June	29.7	19.9	190.6	88.2
July	29.1	20.7	394.8	87.8
August	28.8	20.5	441.1	88.2
September	27.9	19.2	275.2	88.2
October	27.3	15.3	20.4	87.4
November	22.3	10.0	0.0	87.9
December	20.9	8.0	23.1	84.2
Grand Average	25.91	13.48	138.6	86.63

5. Seismicity of the Project Area

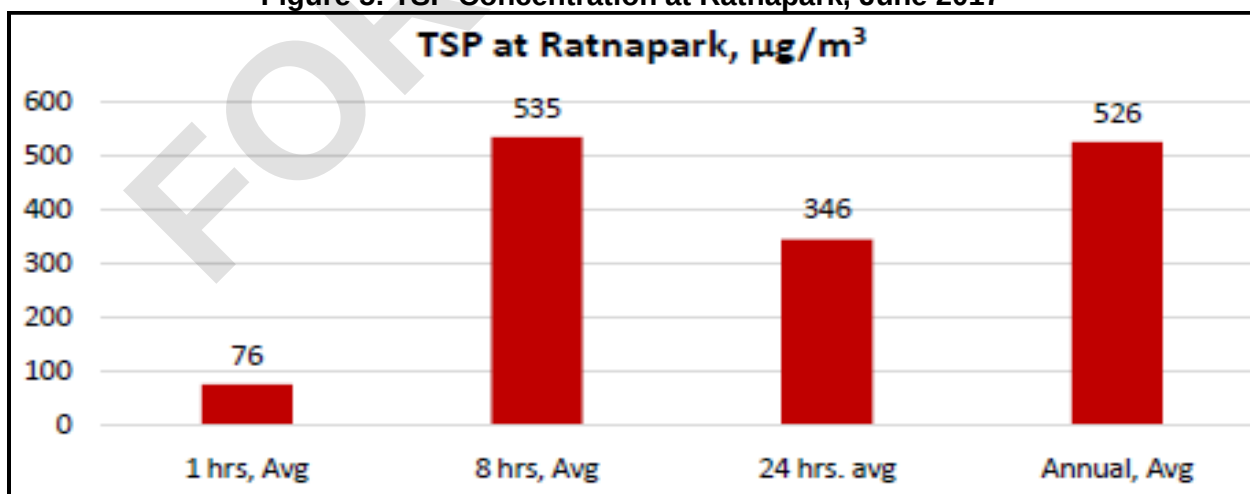
63. Nepal is a seismically active country lying between collisions of the Indian and Eurasian plates and moving continuously resulting in frequent and often devastating earthquakes within the region. Nepal has experienced catastrophic earthquake damages in 1934, 1988 and recently in 2015. Recently tremor of earthquake having epicentre at Barpak of Gorkha and Sindhupalchok in 2015 and its aftershock has caused loss of several thousands of peoples and damaged tremendous value of infrastructures. According to the National Building Code of Nepal, the Kathmandu Valley falls under the Seismic Zone "A".

6. Air, Noise and Water Quality

64. The major sources of air pollution in the site are vehicular emissions, dust particles from unpaved footpaths. According to the then Ministry of Science, Technology and Environment (MoSTE), vehicular emissions have become the main source of air pollution in the Kathmandu Valley.

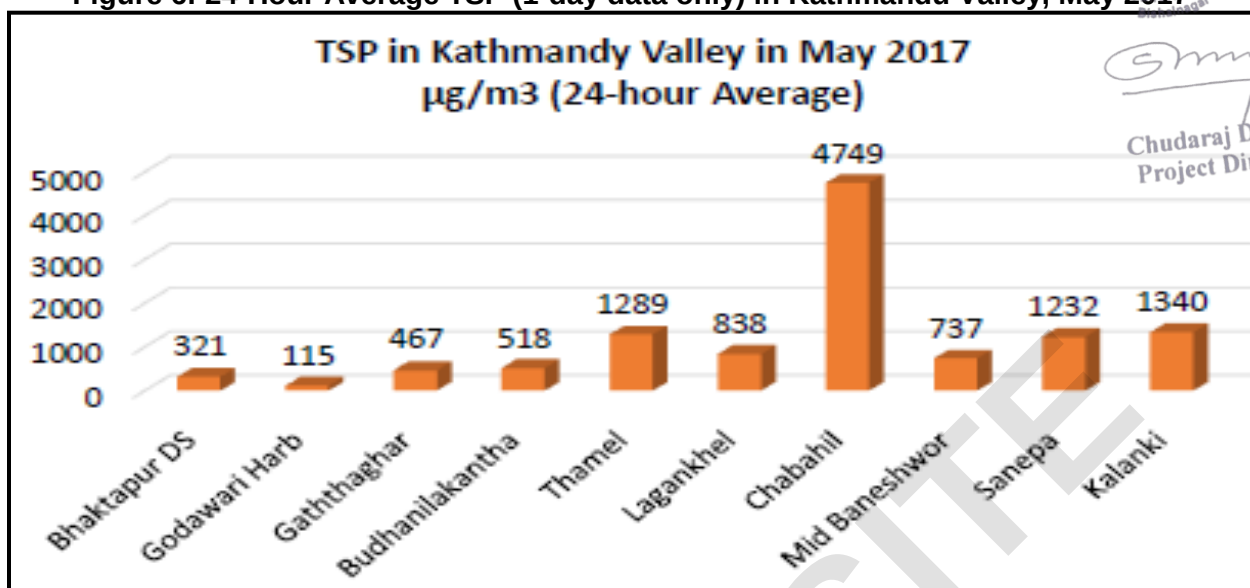
65. **Total Suspended Particulates (TSP):** The results obtained from the monitoring station established by Ministry of Population and Environment (Now Ministry of Forest and Environment) are being disseminated through the webpage of MOPE (www.pollution.gov.np), and the results obtained on June 9, 2017 for Kathmandu valley is presented in Figure 6 and 7 which shows the one-hour average, 8-hour average, 24-hour average, and the annual average. Ratnapark, the sampling station in Kathmandu is located 2.5 km away south-west of the project building. In figure 7 Chabahil which is about 1.2km away towards the east is located closest to the project site. The GON limit for 24-hour average TSP concentration is $230 \mu\text{g}/\text{m}^3$ and for World Health Organization (WHO) it is $120 - 230 \mu\text{g}/\text{m}^3$. WB-EHS standards requirements does not included TSP. Therefore, the data in figure 6 shows that the 24-hour average TSP level on June 9, 2017 in Ratnapark exceeded the standards of both GON and WHO. Data in figure 7 shows that the TSP levels for one day in May exceeded both GON and WHO standards in all locations except for one area – Godawari Harb.

Figure 5: TSP Concentration at Ratnapark, June 2017



(Source: www.pollution.gov.np)

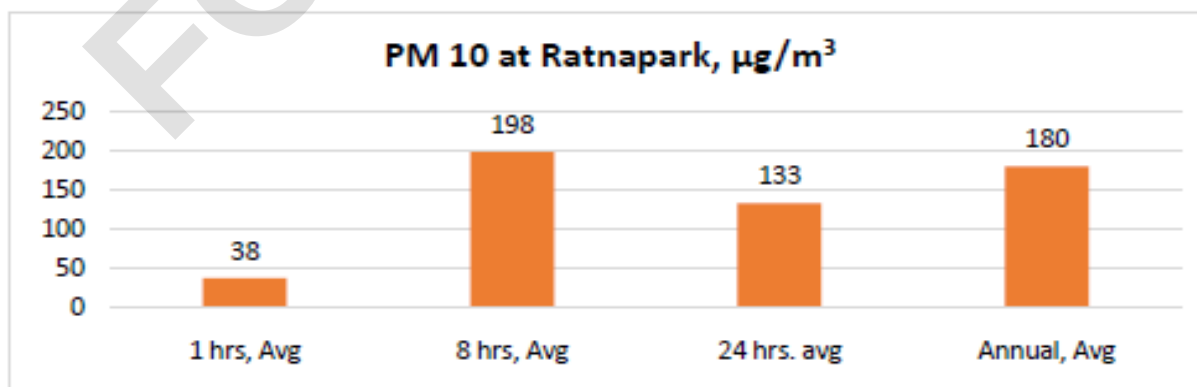
Figure 6: 24-Hour Average TSP (1-day data only) in Kathmandu Valley, May 2017



(Source: QUEST Nepal)

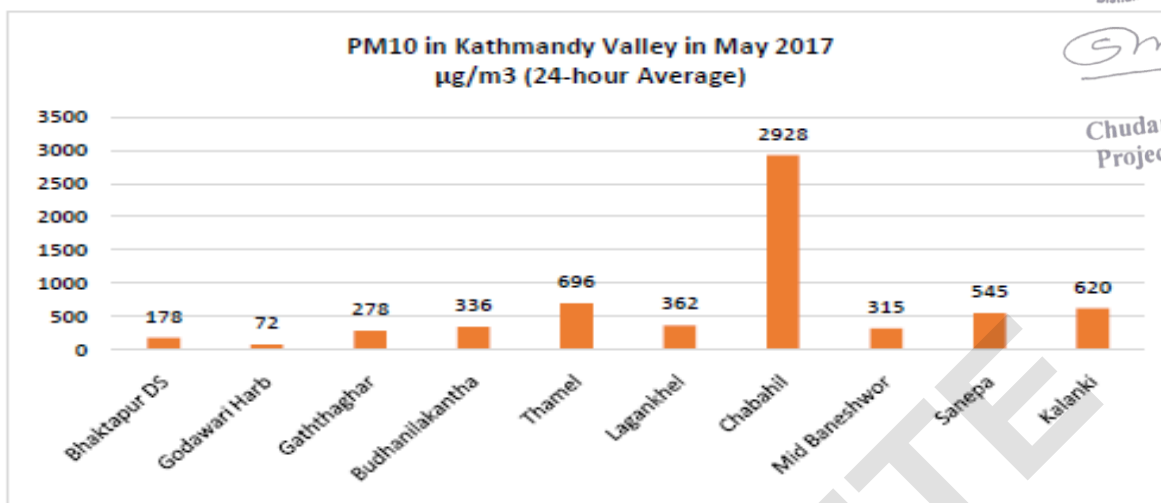
66. **PM₁₀ (Particulate Matter with Aerodynamic Diameter 10 Micron or Less)** From the human health point of view, smaller particulates are the main concern specially PM₁₀ and the smaller ones. The status of the PM₁₀ in the Kathmandu Valley on June 9 2017 from the MOPE station at Ratnapark is presented in Figure 8. The results of PM₁₀ concentration of one-day campaign monitoring in 10 different locations of Kathmandu Valley in the month of May 2017 are shown in Figure 9. This monitoring was only done to understand the highest level of pollution in a very dry day, and the high level of pollution observed is therefore for a day only. In figure 9 Chahabil is located closest to the project site. The GON limit for 24-hour average PM₁₀ concentration is 230 and 110 µg/m³ and the World Bank - Environmental Health and Safety (WB-EHS) standards' maximum interim target level for 24-hour average is 150 µg/m³. Therefore, the data in figure 8 shows that the PM₁₀ level on June 9, 2017 in Ratnapark was within the standards of both GON and WB-EHS. Data in figure 9 shows that the PM₁₀ levels for one day in May exceeded both GON and WB-EHS standards in all locations except for one area – Godawari Harb.

Figure 7: PM₁₀ in Ratnapark and Pulchok, January 2017



(Source: MOPE)

Figure 8: 24-Hour Average PM10 (1-day data in Kathmandu Valley), May 2017

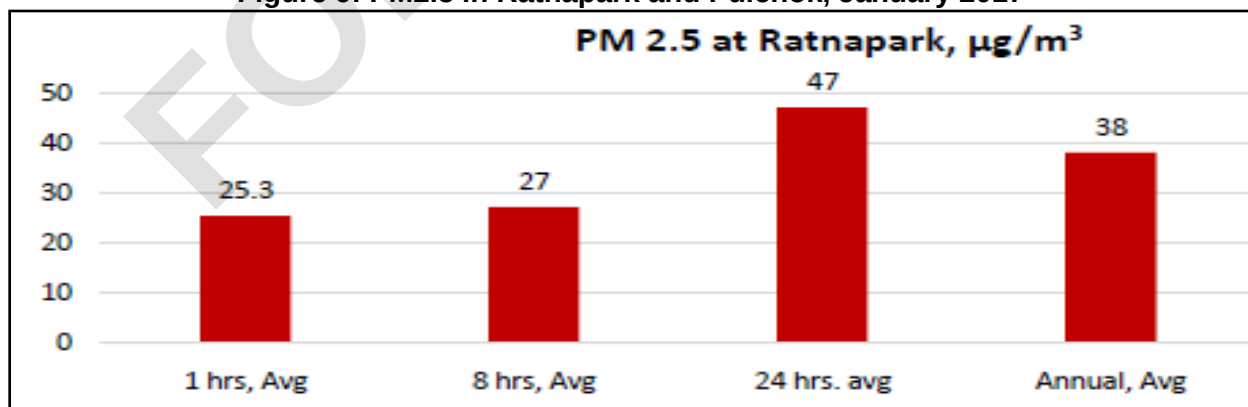


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(Source: QUEST Nepal)

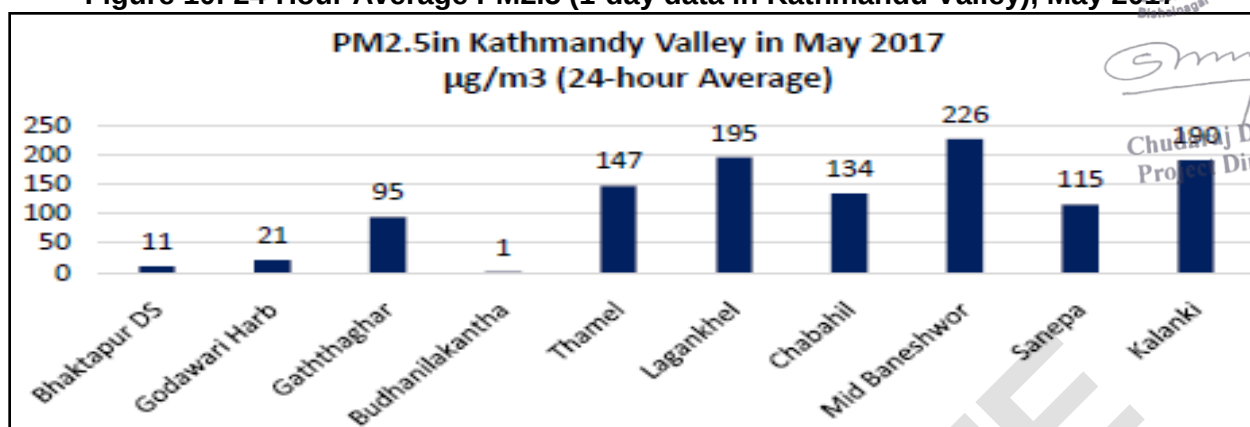
67. **PM2.5 (Particulate Matter with Aerodynamic Diameter 2.5 Micron or Less).** In recent years, more focus has been provided in the monitoring of the smaller particles, like the PM2.5, about one-thirtieth of the width of a human hair, can penetrate deep into the lungs and the cardiovascular system, posing the greatest risks to human health. The monitoring stations recently established by MOPE also provide highest priority in monitoring PM2.5. The results of this system obtained on June 9, 2017 are presented in Figure 10. The results of PM2.5 concentrations of one-day campaign monitoring in 10 different location of Kathmandu Valley in the month of May 2017 are shown in Figure 11. This monitoring was done to understand the highest level of pollution in a very dry day, and the high level of pollution observed are therefore for a day only. In figure 11 Chahabil is located closest to the project site. There is no GON standard for PM2.5 concentration. However there WB-EHS 24-hour average maximum interim target concentration for PM2.5 is $75 \mu\text{g}/\text{m}^3$. Therefore, the data in figure 6 shows that the 24-hour average PM2.5 level on June 9, 2017 is within the WB-EHS standards. Data in figure 11 shows that the PM2.5 levels for one day in May exceeded the WB-EHS standards in 7 out of 10 locations.

Figure 9: PM2.5 in Ratnapark and Pulchok, January 2017



(Source: MOPE)

Figure 10: 24-Hour Average PM_{2.5} (1-day data in Kathmandu Valley), May 2017



(Source: QUEST Nepal)

68. The noise generated by the vehicular operations, industrial activity and other human activities are the main source of noise pollution. Noise pollution is created by moving vehicles with their unnecessarily blowing horn.

Table 4: Noise level at Different Areas

Traffic Area	Day Hour			Night Hour	
	Observed Value	WHO Guideline	WB-EHS Guideline	Observed Value	WB-EHS Guideline
High Traffic Area		70			
Kalanki, Kathmandu	74			70	
Shahidgate, Kathmandu	67			69	
Putalisadak, Kathmandu	75			69	
Maitighar, Kathmandu	71			70	
Commercial Cum Residence Area			70		70
Asan Chowk, Kathmandu	74			67	
Naya Bazar, Kirtipur, Kathmandu	64			62	
Manbhawan, Lalitpur	71			67	

Source: Environmental Statistics of Nepal, CBS, 2013

Table 5: World Bank Noise Guideline Values/standards

Receptor	World Bank		GON	Receptor
	Daytime	Nighttime	Daytime (average) Ldn, dBA	
	7:00-22:00	22:00-7:00		
Residential	55	45	66.28	Old Residential Area
Institutional; educational			62	New Residential Area
Industrial	70	70	72.75	Commercial Cum Residential Area
Commercial			69.25	Commercial Cum Tourist Area
			74.36	High Traffic Area
Silence Zone	None	None	None	None

69. The noise zones of the WB EHS guidelines and the National Ambient standards for Government of Nepal is quite different as can be seen in table 5. Within these constraints it was seen that noise levels exceeded the GON standards as well as WB-EHS standards at 2 locations



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(Asan and Manbhavan) and the at 2 locations.

B. Ecological Resources

1. Vegetation

70. As project site lie in the heart of city, there is no forest in project site and its periphery and the floral diversity is not significant in the area. No clearance of vegetation is required in the project site. However, there are Bakaino(*Melia azedarach*), Kapur (*Dryobalanops aromatica*), Mango (*Mangifera indica*), Dhupi (*Juniperus indica Bertol*), Avocado (*Persea americana*) trees are located in the premises of the building and none of them are expected to be lost due to building construction. None of these trees fall in the endangered list of species.

2. Terrestrial fauna and birds

71. As the area is surrounded by settlements form all directions, fauna diversity is not significant in the area. The different animals recorded in and around the site are Calotes species (Garden lizard), *Rattus rattus* (House rat), *Mus musculus* (House mouse). Besides this, varieties of butterflies and insects are also found in the area. Different birds found in the area are *Streptopelia* species (Dove), *Columbia livia* (Rock pigeon), *Passer domesticus* (House sparrow) and *Corvus splendens* (crow). None of these species are endangered under International Union for Conservation of Nature (IUCN) or protected under GON.

C. Socioeconomic Environment

1. Socio-cultural status

72. The total population of ward number 5 is 18,320 among which male and female population were 9,337 (50.97%) and 8,983 (49.03%) respectively. Number of households in the ward was 4,774. The dominant ethnic group in the area is Newars followed by Brahmin and Chhetri. (Source: CBS 2011)

73. Population in the ward is densely distributed. More than 90% buildings of this area are constructed with RCC and brick structure. The major professions of the people in the ward are: service, business, foreign employment etc. Literacy rate in the given ward is considered very high as compared to national average literacy rate.

74. The majority of the ward's multi-ethnic inhabitants follow the Hindu faith. Most of the people belong to the Newar community, and the feeling of religious tolerance and mutual cooperation runs high. The many Lichchhavi-era artefacts found here is evidence of its ancient glory. Its cultural wealth is shown by the numerous sacred temples and religious sites lying here, like Satya Narayan, Manmaneswari, Dhanawantari, Gahana Pokhari, Dhana Ganesh, Krishna, Dakshinkali, Bhat Bhateni and Saraswati. The locality of Hadigaon in the saying, "No festival like at Hadigaon" is situated in the ward. And so is Gahana Pokhari, a historic and ceremonially important pond. Apart from the festivals celebrated according to the Hindu tradition, special local celebrations include Hadigaon Jatra and Teen Narayan Jatra. (Source: KMC, 2005, Ward Profile)

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Introduction

75. The potential impacts due to implementation of the project has been identified by initially using a screening checklist. The checklist includes a comprehensive list of potential environmental impacts as provided in the table below. Potential environmental impacts that may occur at the various stages of the project activities, are listed and the significance of each environmental impact is indicated. The terms none, minor, moderate, and major are used in the checklists to evaluate the magnitude of the impacts. In the checklist, the location, construction, and operational phases of the proposed development are considered separately in order to distinguish the short-term and long-term impacts. As can be seen from the table below a number of potential adverse impacts have been identified. However, the significance or extent of the impacts are mostly minor and will be short term as they are associated with the construction stage impacts.

Table 6: Checklists of Construction of Multi-storeyed Office Building

Project Phase	Potential environmental resource impacts	Significance of Environmental Impact				Type		Remarks
		None	Minor	Medium	Major	Adverse	Beneficial	
Project Location	Land value depreciation	x						No land value changes anticipated
	Loss of and displacement from homestead land	x						No loss of and displacement from homesteads land; no impact
	Loss of and displacement from agricultural land	x						Loss of and displacement from Agricultural land will not occur; no impact
	Damage to nearby operation	x						No impact anticipated
	Disruption to drainage pattern		x			x		Land development may create problems in local drainage pattern, minor impact
	Blockade of wildlife passage	x						No wildlife in the area, no impact
	Encroachment into precious ecological area	x						No precious ecological issues; no impact
Construction Stage	Blockade of natural drainage	x				x		Cutting/Filling and construction site preparation would create natural drainage blockade during rainy season, minor impact
	Worker accident	x				x		Irregularly may occur in construction period, minor impact
	Safe drinking water and Sanitation hazard			x		x		Concentration of labor force create un-hygienic condition, medium impact
	Noise/vibration hazard		x			x		Piling, brick/stone crushing and equipment installations may create noise, minor impact

Project Phase	Potential environmental resource impacts	Significance of Environmental Impact				Type		Remarks
		None	Minor	Medium	Major	Adverse	Beneficial	
	Traffic congestion		x			x		Carrying of construction materials will create traffic congestion
	Dust Emission		x			x		Cutting/filling, stockpiling of construction material and traffic movement may create dust emission, minor impact
	Surface water pollution	x						No water discharge from the site, no impact
	Solid waste management		x			x		Improper management of construction debris and solid waste may pose risk to the neighbors, minor impact
	Occupational health & safety of workers		x			x		Health & safety of workers at site may pose to risk in some cases, minor impact
	Building site security		x			x		Improper site security may pose risk to the school children or community, minor impact
Operation Stage	Employment opportunity			x			x	Major employment opportunity during construction, medium positive impact
	Pollution from liquid discharge	x						No liquid discharge from the project, domestic sewage should be disposed through septic tank, no impact
	Pollution from solid waste		x			x		Minor domestic solid waste may generate; minor impact
	Air quality	x						No air pollution; no impact
	Noise hazard	x						No noise generation is expected; no impact.
	Traffic congestion	x						No traffic congestion: no impact
	Renewable energy option			x			x	Solar panel may be installed at the roof of the building may save energy and CO ₂ emission
	Employment			x			x	Medium Employment opportunity during operation

B. Impacts during Pre–Construction Phase

1. Land Acquisition

76. The land of the proposed project site belongs to DOR and already has an existing office building. Relocation of homestead will be required. Hence, there will be no land acquisition or need for relocating homesteads or non-title holders. No precious ecological issue is involved with this project since the project site is already used land, has no natural habitat and is not immediately close to watercourses.

2. Removal of Dismantled Concrete and Equipment

77. **Impact:** Existing infrastructure such as the current 3 storied office building, security camp, store, RCC drains etc. within the existing area of PD-ADB office will need to be dismantled and removed. Anticipated impacts from these damaged concretes and equipment will be the pollution of soil, air and ground water. There is also the potential of generating asbestos containing material (ACM) from the dismantling of buildings within the PD-ADB office compound.

78. **Mitigation:** Prior to the start of construction, the existing infrastructure should be dismantled, broken into chips and stored in the designated area of the PD-ADB office by skilled technicians/labors properly. Alternatively, all these materials should be carried out by the dump trucks and reused for ongoing road construction works or dumped at designated approved locations. Any hazardous materials or wastes such as lead acid batteries and old printers and toners must be disposed off carefully either by selling to waste recycling agents or disposed only in legally designated locations. In case asbestos is present in buildings to be demolished, the Contractor will coordinate with the Ministry of Population and Environment (MOPE) on the proper dismantling and disposal of asbestos. The contractor (or external service provider with competency in handling asbestos) must identify the locations of asbestos-containing materials and carry out a risk assessment. The contractor must also ensure that people involved in clear-up work are adequately informed of the risks and the methods of best practice. In addition, the following safeguards should also be implemented: (i) minimize the disturbance of asbestos containing materials; (ii) minimize the release of respirable asbestos in the atmosphere by wetting; (iii) minimize the extent to which people have contact with asbestos; and (iv) ensure that waste is securely stored and adequately labelled.

C. During Construction Stage

1. Drainage Congestion

79. **Impact:** Construction of the proposed office building may impact the existing drainage pattern by impeding the natural flow. Temporary drainage congestion may occur especially during monsoon period due to excavation of earth from the foundation trench of the proposed building construction area. In addition, drainage congestion resulting into stagnant water or local flooding also may be occur in places such as construction yard and labor's camp. The drainage system on the surrounding of the proposed building construction area may be affected by construction activities.

80. **Mitigation:** Temporary storm water drainage congestion in the proposed building construction area due to rainwater should be removed by pumping of rain water from the foundation trench by pump. Drainage congestion at the labor camp and construction yard should be removed by temporary earth or brick drain. Alternative temporary drain close to the boundary can be provided up to the outfall in case the existing drain gets closed or dismantled. Storm water and rainwater will be used for recharging ground water or reused for construction.

2. Ground Water/Drinking Water

81. **Impact:** The proposed PD-ADB building location can affect the ground water resources due to uncontrolled extraction of groundwater for construction purpose. The water table in this area like other areas of Kathmandu valley is constantly depleting due to extraction for drinking, bathing, cooking etc. Groundwater will be required for construction in absence of surface water availability in this area. However, water for construction will also be sourced from other private

supplier. Hence, it is expected that the required quantity of ground water for the construction purpose (only for mixing of concrete, curing and washing of stone chips) will not be high. Hence, impact on quantity of ground water is expected to be insignificant. Drinking and domestic water requirement for workers camp will be arranged by the contractor. Contamination of groundwater is not envisaged since construction camp will have septic tanks or mobile toilets depending on the number of workers in the camp. However accidental spillage of hazardous liquid on the construction yard may contaminate the ground water.

82. **Mitigation:** The contractor will make arrangement for water required for construction in such a way that the water availability and supply to nearby communities remain unaffected. It means that due to construction works the nearby communities will not be affected by water scarcity. Handling and storage of the potential contaminants (such as hazardous chemicals, fuels, lubricants, acids, paints etc) will be handled by experienced workers and will be organized under strict condition to avoid water pollution during construction of the proposed building construction. Proper monitoring should be done by a suitably qualified and experienced person. As the proposed building construction area is not connected with any major water body, no direct impact on the surface water quality is anticipated by the construction of the proposed building construction.

3. Air Pollution

83. **Impact:** Air quality may be affected in and around the construction site due to various construction activities and construction vehicular movement. The pollutants of primary concern include SO_x, Total Suspended Particulates (TSP), PM₁₀ and PM_{2.5}. The construction equipment/vehicles, using fuel and diesel and movement of vehicles will also contribute to air pollution releasing hazardous air emissions such as NO_x, SO₂, PM₁₀ and PM_{2.5}. This will impact the air quality affecting the immediate vicinity of the working area.

84. Another possible source of air pollution will be dust generation due to handling of sand, cement, breaking of bricks/boulders, and mixing of concrete ingredients. However, due to the openness of construction sites and wind conditions, the dust and engine emissions are expected to have limited effects on the existing air quality. The anticipated air quality problem will be for short term, localized and minor lasting mainly during the construction.

85. **Mitigation:** In order to keep the pollution level within acceptable limit, construction related emissions should be regulated. Regular spraying of water on dusty surfaces during dry season to reduce dust generation must be practiced. The rules and regulations of the building specification guideline as mentioned in NNBC should be followed especially by the contractors. Loading and unloading of construction materials likely to generate fugitive emission, shall be done in covered area or provisions of water fogging arrangement may be made around these areas. Regular maintenance of machinery and equipment and vehicular pollution check shall be made mandatory. Silt screens maybe installed around the construction site to control the release of dust to surrounding buildings. Ambient air quality monitoring should be carried out quarterly during construction. If monitored parameters are above the baseline levels (see chapter IV, section xx) or GoN standard, suitable control measures must be taken by the contractor.

4. Noise and Vibration

86. **Impact:** Noise levels in and around the construction site is expected to increase as a result of the operation of construction vehicles/equipment and during unloading and loading of construction materials. A number of vehicles and equipment will be required for the construction

of the proposed PD-ADB building and will depend upon the construction methodology for various types of works. However, the equipment will broadly consist of mixer machine, concrete vibrator, brick/boulder breaking machine and crane. Construction vehicles will mainly consist of heavy trucks to transport materials in and out of the site. Most of them will use diesel engines that generate noise and exhaust emissions. In addition to noise, the construction activities may generate vibration as well. The vibration could potentially impact the buildings and houses nearby.

87. **Mitigation:** Since the existing noise level already exceeds the standards of both GON and WB-EHS, strict measures for noise pollution control will need to be undertaken during construction activities. The Contractor should apply optimum site activities and site layout so as not to exacerbate existing noise levels. Since there is Department of Railways office adjacent to the proposed PD-ADB building area boundary, temporary noise barrier (such as wooden screen, heavy jute screen, heavy plastic screen etc) should be constructed to protect the nearby office from noise pollution. In addition, the timing of construction activities must be limited from 7:00am to 8pm so as the impact intensity is minimized. Undesirable noise should be avoided by confining the source of noise. Brick breaking machine should be confined within a temporary shed so that noise pollution could be kept at minimum. In no case such machine should be allowed to operate at night. Protection devices (ear plugs or ear muffs) shall be provided to the workers operating in the vicinity of high noise generating machines during construction. Construction equipment and vehicles shall be fitted with silencers and maintained properly. Construction equipment will be used judiciously so as not to cause vibration or damage to buildings nearby.

5. Waste Pollution

88. **Impact:** The building construction process will take about 2.5 years and as a result, the worker camp will have a semi-permanent presence at the project site. The majority of waste generated will include construction wastes (solid wastes: piece of rods, woods, bricks, stones, containers etc. Liquid waste: paint, oil etc.) and general wastes (solid wastes: papers, plastic containers, residues of food, fruits etc and liquid waste: from kitchen and bathroom etc.). These wastes will be generated due to construction camp, construction activities and materials used for construction. If inadequate arrangements are made for the disposal of above mentioned wastes, there will be negative impact on the soil, aesthetic beauty of area and workers' health and safety.

89. **Mitigation:** Solid wastes collection system will be essential, which should include separation and collection of solid wastes in the dustbins/ waste containers throughout the work site, construction yard/labor camp. Wastes such as pieces of rods and woods, newspapers, and containers can be sold to local vendors and the remaining waste can be given to the local waste collection service provider from where KMC will send these wastes to the Landfill Site of Kathmandu city regularly by their own arrangement. A log of the disposal of toxic and other waste materials will be kept by the Contractor. Waste water from the labor camp should be disposed through sewerage pipeline. Prior to transport, container of all liquid materials such as bitumen and oil should be checked by experienced persons properly.

6. Sewage Pollution/Sanitation Hazards

90. **Impact:** During construction stage, the proposed building construction area shall be occupied by the construction workers (about 25-30 persons/day). Inadequate and unhygienic sanitation facility can pollute the surrounding area as well as various diseases might be spread out among the workers. Sewage waste also might be the source of odor pollution to the local environment.

91. **Mitigation:** Sewage disposal should follow accepted practice (through sewerage pipe) and avoid ground water contamination. Proper sanitation facilities such as toilets and bathing area with proper water supply must be provided to the workers. Waste water generated must be drained through drains connected with the municipal drainage system.

7. Road and Traffic

92. **Impact:** Heavy construction vehicles will be required during construction for carrying of various construction materials and equipment. There is an existing 6m wide bituminous paved road at the west side which connects with the proposed building construction area. Traffic observation shows that almost all types of vehicles such as buses, minibuses, microbuses, Jeeps, cars, motor cycles, vans, students and workers use this 6m wide access road, and as a result, traffic jams occur especially during peak hour at morning (from 8:00 to 10:00 hrs.) and evening times (from 17:00 to 19:00 hrs.), as mentioned by the local people during consultations. The construction vehicles will add more traffic and as a result, traffic congestions will be increased. In addition, road accidents may be increased due to movement of construction vehicles with construction materials and equipment.

93. **Mitigation:** Proper Traffic Management Plan (TMP) should be prepared during detailed design stage and act accordingly during construction stage of the project. In this TMP, the road safety measures such as warning signs/lights, road safety signs, zebra crossing, flagman etc should be included to ensure uninterrupted traffic movement during construction. Traffic congestions should be minimized by adopting proper planning. Timing schedule for arrival of construction materials can be adjusted so that interruption with the public utilities will be minimal. The public must also be informed about the timing of the movement of the construction vehicles in order to minimize inconveniences.

8. Landscape

94. **Impact:** Construction activities especially excavation of foundation trench, stockpiling of construction materials, placing of construction equipment, parking of construction vehicles etc. will change the local landscape temporarily.

95. **Mitigation:** Stockpiling of construction materials, placing of equipment, parking of vehicles etc. should be done in systematic way to enhance the aesthetics of the site. Duration of stockpiling of construction materials should be minimized as much as possible.

9. Job Opportunities

96. **Impact:** At the peak of construction phase, it is likely to provide employment of minimum 50-60 personnel in various positions. The contractor will be responsible for creating these employment opportunities. Priority will need to be given to the local community for unskilled labor. This may result in an increase on household income. At the time of construction, business opportunity in this area will also be increased.

97. **Recommendation:** Based on the nature of job, adequate salary with other social benefits should be ensured for the men and women workers in time. In addition to adequate salary, equal pay for same type of work between men and women should also be provided.

10. Community Health and Safety

98. **Impact:** Improper health and safety (H&S) policy maintained at the site may lead to outbreak of different diseases to the surrounding communities through the sick construction workers. Storage of construction material and equipment in improper places may also cause inconveniences and hazards to local residents and people visiting the buildings nearby.

99. **Mitigation:** Proper TMP and health and safety should be prepared during design and take action accordingly during construction to avoid road accidents and health hazards of the surrounding project community. In addition, mitigation measures, such as health screening tests for the workers and proper designation and signage of restricted areas for general public to avoid accidents and injuries. All construction material and equipment must be kept at safe distances from existing residents and buildings with proper safety signage.

11. Occupational Health and Safety

100. **Impact:** Construction workers may face occupational health hazards such as minor or major injuries due to lack of general safety requirements and precautions applicable for such sites, malfunctioning equipment and careless use of equipment and vehicles. At the construction site, camp will be constructed for temporary accommodation for about 10-15 workers who will stay overnight. (Other workers will be from the local area and hence will not need to stay overnight at the project site) Poorly designed temporary camp and sanitation facilities may pose a health threat and nuisance to the workers. Uncontrolled vending of food and drinking water on the work site may also pose a risk with respect to the transmission of contagious diseases like typhoid, diarrhea, malaria, dengue and others. Construction workers will be required to handle hazardous materials such as cement, bitumen, paints, chemicals, and fuels therefore increasing health risks of workers.

101. **Mitigation:** A proper Occupational Health and Safety (H&S) Plan should be prepared and follow it to avoid health hazard of the workers. First Aid Box and Personnel Protective Equipment (PPE) such as ear plugs, helmets, hand gloves, safety shoes, goggles, raincoats (during rains) etc. are provided for the workers on construction site. The safety belts and harnesses must be worn by the workers, working at heights at all times and safe anchorage points provided. Plastic net should be provided surrounding the buildings. In case of major accident, transport should be made available to take the patient to the nearest hospital. Health and Safety Manager (H&SM) should be engaged for the construction period of the project. Workers operating the equipment and drivers driving the construction vehicles at construction site should be skilled. Proper H&S signboards and appropriate information to the local people about the construction activities should be provided.

12. Renewable energy option

102. **Impact:** Solar power is one of the best renewable energy options. It is the conversion of sunlight into electricity that may be used for supporting electricity demand of the building and for individual outdoor lights by adding some design and budget modifications.

103. **Benefit maximization measure.** Solar photovoltaic (PV) panels are to be installed in the office premises or at roof. It is a low cost sustainable solution to meet the electricity demand.

13. Rain Water Harvesting

104. **Impact:** Rainwater harvesting is a technique used for collecting, storing, and using rainwater for landscape irrigation and other domestic uses. Rainwater harvesting may contribute to the solution of water logging problem associated the heavy rainfall.

105. **Benefit maximization measure.** Rainwater harvesting systems can be installed with minimal skills. Installation of storage tanks at roof top is the easiest way of rain water harvesting. The water storage tank size should be large enough to contain the captured water and the system should be sized to meet the water demand throughout the dry season specifically, the rainfall capturing area such as a building roof must be large enough to maintain adequate flow.

D. During Operation Stage

106. Operational impacts continue during the life of the project after the completion of construction stage and these impacts are long lasting and, in some cases, permanent. Following sub-sections provide the following potential impacts along with mitigation measures.

2. Drainage Congestion

107. **Impact:** Drainage congestion may occur during operation period in surrounding the proposed building area if all the drains are not adequate in size and are not covered with provision of several adequate round holes (to facilitate cleaning) as well as not connected with the central drain properly.

108. **Mitigation:** The adequate sizes of drains with holes should be provided and connected with the central drain and maintained regularly so that solid wastes such as papers, tree leaves, food grains etc. cannot enter into the drain and create blockage.

3. Air and noise pollution including indoor air pollution

109. **Impact:** This building does not have any foreseen air pollution issues. However, during operation of generators and high capacity water pumps, sound pollution will be an issue. This impact is low in magnitude, local and long term in duration.

110. **Mitigation:** The GoN rules and regulations must be followed to reduce air pollution. Restriction should be imposed on the movement of the old vehicles, installation of generators openly. Generators will have silencer installed and will be kept inside a separate room.

4. Change in Water Table/ Water Quality

111. **Impact:** This office building will be using deep boring to fulfill its water demand. This, in long term will decrease water table of this area. In addition to this, increased built-up area will reduce the percolation of water into the ground. The decrease in percolation shall cause in the fall of water table level. Greenery area must be maintained to reduce this problem.

112. Mitigation:

- Rainwater harvesting technology will be applied to reduce the ground water depletion.
- Rechargeable pits will be constructed to recharge ground water.

- Excessive water will not be extracted.
- Permission will be taken from the Underground Water Development Board to install deep boring

5. Water Demand and Supply

113. **Impact:** The whole building shall be supplied water from the deep tube well boring which will be only constructed after getting the permission through KUKL. A filter plant shall also be installed. This will be sufficient for water demand of the building.

114. Mitigation:

- Only required quantity of water will be extracted by deep boring
- Deep boring water will be treated to meet Nepal's Drinking Water Quality Standard

6. Pressure on public utilities (water supply, electricity, telephone etc.)

115. **Impact:** During operation phase, the building will require water, electricity and telephone facilities. Water demand will be fulfilled through the municipal water supply system and also from underground resources therefore, it will not put any pressure on municipal drinking water supply chain. However, electricity and telephone connections will be connected from Nepal Electricity Authority (NEA) and local telecom companies. This will not impose any significant pressure on local supply chains.

116. **Mitigation:** No significant impact detected therefore no mitigation measures is suggested.

7. Uninterrupted and efficient power supply

117. **Impact:** This building will have 24 hours supply of power. The building will take electricity power from the NEA supply by installing a high capacity transformer to receive HT power and convert it into LT power, but will also be equipped with standby generator to be used during the intervals of power interruption for a long period.

118. Mitigation:

- 24 hours electricity supply will be provided
- Generator backup in case of power cut

8. Movement of vehicles and parking

119. **Impact:** This building will have regular traffic flow during office hour. This will create traffic congestion in the entrance and exit points to and from the building. As the sideway section road is already congested, this access point will add to congestion in the area. This impact will be of medium significance, local and long term in duration. Pressure is more on office time i.e. 10 am-5pm.

120. Mitigation:

- Roadside & haphazard parking will not be allowed
- Traffic signs will be placed inside and around the area.
- Separate entrance and exit outlets for vehicles will be constructed

9. Surface Runoff and Drainage systems

121. **Impact:** Lack of proper drainage of storm water shall cause pounding of water resulting vector diseases in the area. Rainwater could be managed by using domestically or by recharging ground water. Then excess water needs to drain out through the existing municipal drain.

122. **Mitigation:** Rainwater harvesting technology with recharge pits will be installed to recharge ground water

10. Solid Waste Management

123. **Impact:** The forms of solid wastes would be biodegradable and non-degradable which will be generated from the proposal implementation. The degradable solid waste may spread different types of diseases if allowed to decay at the open space for a long time. The collected waste will be finally disposed in the Municipal waste disposal system only the waste which cannot be reused or recycled. The reusable and recyclable waste from the office building shall be encouraged to sell to the local scrapers.

124. **Mitigation:**

- Both bio-degradable and non-bio-degradable will be segregated. 3R principle will be followed for the management of the solid waste.
- Waste segregation and disposal mechanism will be established by providing different colored dustbins marking degradable and non-degradable waste
- Recyclable solid waste will be sold
- Non -degradable waste will be recycled to some extent.
- Coordinate with KMC authority for final disposal of solid waste
- Keep required number of container inside the premises.

11. Landscaping

125. **Impact:** A landscape is a subjective concept that cannot be precisely quantified. However, any project designed without considering the local landscape would create visual intrusion to the people. The proposed project has minimal amount of vegetation to be affected due to the construction. A significant net positive effect is possible with the design of the building and its surroundings to accommodate both the School building itself and a net increase in green cover on the site.

126. **Benefit maximization measure.** Plantation of trees around the office building i.e. grass and shrubs would provide increased habitat for birds and small mammals and enhance the visual aesthetics of the current land.

12. Renewable energy option

127. **Impact:** Solar power is one of the best renewable energy options. It is the conversion of sunlight into electricity that may be used for supporting electricity demand of the building and for individual outdoor lights by adding some design and budget modifications.

128. **Benefit maximization measure.** Solar photovoltaic (PV) panels are to be installed in the office premises or at roof. Regular maintenance of the system will be done.

129. **Mitigation:** The PV cells that will be installed in the office premises or at the roof is expected to have a life expectancy of at least 25 years. In case the cells are damaged or needs to be replaced, rare earth materials can be recovered which commands higher market value rather than just dumping. Also, an emergency response committee, which will be part of the overall emergency response system for the building, will be formed to address any emergency cases such as earthquake.

13. Rain Water Harvesting

130. **Impact:** Rainwater harvesting is a technique used for collecting, storing, and using rainwater for landscape irrigation and other domestic uses. Rainwater harvesting may contribute to the solution of water logging problem associated the heavy rainfall.

131. **Benefit maximization measure.** Rainwater harvesting system will be used with regular maintenance of its components to keep it functioning well. Proper operation and maintenance of rainwater harvesting system helps to protect water quality in several ways. Regular inspection and cleaning of catchment, gutters, filters and tanks reduce the likelihood of contamination.

FOR WEBSITE

VI. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Consultation and Information Disclosure

132. During IEE report preparation consultation meeting was organized at ward office of affected ward i.e. ward no 5 of Kathmandu Metropolitan City on 20 May 2018. The program was facilitated by the Environmental and Social specialist of PD (ADB)/DOR and Design Consultant in presence of Chief of ward, engineer, ward member, locals and representatives from project directorate. A total of 11 people (2 women and 9 men) attended the meeting. Information about the building design, and environmental considerations were shared in the meeting. The participant put their concerns and suggested to build the building with modern facilities with gender and disable friendly facilities. The meeting also suggested to reduce disturbances to the local community due to movement of construction materials, equipment and machinery, waste disposal, noise, dust pollution etc. needs to be paid proper attention and if construction performed at night time.

133. Major concerns raised and discussed in the meeting were:

- Appreciated description of the proposed PD-building by the participants
- Suggested to construct the building in environment, women and disabled people friendly manner
- Suggested to maintain coordination with the ward office at different stages of construction
- Suggested to minimize direct influence of noise, dust, silt and other construction associated hindrance to the local people

134. Draft IEE report of the building will be disclosed on the ADB website. It will also be disclosed on DoR's website for public information and suggestions. During construction PD-ADB through its consultant will prepare annual environmental monitoring reports and provide to ADB for disclosure on their website. The environmental monitoring reports will also be provided to MoPIT to demonstrate implementation of the required environment safeguard measures.

VII. GRIEVANCE REDRESS MECHANISM

135. A Grievance Redress Mechanism (GRM) will be established to receive, evaluate, and facilitate the resolution of affected people's concerns, complaints, and grievances about the construction of the new building of PD-ADB. During the building construction period, grievances of individual/institutions will be addressed.

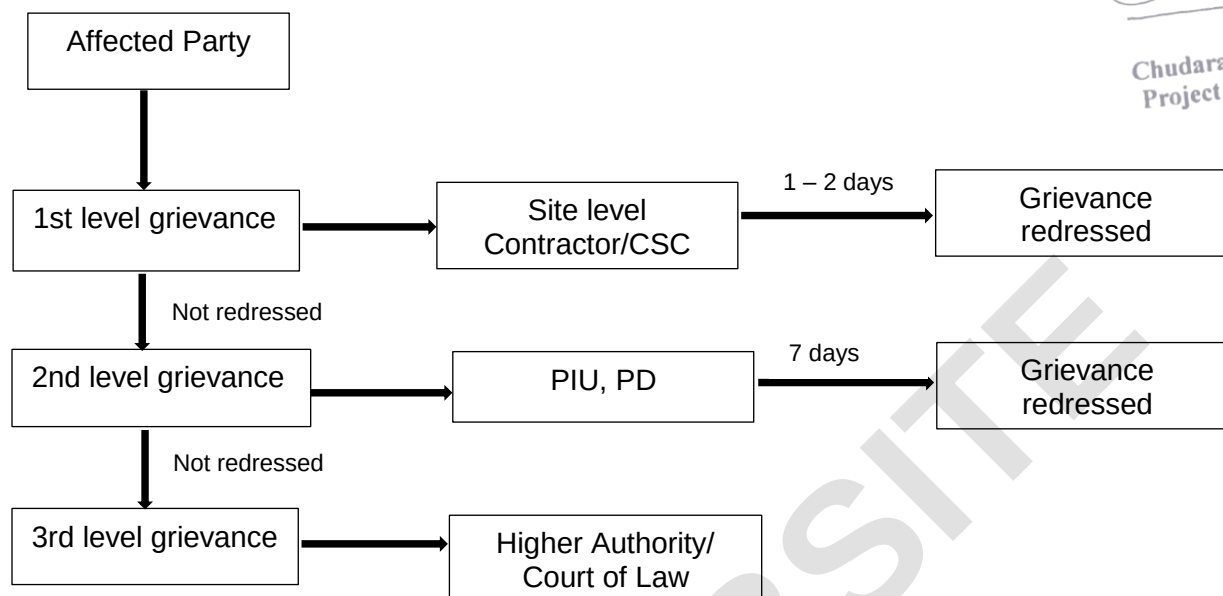
136. **First level:** The first level and most accessible and immediate contact for the fastest resolution of grievances are the contractors, and supervision consultants on site. Prior to construction of any works, the PIU (PD-ADB) or its representative will ensure local community to inform them of the Project. If any complaints arise, the contractors, consultants can immediately resolve the complaint on site. Any person with a grievance related to the project works can contact the project to file a complaint. The PIU office will have a safeguards focal person to field and resolve complaints. The safeguards (environment and resettlement) focus person of contractor will document the complaint, and immediately address and resolve the issue within 1-2 days. If the complaint remains unresolved at the field level. The contractor may seek the assistance of the consultant safeguards specialists (the environmental specialist or social safeguards specialist) to resolve the issue. The safeguards focal person that a complaint was received, and whether it was resolved. The safeguards focal person will fully document the following information: (i) name of the person; (ii) date complaint was received; (iii) nature of complaint; (iv) location, and (v) how the complaint was resolved.

137. **Second level.** If the grievance remains unresolved the specialist of CSC will forward the complaint to the PIU safeguards focal person. The person filing the grievance will be notified by DOR site Project Office safeguards focal person that the grievance was forwarded to the PIU safeguards focal person. The PIU will address the grievance. Grievances will be resolved through continuous interactions with affected persons, and the PIU will answer queries and resolve grievances regarding various issues including environmental or social impacts. Corrective measures will be undertaken at the field level by the PIU safeguards focal person within 7 days. He/she will fully document the following information: (i) name of the person; (ii) date complaint was received; (iii) nature of complaint; (iv) location and (v) how the complaint was resolved

138. **Third level.** In the event that a grievance is not addressed by the contractor, CSC, PIU the affected person can seek legal redress of the grievance in the appropriate courts, the fourth level of the GRM, which is the formal legal court system. The GRM however does not prevent affected persons from seeking legal redress at any time. Figure 6 provided below shows the arrangement of resolving different level of Grievance recorded during project implementation.

Chudraj Dhakal
 Project Director

Figure 11: Grievances Resolution Steps and Processes



Note: PD-Project Director, CSC-Construction supervision consultant, PIU= project implementation unit

VIII. ENVIRONMENTAL MANAGEMENT PLAN

A. Environmental Management Plan

139. The Environmental Management Plan (EMP) is prepared to facilitate effective implementation of recommended mitigations measures with defined roles and responsibility for implementation and monitoring, regulatory compliance requirements, stages of implementation with location, timeframe and costs. The mitigation measures are proposed to eliminate or minimize the identified impact associated with design, construction and operation stages of the project, to acceptable level by adopting the most feasible options.

140. The identified impacts are insignificant and are related to clearing operations of site, setting and operation of construction site, materials sourcing, transportation of materials, air and noise pollution due to construction activities and operation of construction equipment, tree cutting, and shifting of utilities. Appropriate mitigation measures are identified for all construction and operation activities. An Environmental Management Plan (EMP) is given at table 7. The EMP is an integral part of the tender document for the project which shall be available to contractor at the time of bidding.

B. Environmental Monitoring Plan

141. The environmental monitoring program is prepared with the aim to monitor the environmental performance of environmental management plan. The EMoP is planned with the focus on following objectives:

- To assess the effectiveness of mitigation measures proposed
- To assess the change in environmental quality during construction and operation stage with respect to before the project scenario.
- To assess compliance to regulatory requirements
- To monitor the status of corrective action taken in case of deviation from the planned measures or regulatory requirements.

142. The environmental monitoring plan is envisaged to be done once for the identified indicators at following stages of the project:

- During Design and Pre-Construction Stage
- During early Construction Stage (Before 25% progress of Physical works)
- During substantial completion Stage (after 75% progress of Physical works)
- After 1st year of operation

143. The PIU with support of the CSC will be responsible for carrying out the environmental monitoring at the project location. A monitoring plan with monitoring indicator and frequency of monitoring is given at table 8.

Table 7: Environmental Management Plan – PD Office Building

Environmental Impact	Mitigation Measures	Mitigation Cost (NRs.)	Institutional Responsibility	
			Implementation	Monitoring/ Supervision
DETAILED DESIGN AND PRE-CONSTRUCTION STAGE				
Improper design	- All project facilities are to be designed in accordance with the planning and design norms of NNBC. - Earthquake risk should be considered in the structural design of the PD-ADB office building.	Design cost	DSC	PD-ADB
Lack of environmental specifications	- Prepare relevant environmental sections in the tender documents for bidders and include the EMP in the bidding documents - Prepare a bid evaluations section for environment, according to ADB bid evaluation format - Prepare environmental contract clauses for contractors	Design cost	DSC	PD-ADB
Removal of Existing structures	All concrete structures/equipment in the proposed PD-ADB office building area to be dismantled and managed before construction starts.	Construction cost	PD-ADB	PD-ADB
Tree cutting	- Existing trees are located at the periphery of the site. Hence, cutting of trees should be avoided to the extent possible. - If required to be felled, necessary permission should be processed as per GON requirements. - Every tree felled should be compensated at the rate of 1:25. - Cutting, carry out and selling these trees should be as per GoN procedure to avoid any accident.	Construction cost	PD-ADB	PD-ADB
CONSTRUCTION STAGE				
Air, Noise and Dust Pollution during the demolition of existing building	- Prior information shall be given to the adjacent offices regarding the demolishing process, scheduling of the activities etc. - Water spraying at the demolition site - Fencing / Install barriers (GI sheets, geo-net) to shield from dust and aggregates - Avoid usage of machines/equipment with extra noise; - Carry out demolition activities in stages, give adequate notice and information of activities to the adjoining stakeholders	Construction	Contractor	CSC
Drainage Congestion	- Temporary drainage congestion (TDC) in the foundation trench due to rainwater to be removed by pumping. Avoid monsoon period for foundation works. - TDC in construction yard and camp of the proposed building area to be removed by temporary earth or RCC drains.	Construction	Contractor	CSC

Environmental Impact	Mitigation Measures	Mitigation Cost (NRs.)	Institutional Responsibility	
			Implementation	Monitoring/ Supervision
	All rainwater, storm water waste water etc. should be drain out via central sewerage pipelines.		Chudaraj Bhakal Project Director	
Air Pollution	- Fit construction vehicles with appropriate exhaust systems and emission control devices. - Maintain construction vehicles and equipment in good working condition including regular servicing. - Cover hauls vehicles carrying dusty materials moving outside the construction site. - Equipment/vehicles causing excess pollution (e.g. visible smoke) should be banned from construction sites or fixed immediately prior to further usage. - Water spray to the material stockpiles as and when required to minimize the potential environmental nuisance due to dust. - Increase the watering frequency during periods of high risk (e.g. high winds and dry periods). Stored materials such as boulders and sand should be covered and confined to avoid them being wind-drifted. - Erect dust barriers along the boundary of the building area to reduce dust movement to the surrounding areas. - Restore disturbed areas as soon as possible by vegetation/grass-turfing. - Establish adequate locations for storage, mixing and loading of construction materials, in a way that dust dispersion is prevented because of such operations.	Construction	Contractor	CSC
Sewage Pollution/ Sanitation Hazard	- Provide hygienic sanitary facilities and sewerage system. The toilets and domestic waste water will be collected through a common sewerage. Provide separate latrines and bathing places for males and females workers with total isolation by wall or by location. The minimum number of toilet facilities required is one toilet for every ten persons. - Ensure the sanitary facilities are kept clean and without any odour. - Educate the workers of using the facilities.	Construction	Contractor	CSC
Solid Waste Pollution	- Organize disposal of all wastes generated during construction in an environmentally acceptable manner. - Minimize the production of waste materials by 3R (Reduce, Recycle and Reuse) approach. - Segregate and reuse or recycle all the wastes, as far as practical. - Prohibit burning of solid waste. - Provide refuse containers at worksite and worker camp.	Construction	Contractor	CSC

Environmental Impact	Mitigation Measures	Mitigation Cost (NRs.)	Institutional Responsibility	
			Implementation	Monitoring/ Supervision
	• Maintain the construction site in a cleaner, tidy and safe condition and provide and maintain appropriate facilities as temporary storage of all wastes. • Ensure proper collection and disposal of all wastes within the construction camp from where the municipal services will take by their truck and dispose at their dumping area. Insist on waste separation and store by source; organic wastes, inorganic wastes and recyclables in separate containers.		Chudaraj Bhakal Project Director	
Liquid waste	• Train the relevant construction personnel in handling of fuels and spill control procedures. • Make sure all containers and drums that are used for storage are in good condition and are labelled with expiry date. • Any container, drum that is dented, cracked, or rusted might eventually leak. Check for leakage regularly to identify potential problems before they occur. • Put containers and drums in permanent storage areas on an impermeable floor. • Take all precautionary measures when handling and storing fuels and lubricants, avoiding environmental pollution. • Ensure basic firefighting equipment is in place outside these storage areas in case of a fire.	Construction	Contractor	CSC
Occupational Health and Safety issue	• Awareness to safe work procedure • Use of safety equipment as helmet, gloves, boots, mask, earplugs net safety belt etc • Awareness to communicable diseases • Keep First aid box at site • Temporary toilet and bathroom will be made • No one outsider will be allowed to enter the construction zone	200,000.00	Contractor	PIU, CSC
Stockpiling of construction materials	• Haphazard disposal will be controlled • Construction materials, grease, paints will be properly arranged • Residual construction materials will be reused for other purpose		Contractor	CSC
Disturbance to the local Population and pedestrians	• The transportation vehicles will be parked within the premises of PD-ADB • Prohibit the parking of the transportation vehicles outside the construction site • Put hoarding board to inform the pedestrian and adjacent offices about the activities • Install barriers (GI sheets, geo-net) to shield from dust and aggregates	Contractor's BOQ	Contractor	PIU, CSC

Environmental Impact	Mitigation Measures	Mitigation Cost (NRs.)	Institutional Responsibility	
			Implementation	Monitoring/ Supervision
	Provide adequate lighting at demolition site for the night to prevent accident		Chudaraj Bhakal Project Director	
Site selection for the disposal of waste and debris	- The disposal area will be selected with the consultation of Municipality authority - The disposal area will not be the environmentally sensitive area - The disposal area will be far from the water source and community area	Contractor's BOQ	Contractor	PIU, CSC
Camp site restoration	- Camp site to be restored to its original condition as per the rehabilitation plan - Restoration of top soil - Disposal at waste at designated locations - Cleaning of water channels - Removal of debris and disposal	Contractor's BOQ	Contractor	PIU, CSC
Operation & maintenance phase				
Change in Water Table/ Water Quality	- Rainwater harvesting technology will be - Rechargeable pits will be constructed to recharge ground water	Part of agency budget	PD-ADB	PD-ADB
Water Demand / Supply & Waste water Disposal	- Treated Water will be of Nepal's National standard - Only insufficient water will be extracted	Part of agency budget	PD-ADB	PD-ADB
Fire hazard and other emergency response system	- Smoke detection devices will be installed - Earthen and Electrification will be properly done - Fire extinguisher will be installed - Emergency reservoir tank will be made - National Building Code, 2005 will be followed	Part of agency budget	PD-ADB	PD-ADB
Movement of vehicles and parking	- Haphazard parking will not be allowed - Traffic signs will be placed - Speed limit of vehicle inside business complex will be maintained	Part of agency budget	PD-ADB	
Surface runoff and drainage systems	- Rechargeable pits will be installed - Greenery area will be maintained	Part of agency budget	PD-ADB	PD-ADB
Loss of open space and vegetation	Development of greenery area through landscaping and regular maintenance	Part of agency budget	PD-ADB	PD-ADB

Table 8: Environmental Monitoring Plan

Project Phase	Mitigation	Compliance Inspection Activities	Location	Frequency	Responsibility	Budget
Pre-construction	Update EMP based on the detailed design	Submission by the contractor and approval by the DOR site Project Office	PIU-Office	At least 30 days prior to commencement of work	Contractor and CSC Chudamani Bhakshi Project Director	Part of construction cost
	Water supply arrangement, disposal for debris, ground staking of construction site	Clearances, permits, approvals to be submitted prior to construction	Posted onsite	Prior to commencement of construction	Contractor and CSC	Part of construction cost
Construction	Transportation arrangement, ground staking of temporary storage areas including signages	Submission of transport routes, on-site inspection of storage areas	On-site	Monthly during the construction phase	Contractor and CSC	Part of construction cost
	Stripping and storage of 150 mm topsoil	Site inspection of stripped and stored materials	On-site	During site clearing and excavation	Contractor and CSC	Part of construction cost
	Installation of proper fuel and lubricant storage area	Site inspection	On-site	Within 30 days after commencement of civil works	Contractor and CSC	Part of construction cost
	Installation of silt fence or interceptor drains around the project site to control silted runoff from flowing out	Site inspection	On-site	Within 30 days after civil works or 15 days before the on-set of monsoon	Contractor and CSC	Part of construction cost
	Dust and air pollution control – regular sprinkling of all exposed soils including storage piles	Visual inspection of dust, dust settlement on surrounding structures and vegetation, complaints.	On-site	Daily	Contractor and CSC	Part of construction cost
		Measurement of SPM, PM ₁₀ , PM _{2.5}		Twice a year during dry season	Measurement to be done by CSC	
	Noise control –	Spot noise monitoring using	On-site and surround	Daily during when noise	Contractor and CSC	Part of

Project Phase	Mitigation	Compliance Inspection Activities	Location	Frequency	Responsibility	Budget
	consultation with the surrounding communities/offices in the schedule of works that will generate noise, provision of noise buffers around noise generating equipment and activities	applicable cell phone apps or noise monitoring equipment on sensitive areas. Complaints. Regular consultations with surrounding communities/offices.	community	generating activities or when equipment is operating	Noise measurement to be done daily by contractor	construction cost
	Occupational health and safety, materials handling, HIV/AIDs awareness	Spot and periodic inspection. Linkage with state health programs	On-site	Spot and weekly	CSC	Part of construction and DOR site Project Office monitoring contract
	Proper disposal and solid and liquid waste. Recycling and reuse of materials	Spot checking and periodic inspection	On-site	Spot and monthly	Contractor and DOR site Project Office	
Operation	Energy efficiency in building operation, waste minimization, recycling and reuse. Environment Friendly maintenance of air conditioners.	Energy and waste audits	On-site	Annual	PIU	Part of annual operating budget

C. Institutional Setting and Proposed Implementation Arrangement

1. Project Management

144. Both the EA and the IA have extensive experience in implementing ADB-financed road projects. The Project Directorate (ADB), established in 1987, will be maintained within DoR and serve as the Project Implementation Unit (PIU). The Project Director will have overall responsibility for all aspects of project implementation and management including procurement, contract administration, progress monitoring, financial management, reporting, land acquisition and resettlement. Implementation Arrangement (IA) has to be ensured for EMP implementation and for conducting meaningful environmental monitoring. Well defined roles and responsibilities and adequate institutional arrangements are crucial for effective implementation of the environmental safeguard measures outlined in Tables 7 and 8.

145. The Environment focal person of the Contractor will be responsible for implementation of the EMP during construction works and Construction Supervision Consultant (CSC) will be primarily responsible for supervision, and monitoring of the implementation of the EMP. The EMP and MoP specify the name of the organizations responsible for implementation and supervision of mitigation and monitoring activities. The contractor will be recommended to have one Environment, Occupational Health and Safety (EOH&S) Manager, who will closely work with the environmental staff of DSC and PD-ADB.

2. Supervision Consultant

146. The PD-ADB currently has design consultants on board who will assist them with the detailed design of the building. Further the PD-ADB will hire Construction Supervision Consultant (CSC) under the SHIP project to supervise the construction of civil works, and also make arrangement of supervision and monitoring of EMP implementation through environment specialist. The Environmental specialist, in coordination with PIU, will ensure the implementation of environmental management and monitoring plan at each stage of the project.

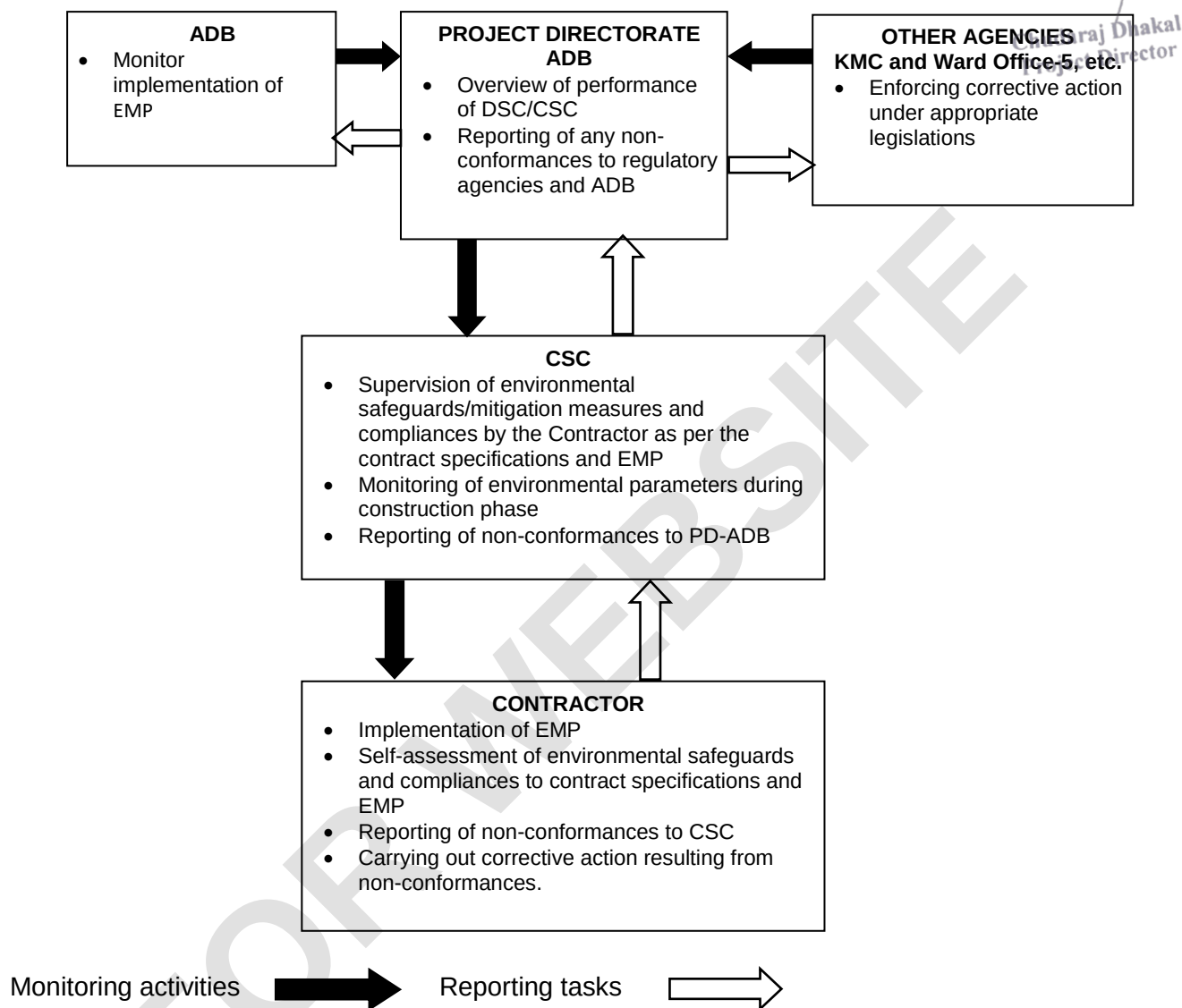
147. The main tasks of the Environmental Expert will include, but not limited to, the following:

- Oversee implementation of the EMP of the project;
- Evaluation of construction related environmental impacts and modifications of the EMP as necessary for adaptation/changes during the project implementation; and
- Preparation of periodic progress reports, QPR and ESMR and submit to PD(ADB)/DoR and ADB.

3. Project Organization

148. The overall organization structure of the project is shown in the succeeding Figure 12. MoPIT will be the Executing Agency (EA) and DoR will be the Implementing Agency (IA) for the project. More specifically, the Project Directorate (ADB) PIU under DoR will be the key institution for the successful implementation of the project and ensure compliance to ADB safeguards as contemplated in the environmental management and monitoring plans.

Figure 12: EMP Implementation Organogram



D. Estimated Environmental Cost

149. The costs of the monitoring and mitigation will comprise: air, water, noise quality monitoring through sample collection, measurement and laboratory analysis. The total cost for implementation of the EMP and monitoring has been estimated as about USD 2,000 during construction phase.

IX. CONCLUSION AND RECOMMENDATIONS

A. Conclusions

150. The findings of Environment Assessment of Project Directorate-ADB office building indicates that impacts are unlikely to cause any significant environmental impacts. Most of the impacts are likely to occur during construction stage, are temporary in nature, and can be mitigated with minor to negligible residual impacts. Operation phase impacts are related to proper sanitation system and waste disposal.

151. The sites/designs were selected based on availability of government land in the urban centre on existing office premises to avoid private land acquisition and related resettlement issues, and environmental concerns relating to sensitive habitats. Accordingly, the proposed building site is not near protected or sensitive areas or of any historical or archeologically protected areas. Similarly, there is no need for cutting trees as the siting of the building has been done to avoid it.

152. Considering the proposed site is not environmentally sensitive and the scale and scope of work are limited, the project is categorized as category B as per ADB Safeguard Policy Statement 2009. No categorization is made under environmental legislation of Nepal, since these small areas do not require any environmental clearance in accordance to Environment Protection Act, 1997 and Environment Protection Rules, 1997 amended till date.

153. The impacts identified are mostly related to demolition of existing building, land clearing, shifting of utilities, establishment of construction camp or material storage areas, occupational health and safety, dust and noise as the site is located in an institutional or commercial zoned area, disruption of utilities, generation of construction debris, and transportation of materials. All identified impacts are either eliminated or minimized through design consideration and suitable mitigation measures.

154. The EMP including monitoring plan has been formulated to eliminate or reduce the above mentioned negative impacts and enhance the positive impacts during pre-construction, construction and operation stages of the PD-ADB Office Building. The EMP including MP has been formulated to eliminate or reduce the above mentioned negative impacts and enhance the positive impacts during pre-construction, construction and operation stages of the PD-ADB Office Building. Total budget for implementation of EMP is approximately USD 2,000.

B. Recommendations

155. Based on the findings of this study, the following items are recommended:

- Nepal National Building Code (NNBC) planning and norms should be followed strictly during planning, design, construction and operation of PD-ADB Office Building;
- Solar panel installation on the roof top of the PD-ADB Office Building can be done for environmentally friendly power;
- Rainwater harvesting and groundwater recharge provision shall be included in the building design features
- Ensure that the proposed mitigation measures including occupational and community H&S will be included in the contract document and implement accordingly.



- With incorporation of the updated baseline data, the EMP will need to be updated during detailed design of the PD-ADB Office Building.

156. Considering that this project is not under any category under GoN and category B under ADB SPS, this IEE is sufficient as the environmental assessment for this project. Other than updating the EMP during detailed design, no further detailed studies are required.


Chudanga Bhakal
Project Director

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APPENDIX 1: RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST

Country/ Project Title : NEP: PD-ADB Office Building
Sector Division : Department of Roads (DoR/ ADB)


Government of Nepal
Ministry of Infrastructure Development
Department of Roads
Directorate (ADB)
Bishalnagar


Chudaraj Dhakal
Project Director

SCREENING QUESTIONS	YES	NO	REMARKS
A. Project Siting: Is the project area adjacent to or within any of the following areas?			
• Underground Utilities		✓	
• Densely populated?	✓		
• Heavy with development activities?	✓		
• Adjacent to or within any environmentally sensitive areas?		✓	
• Cultural heritage site		✓	
• Protected Area		✓	
• Wetland		✓	
• Buffer zone of protected area		✓	
• Special area for protecting biodiversity		✓	
B. Potential Environmental Impacts Will the Project cause...			
• Encroachment on historical/cultural areas?		✓	
• Encroachment on precious ecology (e.g. sensitive or protected areas)?		✓	
• impacts on the sustainability of associated sanitation and solid waste disposal systems.		✓	
• dislocation or involuntary resettlement of people		✓	
• degradation of land and ecosystems (e.g. loss of wetlands and wild lands, coastal zones, watersheds and forests)?		✓	
• Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		✓	
• Accident risks associated with increased vehicular traffic, leading to loss of life?		✓	
• degradation of cultural property, and loss of cultural heritage and tourism revenues?		✓	
• water resource problems (e.g. depletion/ degradation of available water supply, deterioration for surface and ground water quality , and pollution of receiving waters?		✓	
• Increased noise and air pollution resulting from increased traffic volume?		✓	Deterioration in ambient air quality will be localized and temporarily during the construction phase. Mitigation measures are: • Sprinkling water during construction activities • Covering construction materials and • Managing demolition wastes



Chudaraj Dhakal
Project Director

SCREENING QUESTIONS	YES	NO	REMARKS
• Occupational and community health and safety risks?	✓		During the project construction safety risk may arise. However, by adopting the mitigation measures proposed in the EMP, it shall be mitigated
• social conflicts between construction workers from other areas and local workers?		✓	Most of the workers will be hired for work and will not stay at construction site after work
• road blocking and temporary flooding due to land excavation during rainy season?		✓	
• noise and dust from construction activities?	✓		
• traffic disturbances due to construction material transport and wastes?		✓	May cause traffic disturbance in traffic if operated at day time hence, movement of loaded vehicle will be done in night time
• temporary silt runoff due to construction?		✓	May result siltation if construction performed at monsoon, hence land levelling and construction of foundation will be done before/after monsoon. Furthermore, release of drain directly to the sewer will be prohibited during construction
• hazards to public health due to ambient, household and occupational pollution, thermal inversion, and smog formation?		✓	
• water depletion and/or degradation?		✓	
• overpaying of ground water, leading to land subsidence, lowered ground water table, and salinization?		✓	Provision of ground water recharge and rainwater harvest/utilization will be made
• contamination of surface and ground waters due to improper waste disposal?		✓	
• Community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?		✓	The project area is protected by compound wall from the direct access of the public.
Based on the above assessment the project may be categorized as “B” as per SPS, 2009.			

The following questions are not for environmental categorization. They are included in this checklist to help identify potential Climate and Disaster risks.

	Screening Questions	Score	Remarks ¹
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather-related events such as floods, droughts, storms, landslides?	0	The project site is at low from landslides and flooding.

Screening Questions		Score	Remarks ¹
	Would the project design need to consider any hydro-meteorological parameters level, (e.g., sea-peak river flow, reliable water level, peak wind speed etc)?	1	The project site has a low risk for flooding.
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters) affect the selection of project inputs over the life of project outputs (e.g. construction material)?	0	The increase in temperature, precipitation, and flooding will not likely affect the selection of construction materials.
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)?	1	Increased precipitation in future may require more maintenance works of the project road to ensure they are usable particularly during incidents of heavy rain and flash floods
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	0	The design life of the project, particularly the approach roads will be shortened if the required maintenance works are not undertaken.

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response will be categorized as high-risk project.

Result of Initial Screening (Low, Medium, High): **MEDIUM**

Other Comments: _____

Prepared by: _____

¹ If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

APPENDIX 2: AMBIENT NOISE LEVEL LIMITS (in Leq dB (A), Nepal)

Environmental Setting	Typical Range of Ldn, dBA	Average Ldn, dBA
High Traffic Area	64-86	74.36
Old Residential Area	59-73	66.28
New Residential Area	48-69	62.00
Commercial Cum Residential Area	69-75	72.75
Commercial Cum Tourist Area	59-76	69.25

Source: Nepal Health Research Council, 2003

Guideline values for community noise in specific environments

Specific Environment	Critical health effect(s)	LAeq [dB]	Time base [hours]	LAmx fast [dB]
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	
Inside bedrooms	Sleep disturbance, night-time	30	8	45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60
School class rooms and pre-schools, indoors	Speech intelligibility, disturbance of information extraction, message communication	35	during class	-
Pre-school	Sleep disturbance	30	sleeping	45
Bedrooms, indoors			-time	
School, playground outdoor	Annoyance (external source)	55	during play	-
Hospital, ward rooms, indoors	Sleep disturbance, night-time	30	8	40
Hospitals, treatment rooms, indoors	Sleep disturbance, daytime and evenings	30	16	-
	Interference with rest and recovery	#1		
Industrial, commercial, shopping and traffic areas, indoors and outdoors	Hearing impairment	70	24	110
Ceremonies, festivals and entertainment events	Hearing impairment (patrons:<5 times/year)	100	4	110
Public addresses, indoors and outdoors	Hearing impairment	85	1	110
Music through headphones/ Earphones	Hearing impairment (free-field value)	85 #4	1	110
Impulse sounds from toys, fireworks and firearms	Hearing impairment (adults)	-	-	140 #2
Outdoors in parkland and conservation areas	Hearing impairment (children)	-	-	120 #2
	Disruption of tranquility	#3		

Source: WHO, 1999

APPENDIX 3: NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS) FOR NEPAL

Parameters	Units	Averaging Time	WHO Guideline	Concentration in Ambient Air, maximum	Test Method
TSP (Total Suspended Particulates)	$\mu\text{g}/\text{m}^3$	Annual	120-230	-	HVS 24-hour sampling (one week sample on 2 road side station)
		24-hours*		230	
PM ₁₀	$\mu\text{g}/\text{m}^3$	Annual	70	-	Light Volume Sampling
		24-hours*		120	
Sulphur Dioxide	$\mu\text{g}/\text{m}^3$	Annual	125	50	Diffusive sampling based on weekly average
		24-hours**		70	
Nitrogen Dioxide	$\mu\text{g}/\text{m}^3$	Annual	150	40	Diffusive sampling based on weekly average
		24-hours**		80	
Carbon Monoxide	$\mu\text{g}/\text{m}^3$	8 hours**	100000	10,000	To be determined before 2005
		15 minutes		100,000	Indicative sampler
Lead	$\mu\text{g}/\text{m}^3$	Annual	0.5-1.0*	0.5	Atomic absorption spectrometry analysis of PM ₁₀ samples
		24-hours		-	
Benzene	$\mu\text{g}/\text{m}^3$	Annual	-	20****	Diffusive sampling based on weekly average
		24-hours		-	

Source: Nepal Gazette B.S. 2060/4/19 (4 August, 2003)

Notes:

*24 hourly values shall be met 95% of the time in a year. 18 days per calendar year the standard may be exceeded but not on two consecutive days,

**24 hourly standards for NO₂ and SO₂ and 8 hours standard for CO are not to be controlled before MOPE has recommended appropriate test methodologies. This will be done before 2005,

***If representativeness can be proven, yearly averages can be calculated from PM₁₀ samples from selected weekdays from each month of the Year,

****To be re-evaluated by 2005.



APPENDIX 4: NEPAL'S DRINKING WATER QUALITY STANDARDS & WATER QUALITY FOR IRRIGATION

Chudaraj Dhakal
Project Director

Group	Parameter	Unit	Maximum Concentration Limits
	Turbidity	NTU	5 (10)**
	pH		6.5-8.5*
	Color	TCU	5 (15)**
	Taste & Odor		Would not be objectionable
	Total Dissolved Solids	mg/l	1000
	Electrical Conductivity	µc/cm	1500
	Iron	mg/l	0.3 (3)**
Physical	Manganese	mg/l	0.2
	Arsenic	mg/l	0.05
	Cadmium	mg/l	0.003
	Chromium	mg/l	0.05
	Cyanide	mg/l	0.07
	Fluoride	mg/l	0.5-1.5*
	Lead	mg/l	0.01
	Ammonia	mg/l	1.5
	Chloride	mg/l	250
	Sulphate	mg/l	250
	Nitrate	mg/l	50
	Copper	mg/l	1
Chemical	Total Hardness	mg/l	500
	Calcium	mg/l	200
	Zinc	mg/l	3
	Mercury	mg/l	0.001
	Aluminum	mg/l	0.2
	Residual Chlorine	mg/l	0.1-0.2*
Micro Germs	E-Coli	MPN/100ml	0
	Total Coli form	MPN/100ml	95 % in sample

Source: Ministry of Physical Planning and Works (Nepal Gazette (B.S. 2063/03/12))

Notes:

* These standards indicate the maximum and minimum limits.

** Figures in parenthesis are upper range of the standards recommended.

APPENDIX 5: GUIDELINES FOR WORKERS' SAFETY DURING CONSTRUCTION

S. No.	Stage and Nature of construction Hazard	Safety measures expected to be taken by the contractors and site Engineers
1	Excavation in soft, loose & slushy soil above 2m depths sliding of earth or collapsing of sides.	The Excavation beyond 1.5m to 2m to be done in steps of minimum 500mm offsets and also planking and strutting should be done.
2	Excavation in slippery area (water logged) -the labour may fall or machinery on site may slip.	Try to dewater the area and spread minimum 150mm thick sand layer to avoid slipping
3	Excavation in rock where chiselling involved – The fall of hammer may injure the hand, small rock pieces may injure the eyes and legs.	For hammer work, only experienced and skilled labour should be employed. Chisel should not be allowed to be held by hand, while hammering but chisel holding clamp should be provided. The labour should be provided with goggles and leg cover to protect eyes and legs, from injuries due to small rock pieces.
4	Excavation in Rock where blasting is involved – careless handling may lead to injury to worker or a passerby.	The work of blasting should be entrusted to only experienced persons. Provide sufficient length of fuse to give ample margin of time from the time of lighting to the time of explosion. A danger zone at least 180m diameter is to be flagged off 10 minutes before actual firing. All workmen should be sent way from danger zone except the firing man, who should be provided with a whistle.
5	Excavation for drain across road or manhole adjacent to a road – chances of a passer by falling into the excavated portion.	The area should be well barricaded & a red lamp provided at night. A watchman should be deputed to prevent any movement of persons or vehicles.
6	Centering and scaffolding – formwork collapse while concreting or just before concreting or just before concreting especially when wooden ballies are used.	Many a times ballies joined together give way due to weak joint. Hence the use of joined ballies should be restricted. Only 2 joined ballies out of 8 ballies should be allowed. In case of double staging for a slab at a height, utmost care should be taken to see that the top balli rests on the bottom balli. Particular care that should be taken during each concreting, operating of slabs and beams is that one carpenter and two helpers with spare ballies, nails etc. should be deputed below the slab/beam that is being concreted to watch any disturbance in the supports of the form-work below, during concreting and in case of any doubt concreting should be stopped immediately and the form work to be strengthened. Never allow bricks below a balli to make up the required height. This is most dangerous.
7	Form- work for beams and slabs – opening the form – work accident due to fall of materials during removing the forms.	In fact, this is a most dangerous work. One should be very careful while formwork is removed. Only trained carpenters should be deputed for the work. A safe resting place outside the area of slab as a temporary measure should be constructed from where the slab can be removed safely. Removal of form-work during night should not be permitted under any circumstances.
8	Scaffolding – Fall of work-man, supervision staff, standing on challis not tied properly or toed only at one end. (Challis mainly made of Bamboos)	This is a very common negligence on the part of labour who does scaffolding work. The Challis on which they work either span over its complete length or is tied loosely and many a times at one end only.



S. No.	Stage and Nature of construction Hazard	Safety measures expected to be taken by the contractors and site Engineers
		Hence, care must be taken that the challis do not span over the full length but some middle support should be provided and also the same is tied properly on both ends.
9	Ladders - Balli or bamboo ladders – The horizontal member breaks and the person falls. Sometimes the top face just rests on wall and the whole ladder tilts causing an accident.	The ladders should be strong enough to bear the weight of a labour with materials on head. As far as possible a hand rail should be provided at one end. The horizontal member should be preferably fixed with bolt & nuts or strong nails. When the ladder is placed across a wall the top portion should be tied firmly to a strong support so that the ladder does not move laterally.
10	Dismantling – Dismantled materials may fall on passerby or the person engaged in dismantling work may fall due to slipping. The dismantled materials may fall on persons working below.	When work of demolition is to be taken up the area should be closed for all outsiders. No one should be allowed up to 50m from the place of demolition. The workers engaged in demolition should be asked to wear safety belts. Helmets must be worn by all the workers engaged in dismantling work. The place should be strictly guarded at night with red lights at prominent places, and watchman should be posted.
11	Electrical connections/ cables etc., - HT / LT electric wire passing near the slab structure – while bending, lifting or tying reinforcements the bar benders may sustain the electric shock, causing fatal injury.	The work in such places should not be allowed to the workers themselves, but in such position the work must be executed under the strict supervision of a responsible Foreman or a Supervisor.
12	Electric- connections/cables, etc., - cables below ground may get punctured during excavation & thus electrocute the labour working. Similarly, when connecting is in progress the punctured cable may prove to be fatal to the labour.	Before taking up the work all available drawings should be studied, local enquiry to be made to know the position of cables and work in such area should be got executed under strict supervision of an experienced Foreman or a supervisor.
13	Electric connections/cables etc.,- Temporary Electric lines near damp walls, near joinery stretched on a considerable length – There is every chance that the wire may get cut due to usage and may develop short circuits/leakages etc. and may electrocute the person touching the wire accidentally.	The Electric wires should be maintained by an electrician who should regularly check-up the insulation of wires especially placed near steel items & damp areas. The temporary wiring should be supported properly. As far as possible a good quality wire should be used which may not get damaged easily.
14	Electric and gas welding work – Drilling, polishing work – Done by temporary cables used on a number of works – Due to the fact that the wires are old & when they come in contact with water even in the process of curing the surrounding area may get affected due to leakage in the electric current thus causing damage to the workers & supervision staff.	All wiring works to be inspected by experienced electrician. All wires to be properly insulated and fixed at height on temporary poles. No welding work should be permitted near damp area. The welders to be provided with welder's goggles & gloves. As far as possible machine in good condition should be used.
15	Construction machinery – Concrete mixers – Safety precautions. A mixer with hopper tried to be operated by a helper could not release brake in time thus causing injury to the person near hopper – sometimes fatal one.	The Mixers with hopper should be operated by an experienced mixer operator and such mixers should not be allowed to be handled by a helper or a labour.

S. No.	Stage and Nature of construction Hazard	Safety measures expected to be taken by the contractors and site Engineers
16	Water storage Tank for general use and curing - chances of children of workers falling in the tank with fatal accident.	The water tanks constructed on site should be protected by at least 1.0m high walls on four sides, so that the children do not fall.
17	Site cleaning – Cleaning top floors of buildings – Upper portion of any structure – throwing waste materials broken concrete pieces, brick bats, sand etc., straightway from top to ground injuring person below or even a passerby.	This dangerous practice should not be allowed at all. The materials should be brought to the ground with the help of lift or the use of rope over pulley with a bucket, thus bringing down materials safely.
18	Bar bending work – Helpers of bar benders to follow short cut method, throw surplus steel pieces from top floors to ground and may cause fatal injuries.	This is a very bad practice. The helpers should bring the rods to ground with help of lift or rope and pulley.

FOR WEBSITE



Chudaraj Dhakal
Project Director

APPENDIX 6: WORKERS' SAFETY IN COMMON OPERATIONS AND DURING CONSTRUCTION

HOUSEKEEPING PRACTICES

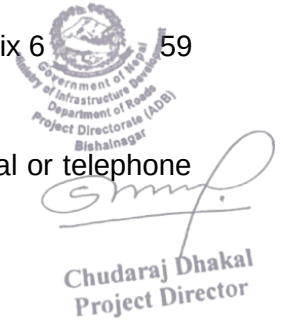
- Maintain washrooms and canteens clean
- Keep all walkways clear and unobstructed at all times
- Ensure that no spillages of oil and grease occurs in the construction camp
- Stack raw materials and finished products clear of walkways or out of roads
- Do not leave tools on the floor or in any location where they can be easily dislodged
- Keep windows and light fittings clean
- Maintain the workplace floors dry and in a non-slippery condition
- Provide and maintain proper drainage system to prevent stagnant water.
- Use metal bins for oily and greasy rags and store all flammable materials in appropriate bins, racks or cabinets. Ensure that the metal bins for storing oily and grease rags should be covered with lids.
- Ensure that protruding nails in boards or walls are removed or bent over so that they do not constitute a hazard to people
- Make sure that hazardous/dangerous chemicals are kept in the stores with the appropriate labelling, display of the material-safety-data-sheet (MSDS) and other precautionary measures
- Display "no smoking" signs in areas with high fire risks such as paint stores, wood working areas, etc.

SAFE LAYOUT IN THE CONSTRUCTION PLANT, CAMP AND QUARRY AREAS

- Arrange perimeter fencing for construction plant
- Ensure good visibility and safe access at site entrances
- Provide adequate warning signs at the entrance and exit and where ever necessary
- Provide adequate space/area for loading, unloading and storage of materials, plant and machinery
- Display emergency procedure and statutory notices at conspicuous locations
- Consider provision of welfare facilities required
- Provide areas for dumping garbage and other waste materials, and also arrange their regular clearance and safe disposal
- Arrange storage, transport and use of fuel, other flammable materials and explosives in lines with the license requirements to be obtained from appropriate authorities
- Plan emergency assembly points, fire escape routes and location of fire-fighting equipment
- Provide access roads and plant movement areas within the site.
- Ensure the availability of first aid facilities and display notices to show the location of these facilities
- Provide proper drainage and sewage facilities

TREE FELLING

- Use hard hats during tree felling works
- Ensure that tools such as axes are in good condition
- Determine proper foot and body position while using the axe
- Wear appropriate foot protection while felling trees



- Carry a first aid kit to the site
- Determine possible hazards in the area, with reference to electrical or telephone or other utility lines
- Determine the safest direction for the tree fall prior to felling
- Determine the proper hinge size before directing the tree fall.

NOISE HAZARDS AND ITS CONTROL

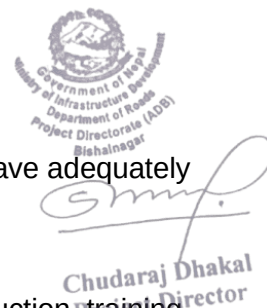
- Observe the indications of noise levels
- Use sound level meters to measure. If the sound level exceeds 85 dB(A), then preventive and protective measures should be taken
- Make personnel aware of noisy areas by using suitable warning signs and insisting that ear protective devices should necessarily be worn.
- Reduce noise at source by improved maintenance, replacing noisy machines, screening with noise absorbing material, making changes to the process/equipment, controlling machine speeds, ensuring that two noise-generating machines are not running at the same time, using cutting oils and hydraulic breakers.
- Appoint a competent person to carry out a detailed noise assessment in the site, designate ear protection zone, and give instructions on the necessary precautionary measures to be observed by site personnel, including the use of suitable type of ear protections.
- Wear and maintain ear muffs and ear plugs as required
- In construction or repair works, noise should be kept to a low-level bearing in mind the disturbance to local residents.

ELECTRICAL HAZARDS IN CONSTRUCTION AREAS

- Treat all wires as live wires
- Never touch dangling wires but report them to the manager
- Unless you are a qualified electrician do not attempt electrical repairs
- Never use electrical equipment if your hands are wet or you are standing in water
- If electrical equipment is sparking or smoking, turn the power off and report the condition to the supervisor
- Never use electrical wires having physical damage
- Never allow equipment or traffic to run over the electrical wires.

USE AND STORAGE OF GAS/LPG

- Store filled gas/LPG cylinder in an open area or outside the building
- Transport, store, use and secure cylinders in upright position
- Ensure proper ventilation at the ground level where the gas/LPG is in use
- Avoid physical damage to the cylinder
- Never weld or cut on or near the cylinder
- Store empty cylinders secured and in upright position.
- Make sure that the cylinder is closed immediately after use.
- Investigate immediately if there is the smell of LPG or gas.
- Never use detached gas/LPG on site.
- Make sure that there is no fire in the vicinity of the cylinder.



OPERATION OF EXCAVATORS

- Ensure that excavators are operated by authorized persons who have adequately trained.
- Prevent unauthorized movement or use of excavators
- Check regularly and maintain the machine thoroughly
- Ensure that all relevant information, including those related to instruction, training, supervision and safe system of work are provided to the operators.
- Ensure that the operation and maintenance manuals, manufacturer's specifications, inspection and maintenance log books are provided for the use of machines to service engineers or other safety personnel during periodic maintenance, inspection and examination.
- During tipping or running along the trenches, excavators must be provided with stop blocks.
- Excavators must be rested on firm ground during operation.
- Avoid operating the machine too close to an overhand, deep ditch or slope.
- Locate and identify underground utility services by checking with all utility companies before the excavations.
- Ensure that all excavations are supervised by experienced and competent persons.
- When reversing or in case the operator's view is restricted, adequate supervision and signalling should be provided.
- Ensure that the type and capacity of the excavator are properly chosen for the intended purposes and site conditions. Never use a machine for any purposes other than it is designed for.
- Check and report for excessive wear and any breakage of the bucket, blade, edge, tooth and other working tools of the excavator.
- Check that all linkages/hinges are properly lubricated and ensure that the linkage pins are secured. Never use the improper linkage pins.
- Never get down or climb a moving machine
- Ensure adequate ventilation and lighting in the working place.
- Ensure that the protective front screen of the driving cabin is fixed in position during excavations to avoid eye injury to the operator.
- Ensure to switch-off the unattended vehicle.

OPERATION OF TRUCKS AND DUMPERS

- Ensure that only trained, authorized and licensed drivers operate the vehicles.
- Provide the help of another worker before reversing the vehicle.
- Switch-off the engine of an unattended vehicle.
- Lower the tipping bodies when the machine is unattended, but if it is necessary to leave them in the raised position they should be blocked to prevent their fall.
- Wear safety boots or shoes to avoid injuries during loading and unloading.
- Carryout periodic servicing to the manufacturer's requirements. All records of maintenance and repairs should be in writing and kept in the site.
- Keep the vehicle tidy and its cabin free from tools and materials which might obstruct the controls.
- Do not exceed speed limits.
- No passenger should be carried on a dumper except the driver
- Never drive the vehicle across a slope
- Provide stop blocks when the vehicle is tipping into or running towards excavations

- Do not overload the vehicle.
- Carry only well secured loads.
- Park only on level ground, in neutral with the parking brake applied.
- Never climb or get down from a moving vehicle.

GAS WELDING

- Use the following personal protective equipment during welding
 - Face or hand shield fitted with filters,
 - Goggles, particularly while chipping slag,
 - Gloves long enough to protect wrists and forearms against heats, molten metal and radiation,
 - High-top boots to prevent sparks from burning foot.
- Screen the work area with sturdy opaque or translucent materials as glare can cause eye injury.
- Key for opening the acetylene cylinder valve must be kept ready while the cylinder is in use so that the cylinder valve may be immediately shut-off in an emergency.
- Ventilate the workplace using air blowers and exhaust fans to remove poisonous fumes and gases that are being used during welding
- Take precautions against flying spark and hot slag where welding is being done near flammable materials and check the area before leaving.
- Do not weld the material degreased with solvents until it is completely dry.
- Do not use gas cylinders for supporting work or as rollers.
- Do not use oil/grease on oxygen cylinder fittings.
- Do not use cylinders with damaged valves.
- Do not use too much force if valves are stuck.
- Replace valve caps after use
- Search for leaks in equipment by using a solution of soap water.
- Shut the cylinder valve if acetylene from a cylinder catches fire at the valve or regulator due to leakage at a connection.
- Treat all gas cylinders as “full” unless you are sure otherwise.
- Never attempt to transfer acetylene from one cylinder to another or attempt to refill an acetylene cylinder.
- Keep portable fire extinguishers near the welding area
- Secure all cylinders against accidental displacement.
- Always lift gas cylinders. Do not slide them along the ground or drop them from trucks.
- Keep gas cylinders in vertical position both in store and when it is in use.
- Keep the work place dry, secure, free from combustible materials and obstruction.
- Store the acetylene and oxygen cylinders separately and in a proper store.
- Keep the gas cylinders away from source of heat, flammable materials, corrosive chemicals and fumes.

MANUAL HANDLING AND LIFTING

- Use mechanical equipment in place of manual handling as far as possible.
- Assess the manpower required to handle or lift the load safely and arrange the manpower accordingly.
- While handling hazardous materials, the workers shall be informed of the hazards and safety precautions.
- All relevant persons shall be trained on proper methods of lifting and carrying.

- Where team work is required, select the persons whose ages and physical builds are compatible for teaming up. Coordinate the actions of the team members by giving necessary instructions.
- Always lighten or suitably shape the load for manual handling. As far as possible keep a look for splinters, sharp edges, loose banding and nails.
- Clear path or obstruction and tripping hazards.
- Stack and secure goods safely on trucks, otherwise they fall off and injure passers-by.
- Use personal protective equipment such as gloves, safety shoes, etc.
- Adopt the following procedure when you lift a load.
 - Stand close to the object, have a firm footing with feet spread on either side of the road.
 - Bend the knees and keep your back as straight as you can.
 - Grasp object firmly & be sure grip will not slip
 - Breathe in and throw the shoulder backwards.
 - Straighten the legs, continuing to keep the back as straight as you can.
 - Hold the object firmly & close to the body
 - Always lift smoothly, avoid jerky motions and turn with feet instead of twisting the back.

FIRST AID

- Provide first aid boxes at every site.
- Ensure that training on the use of first aid box is provided to a handful of staff working in the site.
- Display the list of persons who are trained on providing first aid.
- Ensure that every first aid box is marked plainly "First Aid" in English and local language.
- The responsible person or first aider should replenish the contents of the first aid box as necessary.

PERSONAL PROTECTIVE EQUIPMENT

List of personal protective equipment (PPE)

Sl. No.	Part of the body	Personal protective Equipment
1	Eye	Safety glasses, Goggles
2	Face	Face shields
3	Nose	Nose masks
4	Head	Helmets
5	Feet	Safety shoes
6	Hands and Arms	Gloves
7	Body	Vests
8	Hearing	Earplugs, Earmuffs

General:

- Ensure that sufficient personal protective equipment are provided and that they are readily available for every person who may need to use them.
- The management should ensure that all persons make full and proper use of the personal protective equipment provided.
- Provide instruction and training on the proper use and care of protective equipment.



Chudaraj Dhakal
Project Director

- Do not wilfully misuse, interfere with or ill-treat any protective clothing and equipment provided.
- Ensure that the personal protective equipment are in good condition. Report immediately any damage to the management for replacement. Always keep the personal protective equipment as clean as possible.

Eye Protection

- Issue eye protection equipment where there is a foreseeable risk of eye injury.
- Ensure an adequate supply of goggles/shields is available.
- Keep the goggles clean and make sure they fit well.
- Do not watch welding operations unless your eyes are protected.

Head Protection

- No person shall enter a construction site unless he is wearing a suitable safety helmet
- Wear a safety helmet:
- When there is the risk of being hit by falling objects
- While on or near a construction site
- During adverse weather conditions
- When in any area designated as a "hard hat" area.
- Provide identification labels to all helmets in some way to prevent random exchange among wearers, with one helmet exclusive to each person.
- Inspect helmets for cracks, sign of impact or rough treatment before each usage and replace defective or damaged helmets.

Hearing Protection

- Provide ear plugs or ear muffs as required. Use re-usable ear plugs when the reduction required (15-25 dB (A)) is not excessive. Use ear muffs where a large attenuation of up to 40 dB (A) is demanded.
- Do not use dry cotton wool for hearing protection because it cannot provide protection.
- Provide disposable ear plugs for infrequent visitors and ensure that they are never re-used.
- Provide re-usable ear plugs for those who need to work continuously for a long period in a high noise area.
- Use ear muffs with replaceable ear cushions because they deteriorate with age or may be damaged in use.
- Avoid wearing spectacles with ear muffs.
- Use soap and water or the recommended solvent for cleaning ear muffs.
- Provide ear muffs for those who may need to get in and out of a high noise area frequently.

Respiratory Protective Equipment

- Wear suitable respirable mask for protection against small particles entering the lungs, e.g. while emptying of cement bags.
- Provide training to all persons using the respirators for their correct fitting, use, limitations and symptoms of exposure.
- Clean and inspect all respirators before and after use.
- Store respirators properly when it is not in use.

Safety Footwear

- Wear suitable footwear while working.
- Use safety footwear on site or in dangerous areas.
- 3) Wear suitable safety shoes or ankle boots when working where there is a high risk of foot injuries from slippery or uneven ground, etc.
- All Safety footwear including safety shoes, ankle boots and rubber boots should be fitted with steel toecaps.
- Avoid wearing flip flops, high heeled shoes, slippers, light sport shoes in situations where there is a risk of foot injury.
- Keep shoe lace knots tight.

Hand Protection

- Wear suitable gloves for activities such as welding & cutting and manual handling of materials & equipment.
- Do not wear gloves where there is a risk of them becoming entangled in moving parts of machinery.
- Wash hands properly with disinfectant soap before eating & drinking. Wash hands immediately after each operation on site & when the situation warrants.

FIRE PREVENTION, FIGHTING AND EQUIPMENT

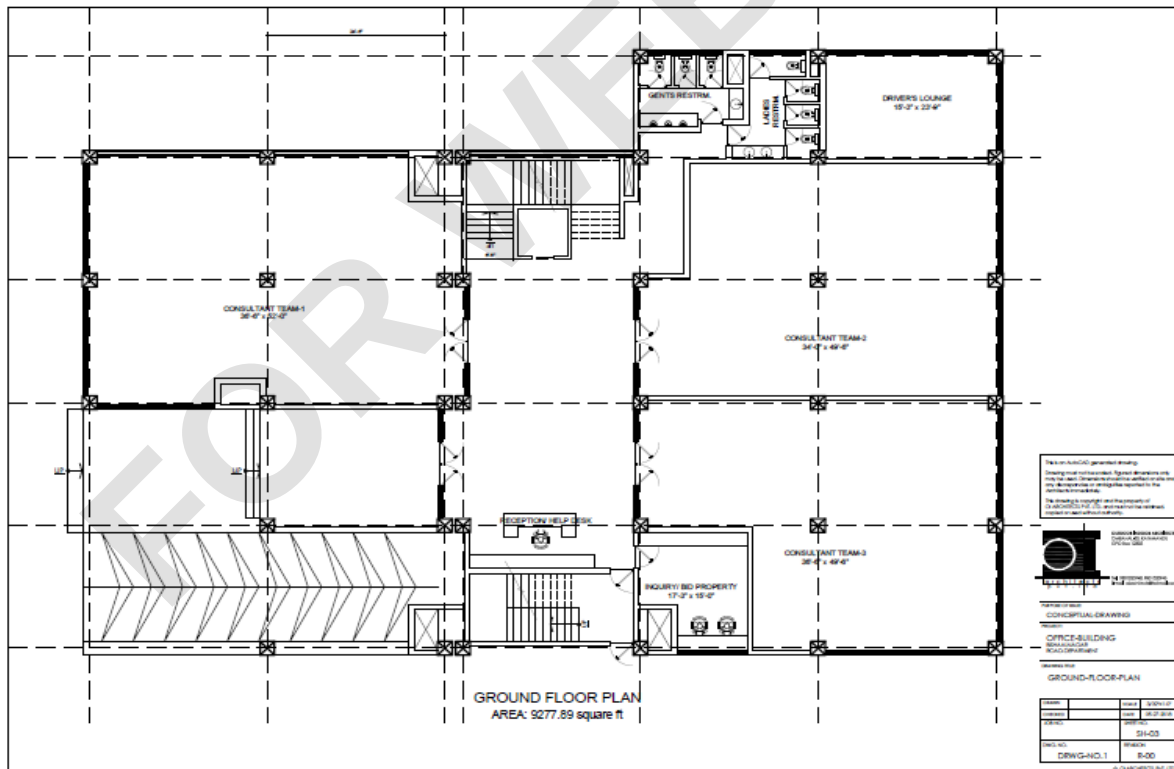
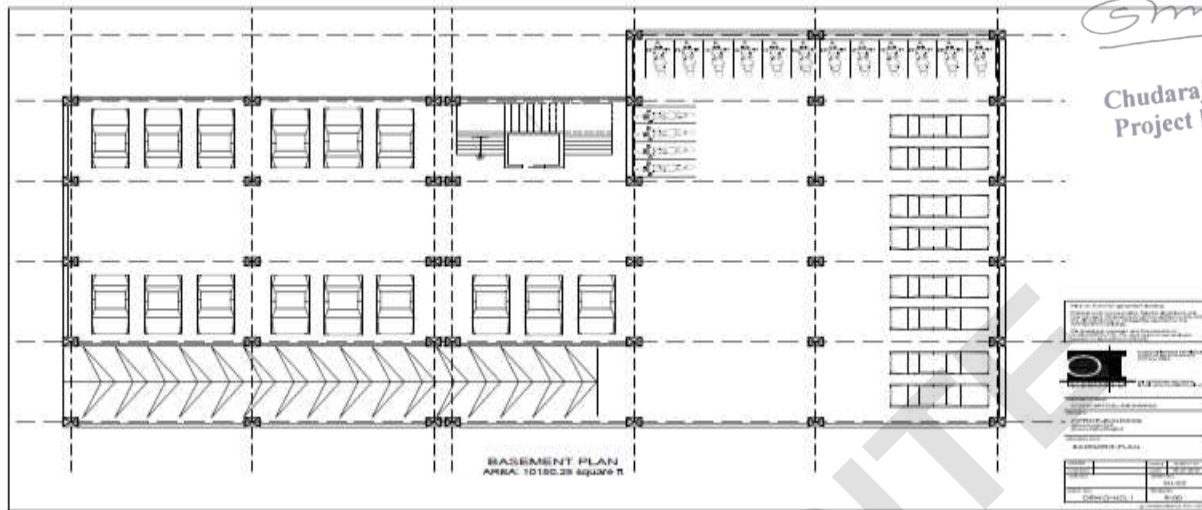
Before fire breaks out

- Store flammable material in proper areas having adequate fire protection systems.
- Display sufficient warning signs.
- Train selected personnel to use these fire extinguishers.
- Inspect fire extinguishers regularly and replace as necessary.
- Fire escape route should be kept clear at all times and clearly indicated.
- Know the escape route and assembly point.
- Display escape route maps prominently at prominent places.
- Carryout fire drill regularly. Designate fire Officers.
- Install fire alarm wherever required and test regularly.
- Provide sufficient exit signs at prominent locations for directing people to the escape route.

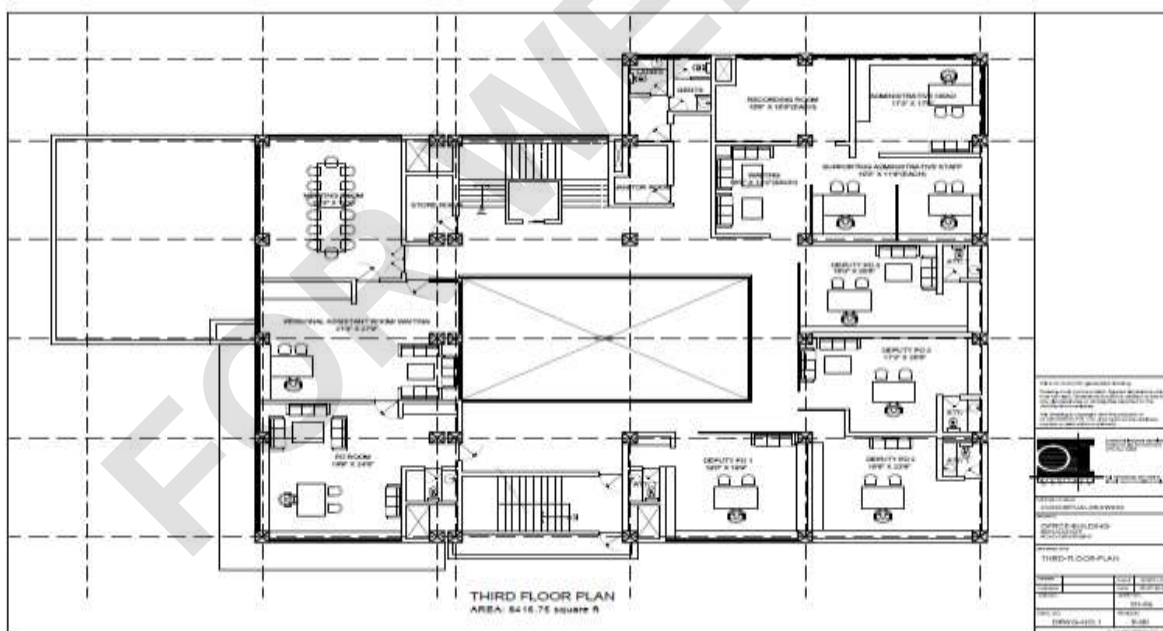
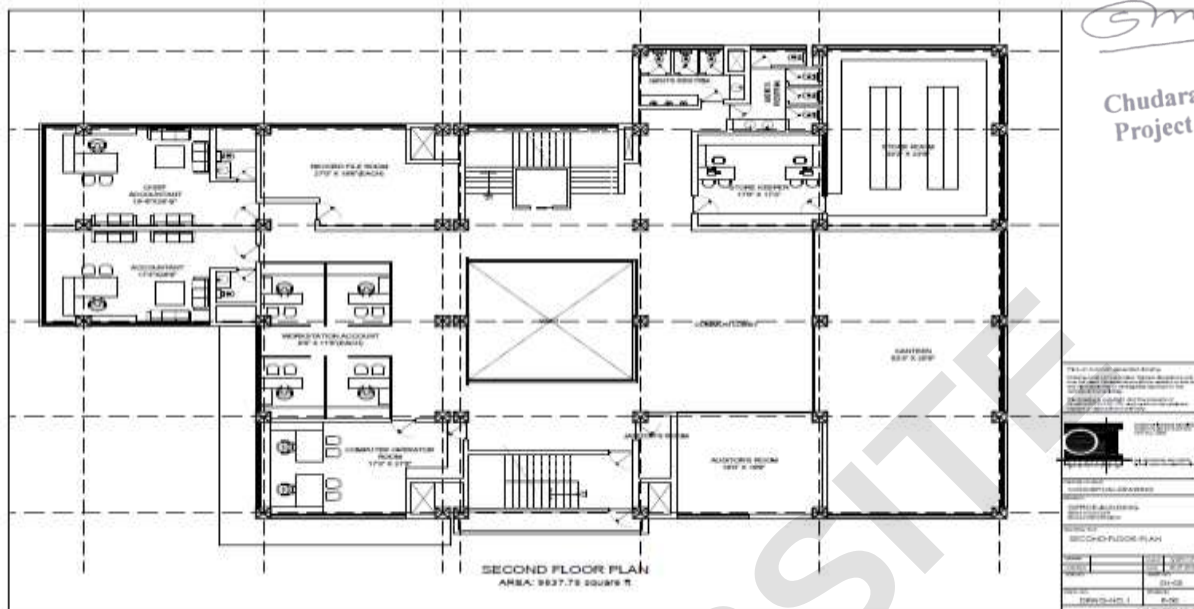
When fire breaks out

- Alert all persons.
- Put off the fire with appropriate fire extinguishers when you are sure that you are safe to do so.
- Escape if you are in danger through the fire escape route to assembly point.
- Fire officers should carryout head count at the assembly point
-

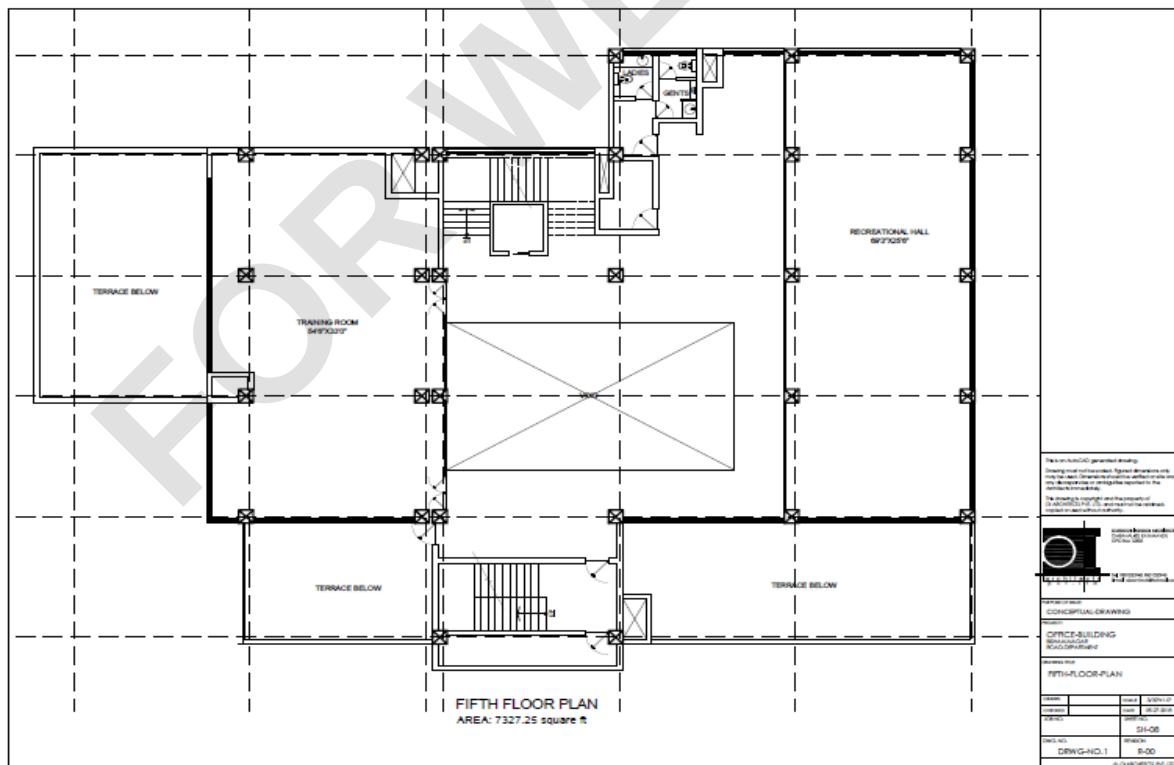
APPENDIX 7: FLOOR PLANS OF PROPOSED BUILDING



Chudaraj Dhakal
Project Director



FOURTH FLOOR PLAN
AREA: 7327.25 square ft square ft



APPENDIX 8: PHOTOGRAPHS



Photo 1: Entry point of proposed building



Photo 2: Existing PD-Building in the proposed site



Photo 3: Existing parking area and staff quarter of the Directorate



Photo 4: Barren land located north side of the existing building



Photo 5: Briefing the project to Consultation with Ward Chairman and Engineer by consultant and PD representatives



Photo 6: Preparation of Minute for collecting suggestions of Consultation Meeting



Photo 7: Ward representative reflecting women participation

FOR WEB

APPENDIX 9: MINUTES OF CONSULTATION MEETING



Gmuf.
Chudaraj Dhakal
Project Director

आम्य मिति २०६४/१३/६ गतेका दिन नेपाल सरकार सडक विकास
अभियोगको आयोजना निर्देशनालय (ए.डि.न) प्रस्तावक रहेको
हाल प्रस्ताव सडक अवस्थित पुरानो अवन लाई हटाएर परामर्श
दाता संस्थाहरू सहित लम्बै अघाडने गरी एसिमाती विकास पत्रको
अध्यापिका अभिनेता गर्ने प्रस्ताव गरिएको अवनको अन्त प्रारम्भिक
पालावर्णीय परिक्षणका लागि कामकाज अघाडने पालिका को
पत्रा सं. ५ को कार्यालयमा छलफल कार्यक्रम संचालन गरियो।
उक्त छलफल कार्यक्रमका निम्न सहभागिहरूको उपस्थितिमा
किविद विषय उपर राम्रुसाथ उपलब्ध गराइयो।

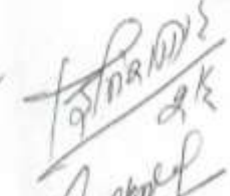
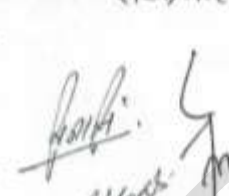
उपस्थिति

१. रमेश उंगेल - बाजा अध्यक्ष (वार्ड नं. ५) *[Signature]* 9851041001
२. सुकेन वाद्य जोर - सचिव *[Signature]* 9851051278
३. विना सिंह - बा सचिव *[Signature]*
४. काका काई उंगेल - स्थानिय बासी *[Signature]*
५. कुवेश नाथि - स्थानिय बासी *[Signature]*
६. सानु जोर - स्थानिय बासी *[Signature]*
७. नारायण अधिकारी - स्थानिय बासी *[Signature]*
८. खलम ८९१ - पालावर्णीय अभियोग निर्देशनालय *[Signature]*
९. रोजि बजारी - सम्मान्य बासी " " *[Signature]*
१०. शिव खड्ग जोर - पालावर्णीय विन लेखि प्रमुख *[Signature]*
११. साविन भोटा - स्थानिय बासी *[Signature]*


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Project Director

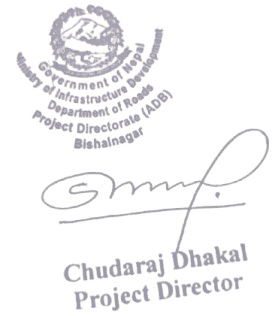
દેલપતાની વિષયક ૯૦ સમુદાયક

૧. પ્રસ્તાવિત અવન નિર્માણો વિષયક આવકારી ઉપલબ્ધ ગણાશે.
૨. અવન નિર્માણમાં વાતાવરણ મૈત્રી, સ્ત્રીઓ માટે ૫૦ અપાક્ટ મૈત્રી તરફ નિર્માણ ગણાશે.
૩. અવન નિર્માણના સમયમાં કાગમોલમ (સા) પ્રાગટ્ય સમય ગણાશે.
૪. અવન નિર્માણના સમયમાં સ્થાનિકવાસીઓના હિત પ્રમાણ પૂર્વે ગણાશે.

    
ગામી ૨૦૧૧

FOR WEB

Government of Nepal
Ministry of Infrastructure Development
Department of Roads
Project Directorate (ADB)
Bishalnagar, Kathmandu,
Nepal



SASEC Highway Improvement Project (SHIP)
(ADB Loan No. 3722-NEP)

**Construction of Project Directorate Office Building with necessary accessories
(Completion of Remaining Works) at Bishalnagar, Kathmandu**

Contract No: SHIP/OCB/BLDPDADB/02

Bidding Document

Part III Conditions of Contract

Section 7	General Conditions of Contract
Section 8	Particular Conditions of Contract
Section 9	Contract Forms

August, 2026

Preface



[Signature]
Chudhary Thakal
Project Director

This Bidding Document for the Procurement of Works (Single Stage – Two Envelope) has been prepared by the Government of Nepal, Ministry of Infrastructure Development, Department of Roads, Project Directorate (ADB) and is based on the Standard Bidding Document for the Procurement of Works (SBD Works) issued by the Asian Development Bank dated December 2021.

ADB's SBD Works has the structure and the provisions of the Master Procurement Document entitled "Bidding Documents for the Procurement of Works", prepared by multilateral development banks and other public international financial institutions, except where ADB-specific considerations have required a change.

FOR WEBSITE

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PART I BIDDING PROCEDURES

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Section 2 - Bid Data Sheet (BDS) -----	2-1
This Section consists of provisions that are specific to each procurement and supplement the information or requirements included in Section 1 - Instructions to Bidders.	
Section 3 - Evaluation and Qualification Criteria (EQC) -----	3-1
This Section contains the criteria to determine the lowest evaluated bid and the qualifications of the Bidder to perform the contract.	
Section 4 - Bidding Forms (BDF) -----	4-1
This Section contains the forms which are to be completed by the Bidder and submitted as part of his Bid.	
Section 5 - Eligible Countries (ELC) -----	5-1
This Section contains the list of eligible countries.	

PART II REQUIREMENTS

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This Section contains the Specifications, Drawings, and Supplementary Information that describe the Works to be procured, Personnel Requirements, and Equipment Requirements.	
Section 6A - Standard Specifications	
This document has been issued under the authority of the Government of Nepal, Ministry of Infrastructure Development, Department of Urban Development and Building Construction.	
Section 6B - Special Provisions	
This section contains amendments, supplements, etc. to the standard specifications to suit the specific requirements of the project.	
Section 6C - Environmental, Health and Safety Management Requirement	
This section provides the Environmental, Health and Safety Management Requirement	
Section 6D - Drawings	
The drawings are presented in a separate volume.	
Section 6E Supplementary Information Regarding Works to Be Procured	
This section provides the supplementary information regarding the works	
Section 6F- Personnel Requirements	
This section provides the information on Personnel Requirements.	
Section 6G - Equipment Requirements	
This section provides the information on Equipment Requirements.	

PART III CONDITIONS OF CONTRACT AND CONTRACT FORMS

Section 7 - General Conditions of Contract (GCC) -----	7-1

This Section contains the general clauses that govern the Contract. These General Conditions shall be the Conditions of Contract for Construction, Multilateral Development Bank Harmonized Edition, prepared by the Fédération Internationale des Ingénieurs-Conseil (FIDIC June 2010 MDB version). These Conditions are subject to the variations and additions set out in Section 8 (Particular Conditions of Contract).



Chudaraj Dhakal
Project Director

Section 8 - Particular Conditions of Contract (PCC)-----8-1

This Section contains provisions which are specific to each contract and which modify or supplement the GCC. Whenever there is a conflict, the provisions herein shall prevail over those in the GCC.

Section 9 - Contract Forms (COF) -----9-1

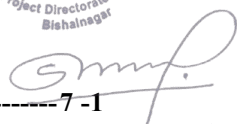
This Section contains forms, which, once completed, will form part of the Contract. The forms for Performance Security and Advance Payment Security, when required, shall only be completed by the successful Bidder after contract award.

FOR WEBSITE

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 Project Director

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Section 7 - General Conditions of Contract

Ministry of Infrastructure Development
Department of Roads
Project Directorate (ADB)

Contract No. SHIP/OCB/BLDPDADB/02

The Conditions of Contract consists of two parts, this Section 7 (General Conditions of Contract) and the following Section 8 (Particular Conditions of Contract).

The General Conditions shall be the *Conditions of Contract for Construction for Building and Engineering Works Designed by the Employer*, Multilateral Development Bank Harmonized Edition, prepared by the Fédération Internationale des Ingénieurs-Conseil, or FIDIC (FIDIC MDB Harmonized Construction Contract) available at FIDIC MDB June 2010. The FIDIC MDB Harmonized Construction Contract is exclusive for the use of ADB Borrowers and their project implementing agencies as provided under the License Agreement dated 9 June 2005 and its amendment to the said Agreement dated 29 June 2020, and 11 October 2021, between ADB and FIDIC, and, consequently, no part of this publication may be reproduced, translated, adapted, stored in a retrieval system or communicated, in any form or by any means, whether mechanical, electronic, magnetic, photocopying, recording or otherwise, without prior permission in writing from FIDIC, except by the Employer identified in the contract and only for the exclusive purpose of preparing bidding documents for ADB-financed contracts.

The standard text of the General Conditions chosen must be retained intact to facilitate its reading and interpretation by Bidders and its review by ADB. Any amendments and additions to the GCC, specific to the contract in hand, should be introduced in Section 8 (Particular Conditions of Contract), Part A (Contract Data) and Part B (Special Provisions). Clause numbers in the Particular Conditions of Contract (PCC) correspond to those in the General Conditions of Contract (GCC). As per GCC 1.5 (Priority of Documents), the PCC takes precedence over the GCC.

Part A (Contract Data) of the PCC includes data to complement the GCC in a manner similar to the way in which the Bid Data Sheet (BDS) complements the Instructions to Bidders (ITB).

Part B (Specific Provisions) is to be used to introduce country- or project-specific provisions, if so required.

The Conditions of Contract have been prepared for an ad measurement (unit price or unit rate) type of contract and cannot be used for other types of contracts.



Chudaraj Dhakal
Project Director

APPENDIX

General Conditions of Dispute Board Agreement

1. Definitions

Each "Dispute Board Agreement" is a tripartite agreement by and between:

- (a) the "Employer";
- (b) the "Contractor"; and
- (c) the "Member" who is defined in the Dispute Board Agreement as being:
 - (i) the sole member of the "DB" (or "dispute board") and, where this is the case, all references to the "Other Members" do not apply, or
 - (ii) one of the three persons who are jointly called the "DB" and, where this is the case, the other two persons are called the "Other Members."

The Employer and the Contractor have entered (or intend to enter) into a contract, which is called the "Contract" and is defined in the Dispute Board Agreement, which incorporates this Appendix. In the Dispute Board Agreement, words and expressions which are not otherwise defined shall have the meanings assigned to them in the Contract.

2. General Provisions

Unless otherwise stated in the Dispute Board Agreement, it shall take effect on the latest of the following dates:

- (a) the Commencement Date defined in the Contract,
- (b) when the Employer, the Contractor, and the Member have each signed the Dispute Board Agreement, or
- (c) When the Employer, the Contractor and each of the Other Members (if any) have respectively each signed a dispute board agreement.

This employment of the Member is a personal appointment. At any time, the Member may give not less than 70 days' notice of resignation to the Employer and to the Contractor, and the Dispute Board Agreement shall terminate upon the expiry of this period.

3. Warranties

The Member warrants and agrees that he/she is and shall be impartial and independent of the Employer, the Contractor, and the Engineer. The Member shall promptly disclose, to each of them and to the Other Members (if any), any fact or circumstance, which might appear inconsistent with his/her warranty and agreement of impartiality and independence.

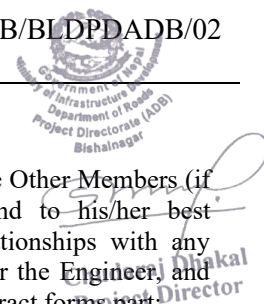
When appointing the Member, the Employer and the Contractor relied upon the Member's representations that he/she is

- (a) experienced in the work, which the Contractor is to carry out under the Contract;
- (b) experienced in the interpretation of contract documentation; and
- (c) fluent in the language for communications defined in the Contract.

4. General Obligations of the Member

The Member shall

- (a) have no interest, financial or otherwise, in the Employer, the Contractor or Engineer, nor any financial interest in the Contract except for payment under the Dispute Board Agreement;
- (b) not previously have been employed as a consultant or otherwise by the Employer, the Contractor, or the Engineer, except in such circumstances as were disclosed in writing to the Employer and the Contractor before they signed the Dispute Board



Agreement;

- (c) have disclosed in writing to the Employer, the Contractor, and the Other Members (if any), before entering into the Dispute Board Agreement and to his/her best knowledge and recollection, any professional or personal relationships with any director, officer, or employee of the Employer, the Contractor or the Engineer, and any previous involvement in the overall project of which the Contract forms part;
- (d) not, for the duration of the Dispute Board Agreement, be employed as a consultant or otherwise by the Employer, the Contractor, or the Engineer, except as may be agreed in writing by the Employer, the Contractor, and the Other Members (if any);
- (e) comply with the annexed procedural rules and with Subclause 20.4 of the Conditions of Contract;
- (f) not give advice to the Employer, the Contractor, the Employer's Personnel or the Contractor's Personnel concerning the conduct of the Contract, other than in accordance with the annexed procedural rules;
- (g) not, while a Member, enter into discussions or make any agreement with the Employer, the Contractor, or the Engineer regarding employment by any of them, whether as a consultant or otherwise, after ceasing to act under the Dispute Board Agreement;
- (h) ensure his/her availability for all site visits and hearings as are necessary;
- (i) become conversant with the Contract and with the progress of the Works (and of any other parts of the project of which the Contract forms part) by studying all documents received, which shall be maintained in a current working file;
- (j) treat the details of the Contract and all the DB's activities and hearings as private and confidential, and not publish or disclose them without the prior written consent of the Employer, the Contractor, and the Other Members (if any); and
- (k) be available to give advice and opinions, on any matter relevant to the Contract when requested by both the Employer and the Contractor, subject to the agreement of the Other Members (if any).

5. General Obligations of the Employer and the Contractor

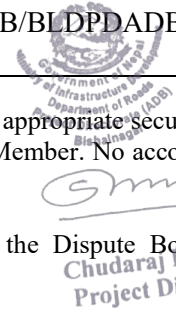
The Employer, the Contractor, the Employer's Personnel and the Contractor's Personnel shall not request advice from or consultation with the Member regarding the Contract, otherwise than in the normal course of the Dispute Board's activities under the Contract and the Dispute Board Agreement. The Employer and the Contractor shall be responsible for compliance with this provision, by the Employer's Personnel and the Contractor's Personnel respectively.

The Employer and the Contractor undertake to each other and to the Member that the Member shall not, except as otherwise agreed in writing by the Employer, the Contractor, the Member, and the Other Members (if any),

- (a) be appointed as an arbitrator in any arbitration under the Contract;
- (b) be called as a witness to give evidence concerning any dispute before arbitrator(s) appointed for any arbitration under the Contract; or
- (c) be liable for any claims for anything done or omitted in the discharge or purported discharge of the Member's functions, unless the act or omission is shown to have been in bad faith.

The Employer and the Contractor hereby jointly and severally indemnify and hold the Member harmless against and from claims from which he is relieved from liability under the preceding paragraph.

Whenever the Employer or the Contractor refers a dispute to the Dispute Board under Sub-clause 20.4 of the Conditions of Contract, which will require the Member to make a site



visit and attend a hearing, the Employer or the Contractor shall provide appropriate security for a sum equivalent to the reasonable expenses to be incurred by the Member. No account shall be taken of any other payments due or paid to the Member.

6. Payment

The Member shall be paid as follows, in the currency named in the Dispute Board Agreement:

- (a) a retainer fee per calendar month, which shall be considered as payment in full for
 - (i) being available on 28 days' notice for all site visits and hearings;
 - (ii) becoming and remaining conversant with all project developments and maintaining relevant files;
 - (iii) all office and overhead expenses including secretarial services, photocopying and office supplies incurred in connection with his duties; and
 - (iv) all services performed hereunder except those referred to in sub-paragraphs (b) and (c) of this Clause.

The retainer fee shall be paid with effect from the last day of the calendar month in which the Dispute Board Agreement becomes effective; until the last day of the calendar month in which the Taking-Over Certificate is issued for the whole of the Works.

With effect from the first day of the calendar month following the month in which the Taking-Over Certificate is issued for the whole of the Works, the retainer fee shall be reduced by one third. This reduced fee shall be paid until the first day of the calendar month in which the Member resigns or the Dispute Board Agreement is otherwise terminated.

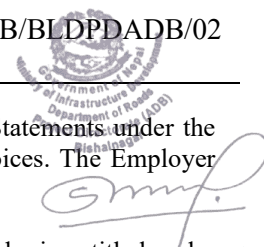
- (b) a daily fee, which shall be considered as payment in full, for
 - (i) each day or part of a day up to a maximum of 2 days' travel time in each direction for the journey between the Member's home and the site, or another location of a meeting with the Other Members (if any);
 - (ii) each working day on Site visits, hearings, or preparing decisions; and
 - (iii) each day spent reading submissions in preparation for a hearing.
- (c) all reasonable expenses, including necessary travel expenses (air fare in less than first class, hotel and subsistence, and other direct travel expenses) incurred in connection with the Member's duties, as well as the cost of telephone calls, courier charges, faxes and telexes: a receipt shall be required for each item in excess of five percent (5%) of the daily fee referred to in sub-paragraph (b) of this Clause;
- (d) any taxes properly levied in the Country on payments made to the Member (unless a national or permanent resident of the Country) under this Clause 6.

The retainer and daily fees shall be as specified in the Dispute Board Agreement. Unless it specifies otherwise, these fees shall remain fixed for the first 24 calendar months, and shall thereafter be adjusted by agreement between the Employer, the Contractor, and the Member, at each anniversary of the date on which the Dispute Board Agreement became effective.

If the parties fail to agree on the retainer fee or the daily fee, the appointing entity or official named in the Contract Data shall determine the amount of the fees to be used.

The Member shall submit invoices for payment of the monthly retainer and air fares quarterly in advance. Invoices for other expenses and for daily fees shall be submitted following the conclusion of a site visit or hearing. All invoices shall be accompanied by a brief description of activities performed during the relevant period and shall be addressed to the Contractor.

The Contractor shall pay each of the Member's invoices in full within 56 calendar days



after receiving each invoice and shall apply to the Employer (in the Statements under the Contract) for reimbursement of one-half of the amounts of these invoices. The Employer shall then pay the Contractor in accordance with the Contract.

If the Contractor fails to pay to the Member the amount to which he/she is entitled under the Dispute Board Agreement, the Employer shall pay the amount due to the Member and any other amount which may be required to maintain the operation of the Dispute Board; and without prejudice to the Employer's rights or remedies. In addition to all other rights arising from this default, the Employer shall be entitled to reimbursement of all sums paid in excess of one-half of these payments, plus all costs of recovering these sums and financing charges calculated at the rate specified in Sub-clause 14.8 of the Conditions of Contract.

If the Member does not receive payment of the amount due within 70 days after submitting a valid invoice, the Member may (i) suspend his/her services (without notice) until the payment is received, and/or (ii) resign his/her appointment by giving notice under Clause 7.

7. Termination

At any time, (i) the Employer and the Contractor may jointly terminate the Dispute Board Agreement by giving 42 days' notice to the Member; or (ii) the Member may resign as provided for in Clause 2.

If the Member fails to comply with the Dispute Board Agreement, the Employer and the Contractor may, without prejudice to their other rights, terminate it by notice to the Member. The notice shall take effect when received by the Member.

If the Employer or the Contractor fails to comply with the Dispute Board Agreement, the Member may, without prejudice to his other rights, terminate it by notice to the Employer and the Contractor. The notice shall take effect when received by them both.

Any such notice, resignation and termination shall be final and binding on the Employer, the Contractor, and the Member. However, a notice by the Employer or the Contractor, but not by both, shall be of no effect.

8. Default of the Member

If the Member fails to comply with any of his obligations under Clause 4 (a)-(d) above, he shall not be entitled to any fees or expenses hereunder and shall, without prejudice to their other rights, reimburse each of the Employer and the Contractor for any fees and expenses received by the Member and the Other Members (if any), for proceedings or decisions (if any) of the Dispute Board which are rendered void or ineffective by the said failure to comply.

If the Member fails to comply with any of his obligations under Clause 4 (e) - (k) above, he shall not be entitled to any fees or expenses hereunder from the date and to the extent of the noncompliance and shall, without prejudice to their other rights, reimburse each of the Employer and the Contractor for any fees and expenses already received by the Member, for proceedings or decisions (if any) of the Dispute Board, which are rendered void or ineffective by the said failure to comply.

9. Disputes

Any dispute or claim arising out of or in connection with this Dispute Board Agreement, or the breach, termination, or invalidity thereof, shall be finally settled by institutional arbitration. If no other arbitration institute is agreed, the arbitration shall be conducted under the Rules of Arbitration of the International Chamber of Commerce by one arbitrator appointed in accordance with these Rules of Arbitration.

Procedural Rules

Unless otherwise agreed by the Employer and the Contractor, the Dispute Board shall visit the site at intervals of not more than 140 days, including times of critical construction events, at the request of either the Employer or the Contractor. Unless otherwise agreed by the Employer, the Contractor, and the Dispute Board, the period between consecutive visits shall not be less than 70 days, except as required to convene a hearing



as described below.

The timing of and agenda for each site visit shall be as agreed jointly by the Dispute Board, the Employer, and the Contractor, or in the absence of agreement, shall be decided by the Dispute Board. The purpose of site visits is to enable the Dispute Board to become and remain acquainted with the progress of the Works and of any actual or potential problems or claims, and, as far as reasonable, to endeavor to prevent potential problems or claims from becoming disputes.

Site visits shall be attended by the Employer, the Contractor, and the Engineer and shall be coordinated by the Employer in cooperation with the Contractor. The Employer shall ensure the provision of appropriate conference facilities and secretarial and copying services. At the conclusion of each site visit and before leaving the site, the Dispute Board shall prepare a report on its activities during the visit and shall send copies to the Employer and the Contractor.

The Employer and the Contractor shall furnish to the Dispute Board one copy of all documents which the Dispute Board may request, including Contract documents, progress reports, variation instructions, certificates, and other documents pertinent to the performance of the Contract. All communications between the DB and the Employer or the Contractor shall be copied to the other Party. If the Dispute Board comprises three persons, the Employer and the Contractor shall send copies of these requested documents and these communications to each of these persons.

If any dispute is referred to the Dispute Board in accordance with Sub-clause 20.4 of the Conditions of Contract, the Dispute Board shall proceed in accordance with Sub-clause 20.4 and these Rules. Subject to the time allowed to give notice of a decision and other relevant factors, the Dispute Board shall

- (a) act fairly and impartially as between the Employer and the Contractor, giving each of them a reasonable opportunity of putting his case and responding to the other's case; and
- (b) adopt procedures suitable to the dispute, avoiding unnecessary delay or expense.

The Dispute Board may conduct a hearing on the dispute, in which event it will decide on the date and place for the hearing and may request that written documentation and arguments from the Employer and the Contractor be presented to it prior to or at the hearing.

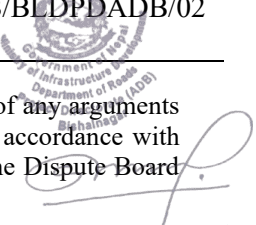
Except as otherwise agreed in writing by the Employer and the Contractor, the Dispute Board shall have power to adopt an inquisitorial procedure, to refuse admission to hearings or audience at hearings to any persons other than representatives of the Employer, the Contractor, and the Engineer, and to proceed in the absence of any party who the Dispute Board is satisfied received notice of the hearing; but shall have discretion to decide whether and to what extent this power may be exercised.

The Employer and the Contractor empower the Dispute Board, among other things, to

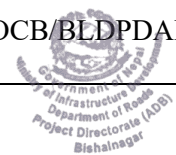
- (a) establish the procedure to be applied in deciding a dispute;
- (b) decide upon the Dispute Board's own jurisdiction, and as to the scope of any dispute referred to it;
- (c) conduct any hearing as it thinks fit, not being bound by any rules or procedures other than those contained in the Contract and these Guidelines;
- (d) take the initiative in ascertaining the facts and matters required for a decision;
- (e) make use of its own specialist knowledge, if any;
- (f) decide upon the payment of financing charges in accordance with the Contract;
- (g) decide upon any provisional relief such as interim or conservatory measures; and
- (h) open up, review and revise any certificate, decision, determination, instruction, opinion or valuation of the Engineer, relevant to the dispute.

The Dispute Board shall not express any opinions during any hearing concerning the merits of any arguments advanced by the Parties. Thereafter, the Dispute Board shall make and give its decision in accordance with Sub-clause 20.4, or as otherwise agreed by the Employer and the Contractor in writing. If the Dispute Board comprises three persons:

- (a) it shall convene in private after a hearing, in order to have discussions and prepare its decision;
- (b) it shall endeavor to reach a unanimous decision: if this proves impossible, the applicable decision shall be made by a majority of the Members, who may require the minority Member to prepare a written report for submission to the Employer and the Contractor; and
- (c) if a member fails to attend a meeting or hearing, or to fulfil any required function, the other two Members may nevertheless proceed to make a decision, unless
 - (i) either the Employer or the Contractor does not agree that they do so, or
 - (ii) the absent Member is the chairman and he/she instructs the other Members to not make a decision.


Chudaraj Dhakal
Project Director

FOR WEBSITE



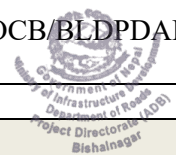
Section 8 - Particular Conditions of Contract

The following Particular Conditions of Contract (PCC) shall supplement the General Conditions of Contract (GCC). Whenever there is a conflict, the provisions herein shall prevail over those in the GCC.

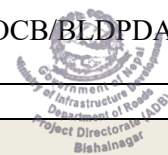
Part A – Contract Data

Chudaraj Dhakal
Project Director

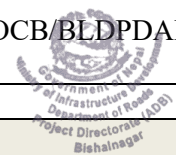
Subject	Ref. GCC	Data
Employer's name and address	1.1.2.2 & 1.3	Ministry of Infrastructure Development, Department of Roads, Project Directorate (ADB), Bishal Nagar Kathmandu, Nepal.
Engineer's name and address	1.1.2.4 & 1.3	Kunhwa Engineering and Consulting Co., Ltd., Korea in Joint Venture with BCL Associates Limited, Bangladesh and in association with Total Management Services P. Ltd., Nepal
Bank's name	1.1.2.11	Asian Development Bank (ADB)
Borrower's name	1.1.2.12	Nepal
Time for Completion	1.1.3.3	270 days from the commencement Date
Defects Notification Period	1.1.3.7	365 days
Sections	1.1.5.6	Not Applicable
Electronic transmission systems	1.3	Email, fax supplemented by original hard copy through post, courier or hand delivered.
Governing Law	1.4	The Law of Nepal
Ruling language	1.4	English
Language for communications	1.4	English
Time for access to the site	2.1	7 days from the commencement date
Engineer's Duties and Authority	3.1(B)(ii)	A Variation having a value of more than 0.1% of the Accepted Contract Amount shall require approval of the Employer. Similarly, when the cumulative sum of Variations results in an increase of the Accepted Contract Amount by more than 2 %, any Variation thereafter shall require approval of the Employer.
Performance Security	4.2	The performance security will be in the form of an unconditional bank guarantee in the amount(s) of Ten (10) percent of the Accepted Contract Amount and denominated in the proportions of currencies mentioned in the schedule of currencies and issued by a reputable



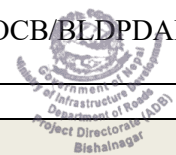
Subject	Ref. GCC	Data
		financial institution/bank. When additional performance security is required due to seriously unbalanced or frontloaded bid in accordance with ITB 38 and ITB 39, the Employer shall specify the percentage of the performance security and the terms for its release. If the Performance Security is issued by a bank located outside Nepal, it shall be counter guaranteed by a commercial bank established in Nepal.
Sub Contractor	4.4	NA
Safety Procedure	4.8 (b)	<i>After bullet point (b), add the following:</i> “In particular, the Contractor is responsible for providing site workers with safe and healthy working conditions and establish an operating system to prevent accidents, injuries, and disease.”
Normal working hours	6.5	Normal working hours shall not be applicable. Daily Inspections and emergency response need to be done on Saturdays and Public as well
Health and Safety	6.7	<i>Add the following after the first paragraph:</i> “The Contractor is responsible for establishment of preventive and emergency preparedness and response measures to avoid, and where avoidance is not possible, to minimize, adverse impacts and risks of the construction site work to the health and safety of local communities. Within 28 days of the Commencement Date unless otherwise instructed by the Engineer, the Contractor shall submit a detailed Site Specific Health and Safety Management Plan (SSHSM), based on the Environmental Health and Safety Management Plan submitted in the technical proposal, for the Engineer’s no objection showing how he/she intends to comply with the local Health and Safety laws and regulations and other specific requirements prescribed in the Contract, taking into account the Supplementary Information in Section 6-Employer’s Requirements. Work shall not commence on the Site until the confirmation of no objection of the SSHSM has been obtained from the Engineer and is being implemented. Where unanticipated health and safety hazards or risks become apparent during the Contract, the Contractor is



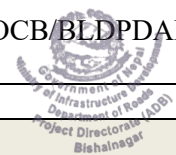
Subject	Ref. GCC	Data
		required to update the SSHSMP to outline the potential impacts to site works and associated mitigation measures for the Engineer's no objection. The Contractor shall comply with the approved SSHSMP and any corrective or preventative actions set out in safeguards monitoring reports that the Employer will prepare from time to time to monitor the implementation of the project EMP through the SSHSMP. In particular, the Contractor is required to provide all personnel on site including Employer's Personnel and visitors with personal protective equipment, including protection for feet (safety boots), head, eyes, ears (safety helmets) and hands, etc., in accordance with the Contractor's SSHSMP. The Contractor should ensure that his Subcontractors comply with the SSHSMP and provide all such necessary equipment to their personnel. The Contractor shall bear the costs to ensure that such measures, requirements and actions are carried out. The Contractor shall submit semi-annual reports on the compliance of such measures to the Employer." <i>Add after the third paragraph the following:</i> "In the event of a significant injury involving medical treatment or hospitalization and fatal accident the Contractor shall notify the Engineer immediately by verbal communication and submit a formal report as soon as practicable after its occurrence. For all accidents, whether fatal or not, the Contractor shall also notify the appropriate local authorities in accordance with the Laws of the Country."
Respectful Work Environment	6.25	<i>The following sentence shall apply:</i> The Contractor shall ensure that its employees and sub-contractors observe the highest ethical standards and refrain from any form of bullying, discrimination, misconduct and harassment, including sexual harassment and shall, at all times, behave in a manner that creates an environment free of unethical behavior, bullying, misconduct and harassment, including sexual harassment. The Contractor shall take appropriate action against any employees or sub-contractors, including suspension or termination of employment or sub-contract, if any form of unethical or inappropriate behavior is identified.



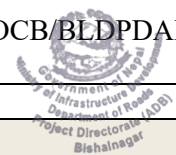
Subject	Ref. GCC	Data
		The Contractor shall conduct training programs for its employees and sub-contractors to raise awareness on and prevent any form of bullying, discrimination, misconduct and harassment including sexual harassment, and to promote a respectful work environment. The Contractor shall keep an up-to-date record of its employees and subcontractors who have attended and completed such training programs and provide such records to the Employer or the Engineer at their first written request.
Delay damages for the Works	8.7 & 14.15(b)	0.05 % of the Contract Price
Maximum amount of delay damages	8.7	Ten (10) percent of the Contract Price/
Adjustments for Changes in Cost	13.8	The Contract Price shall not be adjustable during Contract Execution.
The Contract Price	14.1	<i>Delete the last sentence of the Sub-clause 14.1 and replace with the text below relating with the exemption on construction equipment:</i> Notwithstanding the provisions in this document, the Contractor's construction equipment, including essential tools thereof, imported for the sole purpose of executing the contract on condition of re-export upon completion of the Works, shall be exempt from the payment of custom duties. However, the Contractor shall deposit the amount or provide a bank guarantee to the Government of Nepal, Customs Office equal to the amount of custom duties as per the prevailing laws, rules and regulations of Nepal for that imported equipment at the time of import. Such deposited amount shall be refunded, or the bank guarantee be cancelled by the Custom Office after re-export of those imported equipment. The construction equipment imported by the Contractor for the performance of the Works shall be taken out of the Country within 90 days after issuance of Taking-Over Certificate
Total advance payment	14.2	Maximum Fifteen (15) Percentage of the Accepted Contract Amount Less Provisional sum and VAT payable in the currencies and proportions in which the Accepted Contract Amount is payable. The Advance Payment Guarantee shall be valid until Time for Completion of the Works. The total advance payment shall be made in Two (2)



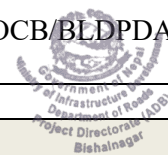
Subject	Ref. GCC	Data
		installments as follows: First (1st) installment of 7.5% shall be paid within 28 days after the submission of advance payment guarantee issued from commercial bank of Nepal. Second (2nd) installment of 7.5% shall be paid after (a) the completion of the Contractor's mobilization of all required resources to the Site, and (b) submission by the Contractor of a statement of utilization with supporting documents of the first instalment of the advance paid to the Contractor along with a certificate from the Engineer that such amounts were utilized in a purposeful manner in relation to the Works (c) submission of bank guarantee issued from commercial bank of Nepal as required by the Contract.
Repayment of advance payment	14.2(a)	Delete "exceeds thirty percent (30%) of the Accepted Contract Amount Less Provisional Sums" in third line and replace with: "Exceeds thirty percent (30%) of the Accepted Contract Amount less Provisional sum and VAT".
Repayment amortization of advance payment	14.2(b)	Amortization Rate shall be: 30% Delete "when 90 percent (90%) of the Accepted Contract Amount less Provisional Sums" in fifth and sixth lines and replace with: "when 80 percent (80%) of the Accepted Contract Amount less Provisional Sum and VAT"
Percentage of Retention	14.3(c)	Ten percent (10%)
Limit of Retention Money	14.3 (c)	Five Percent (5%) of the Accepted Contract Amount
Plant and Materials	14.5(b)(i)	Not Applicable
	14.5(c)(i)	Not Applicable
Minimum Amount of Interim Payment Certificates	14.6	Two percent (2.0%) of the Accepted Contract Amount
Termination by Employer	15.2	This sentence will apply as Sub-clause 15.2(g): (g) the Engineer gives two consecutive Notices to update the Program and accelerate the works to ensure compliance with Sub-clause 8.2 (Time for Completion) and the Contractor fails to update the Program and



Subject	Ref. GCC	Data
		demonstrate acceleration of the works within a reasonable period of time determined by the Engineer;
Corrupt and Fraudulent Practices	15.6	Revise the two entry paragraph of GCC 15.6 as: If the Employer determines, based on reasonable evidence, that the Contractor has engaged in corrupt, fraudulent, collusive or coercive practices, or other integrity violations, including the failure to disclose any required information which constitutes a fraudulent practice, in competing for or in executing the Contract, then the Employer may, after giving 14 days' notice to the Contractor, terminate the Contract and expel him from the Site, and the provisions of Clause 15 shall apply as if such termination had been made under Sub-Clause 15.2 [Termination by Employer]. Should any employee of the Contractor be determined, based on reasonable evidence, to have engaged in corrupt, fraudulent or coercive practice or other integrity violations during the execution of the work then that employee shall be removed in accordance with Sub-Clause 6.9 [Contractor's Personnel] The following sentence shall apply: For the purposes of this Sub-clause: ADB requires Borrowers (including beneficiaries of ADB-financed activity) and their personnel, as well as firms and individuals participating in an ADB-financed activity, including but not limited to, Bidders, Suppliers, Contractors, agents, subcontractors, sub-consultants, service providers, sub suppliers, manufacturers (including their respective officers, directors, employees and personnel) under ADB-financed contracts to observe the highest standard of ethics during the procurement and execution of such contracts in accordance with ADB's Anticorruption Policy (1998, as amended from time to time). In pursuance of this policy, ADB (a) defines, for the purposes of this provision, the terms set forth below as follows: (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

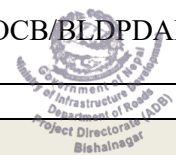


Subject	Ref. GCC	Data
		recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation; (iii) “coercive practice” means impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence 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) “abuse” means theft, waste, or improper use of assets related to ADB-related activity, either committed intentionally or through reckless disregard. (vi) “conflict of interest” means any situation in which a party has interests that could improperly influence that party’s performance of official duties or responsibilities, contractual obligations, or compliance with applicable laws and regulations; and (vii) ““integrity violation” is any act, as defined under ADB’s Integrity Principles and Guidelines (2015, as amended from time to time), which violates ADB’s Anticorruption Policy, including (i) to (vi) above and the following: obstructive practice, violations of ADB sanctions, retaliation against whistleblowers or witnesses, and other violations of ADB's Anticorruption Policy, including failure to adhere to the highest ethical standard. (b) will reject a proposal for award if it determines that the Bidder recommended for award or any of its officers, directors, employees, personnel, sub-consultants, subcontractors, service providers, suppliers or manufacturers 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) will cancel the portion of the financing allocated to a contract if it determines at any time that representatives of the Borrower or of a beneficiary of ADB-financing engaged in corrupt, fraudulent,

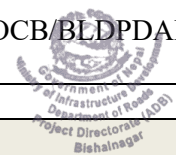


Subject	Ref. GCC	Data
		collusive, coercive, or obstructive practices or other integrity violations during the procurement or the execution of that contract, without the Borrower having taken timely and appropriate action satisfactory to ADB to remedy the situation, including by failing to inform ADB in a timely manner at the time they knew of the integrity violations; (d) will impose remedial actions on a firm or an individual, at any time, in accordance with ADB's Anticorruption Policy and Integrity Principles and Guidelines, including declaring ineligible, either indefinitely or for a stated period of time, to participate¹ in ADB-financed, -administered, or -supported activities or to benefit from an ADB-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) will have the right to require that a provision be included in bidding documents and in contracts financed, administered, or supported by ADB, requiring Bidders, suppliers and contractors, consultants, manufacturers, service providers and other third parties engaged or involved in ADB-related activities, and their respective officers, directors, employees and personnel, to permit ADB or its representative to inspect the site and their assets, accounts and records and other documents relating to the bid submission and contract performance and to have them audited by auditors appointed by ADB. All Bidders, consultants, contractors, suppliers, manufacturers, service providers, and other third parties engaged or involved in ADB-related activities and their respective officers, directors, employees and personnel, are obliged to cooperate fully in any investigation when requested by ADB to do so. As determined on a case by case basis by ADB, such cooperation includes, but is not limited to, the following: (a) being available to be interviewed and replying fully

¹ Whether as a Contractor, Subcontractor, Consultant, Manufacturer or Supplier, or Service Provider; or in any other capacity (different names are used depending on the particular Bidding Document).



Subject	Ref. GCC	Data
		and truthfully to all questions asked; (b) providing ADB with any items requested that are within the party's control including, but not limited to, documents and other physical objects; (c) upon written request by ADB, authorizing other related entities to release directly to ADB such information that is specifically and materially related, directly or indirectly, to the said entities or issues which are the subject of the investigation; (d) cooperating with all reasonable requests to search or physically inspect their person and/or work areas, including files, electronic databases, and personal property used on ADB activities, or that utilizes ADB's Information and Communications Technology (ICT) resources or systems (including mobile phones, personal electronic devices, and electronic storage devices such as external disk drives); (e) cooperating in any testing requested by ADB, including but not limited to, fingerprint identification, handwriting analysis, and physical examination and analysis; and (f) preserving and protecting confidentiality of all information discussed with, and as required by, ADB. All Bidders, consultants, contractors and suppliers shall require their officers, directors, employees, personnel, agents to ensure that, in its contracts with its sub-consultants, Subcontractors, and other third parties engaged or involved in ADB-related activities, such sub-consultants, Subcontractors, and other third parties similarly are obliged to cooperate fully in any investigation when requested by ADB to do so. The Contractor undertakes that no fees, gratuities, rebates, gifts, commissions or other payments, other than those shown in the bid, have been given or received in connection with the procurement process or in the contract execution.
Maximum total liability of the Contractor to the Employer	17.6	The product of 1.10 times the Accepted Contract Amount
General Requirements	18.1	The insuring party shall be the Contractor.



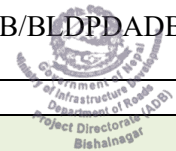
Subject	Ref. GCC	Data
for Insurances		
Periods for submission of insurance:	18.1 (a)	a. evidence of insurance: 14 days
	18.1 (b)	b. copies of relevant policies: 21 days
Insurance of Contractor's Equipment	18.2 (b)	Contractor's Equipment shall be insured before mobilizing to the Site. The insurance shall be in the name of the legal owner of the Equipment. Insurance in the joint name of the Employer and the Contractor shall not be required for the insurance against loss or damage to the Contractor's Equipment.
Maximum amount of deductibles for insurance of the Employer's risks	18.2 (d)	NRs. 500,000.00 (Five hundred thousand only)
Minimum amount of third-party insurance	18.3	NRs. Fifteen (15.00) Million with no limit on the number of occurrences.
Date by which the DB shall be appointed	20.2	28 days after the Commencement
The DB shall be comprised of	20.2	Three Members
List of potential Dispute Board sole members	20.2	None
Appointment (if not agreed) to be made by	20.3	Appointing Authority: Nepal Council of Arbitration (NEPCA)
Arbitration shall be administered by	20.6 (a)	Nepal Council of Arbitration (NEPCA)
Place of Arbitration	20.6	Nepal



Part B – Specific Provisions

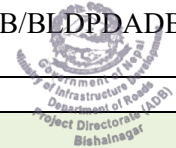
Chudaraj Dhakal
Project Director

Subject	Ref. GCC	Provision
Definitions	1.1	
Specifications	1.1.1.5	The Specifications mean: - Standard Specifications issued under the authority of the Government of Nepal, Ministry of Infrastructure Development, Department of Urban Development and Building Construction. - Special Provisions to the Standard Specifications
Defects Notification Period	1.1.3.7	In the fifth line immediately after “calculated” delete the remaining texts and add “from the date on which the Construction Works is completed as certified under Sub-Clause 10.1 [Taking Over of the Works and Sections] and as stated in the Taking-Over Certificate of the Construction Works.”
Priority of Documents	1.5	The document to be added in the list of Priority of Documents after (e): (f) List of Eligible Countries that was specified in Section 5 of the Bidding Document and the list renumbered accordingly
Care and Supply of Documents	1.8	<i>Add the following text at the end of Sub-clause 1.8:</i> Irrespective of the above, the Contractor shall be responsible for the production of detailed construction drawings as may be necessitated by his work programme pursuant to Sub-Clause 8.3 and as the Engineer may deem necessary for the proper execution of the Works. The Contractor shall supply two copies of draft prints of all such detailed construction drawings for the Engineer’s review and when approved by the Engineer shall supply six final prints together with a reproducible copy on computer disk or as may be otherwise approved by the Engineer.

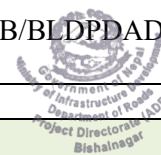


Chudaraj Dhakal
Project Director

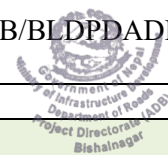
Subject	Ref. GCC	Provision
Joint and Several Liability	1.14	Delete the entire contents of Sub-Clause 1.14 and replace with: If the Contractor is a Joint Venture: (a) the members of the JV shall be jointly and severally liable to the Employer for the performance of the Contractor's obligations under the Contract; (b) the JV leader shall have authority to bind the Contractor and each member of the JV; and (c) neither the members nor (if known) the scope and parts of the Works to be carried out by each member nor the legal status of the JV shall be altered without the prior consent of the Employer (but such consent shall not relieve the altered JV from any liability under sub-paragraph (a) above). In the context of JV, the word "leader" is synonymous with the words "lead partner" and "Lead Partner", the word "member" is synonymous with "partner" and "Partner", and "members" with "partners" and "Partners".
Engineers Duties and Authorities	3.1	Add following at the end of the sub-clause: The Engineer shall obtain the specific approval of the Employer before taking action under the following Sub-Clauses of these Conditions: (A) Sub-Clause 4.12: agreeing or determining an extension of time and/or additional cost. (B) Sub-Clause 13.1: instructing a Variation, except; (i) in an emergency situation as determined by the Engineer, (C) Sub-Clause 13.3: approving a proposal for Variation submitted by the Contractor in accordance with Sub-Clause 13.1 or 13.2. (D) Sub-Clause 13.4: specifying the amount payable in each of the applicable currencies. Notwithstanding the obligation, as set out above, to obtain approval, if, in the opinion of the Engineer, an emergency occurs affecting the safety of life or of the Works or of adjoining property, he may, without relieving the Contractor of any of his duties and responsibility under the Contract, instruct the Contractor to execute all such work or to do all such things as may, in the opinion of the Engineer, be necessary to abate or reduce the risk. The Contractor



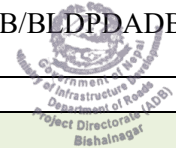
Subject	Ref. GCC	Provision
		shall forthwith comply, despite the absence of approval of the Employer, with any such instruction of the Engineer. The Engineer shall determine an addition to the Contract Price, in respect of such instruction, in accordance with Clause 13 and shall notify the Contractor accordingly, with a copy to the Employer.
Determination	3.5	Add the end of the second paragraph, add the following: “Each Party shall give effect to each agreement or determination, unless the either Party gives notice, to the Engineer with copies to the other Party, of his dissatisfaction with a determination within 14 days of receiving it. Either Party may then refer the dispute to the DB in accordance with Sub-Clause 20.4 [Obtaining Dispute Board’s Decision].”
Contractor’s General Obligations	4.1	In the fifth paragraph delete "whenever required by the Engineer" and replace with "as part of his quality assurance obligations". <i>After the fifth paragraph, add the following paragraph:</i> "The Contractor shall prepare and submit working drawings, shop drawings and schedules for all works to be constructed and maintained under the Contract and shall be fully responsible for the accuracy of these working drawings, shop drawings and schedules which shall be deemed to be Contractor's Documents in accordance with the Contract and be submitted in accordance with the provisions for the same. The working drawings, shop drawings and schedules shall be based on the Drawings and the actual site conditions as surveyed by the Contractor and agreed with the Engineer." <i>At the end of this Sub-Clause add the following paragraph:</i> “On or before completion of the Construction Works, the Contractor shall arrange to furnish to the Engineer, as part of Contractor’s Documents, “as-built” drawings of the permanent works of the construction phase works (not limited to works designed by the Contractor), in the quality and detail to be approved by the Engineer. The “as-built”



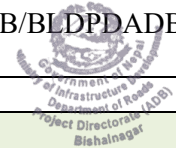
Subject	Ref. GCC	Provision
		drawings shall be prepared, and submitted for the Engineer's checking and acceptance, progressively with the progress of the construction works. The Taking-Over Certificate for the construction works shall not be issued by the Engineer until the "as-built" drawings of the permanent works of the construction works are submitted and accepted.
Performance Security	4.2	The Performance Security, including any additional security required as per ITB 35.5 and ITB 40.1, 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 acceptable to the Employer, and denominated in Nepalese Rupees. The Performance Security shall be valid until a date 30 days from the date of issue of the Defect Liability Certificate in the case of a bank guarantee. Any additional performance security required as per ITB 35.5 shall be valid until a date 30 days from the date of issue of the certificate of Completion in the case of a bank guarantee. Any additional performance security required as per ITB 40.1 shall be valid until a date 30 days from the date of issue of the certificate of DLP in the case of a bank guarantee. 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.
Contractor's Representative	4.3	<i>At the end of second paragraph of Sub-Clause 4.3, add the following:</i> The Contract Manager / Contractor's Representative shall require being the Senior Employee from the Bidder and working with the firm for at least one year prior to the bid submission deadline. If the Contractor is a Joint Venture, the Contractor's Representative shall be from the Lead Partner. The Contract Manager / Contractor's Representative shall be at the work site during the contract duration.



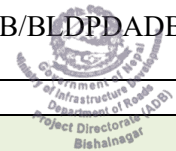
Subject	Ref. GCC	Provision
Setting Out	4.7	<i>At the end of the second paragraph, add the following:</i> "For this purpose, before commencement of the work on the site, the Contractor and representative of the Engineer jointly shall carry out a check/setting out survey, in the presence of the Engineer, to verify the accuracy of the items of reference and submit the results of the verification survey to the Engineer for his acceptance."
Safety Procedures	4.8	<i>At the end of this Sub-Clause, add the following paragraph:</i> "Within twenty-eight (28) days of the Commencement Date, and before commencing any construction on Site, the Contractor shall provide a Site Safety Manual, which shall be subject to the Engineer's consent, specifically for the Site which shall establish all of the requirements for effecting and maintaining a safe working environment for Contractor's and Employer's Personnel and any other authorized personnel entering the Site in accordance with the Contractor's obligations. The Site Safety Manual shall include all of safety obligations of the Contractor for Site activities and personal protective equipment required for working area. The Manual shall be revised as deemed necessary to suit with the changed site situation by the Contractor with the consent of the Engineer."
Unforeseeable Physical Conditions	4.12	Add the following subparagraph at the end of GCC Sub- clause 4.12: "In addition to notice of any unforeseeable physical conditions, the Contractor shall provide the Engineer with a written notice of any unanticipated environmental, resettlement or indigenous people's risks or impacts that arise during construction, implementation or operation of the Project that were not considered in applicable EMP attached hereto Employer's Requirement."



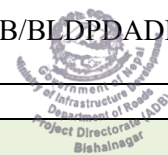
Subject	Ref. GCC	Provision
Protection of the Environment	4.18	<i>Add the following paragraphs at the end of Sub-clause 4.18:</i> The Contractor shall, to the satisfaction of the Engineer, take all necessary precautions for the efficient protection of all surface and sub-surface water courses against all kinds of pollution arising from the execution of the works. The Contractor shall ensure that at all locations where his labour force are living or working, other than labour living in their own homes, adequate facilities are provided to collect and treat all sewage and wastewater and to ensure that the outflows from such treatment facilities comply with recognized national or international standards for sewage treatment discharges. The Contractor shall take special precautions in connection with the establishment of storage facilities for diesel fuel, petrol, lubricants, bitumen and bituminous materials. Storage facilities shall not be placed in rock- fall prone areas. They shall have barriers and impervious surfaces preventing leakages of spilt material outside the storage area or into the underlying soils. The Contractor shall also comply with all applicable national, regional, provincial and local environment laws and regulations. The Contractor shall (a) establish an operational system for managing environmental impacts, (b) carry out all of the monitoring and mitigation measures, and (c) allocate the budget required to ensure that such measures are carried out. The Contractor shall submit quarterly reports on the carrying out of such measures to the Employer. The Contractor shall allocate a budget at his own cost for compliance with these measures, requirements and actions.
Progress Reports	4.21	In the sub-paragraph (g) just after “relations;” delete “and” At the end of sub-paragraph (h), delete “.” and replace with “;”, and add the following sub-paragraphs (i), (j), (k), (l), (m) and (n): (i) the status of all Variations; (j) details of all matters affecting, or likely to affect, the progress or cost of the Works and particulars of the preventative and remedial measures which have been, are being, or may be taken in respect of those matters; (k) any other particulars reasonably required by the Engineer; (l) monitoring of the obligations in Sub-Clauses 4.7, 4.13, 4.18, 6.4, 6.7, 6.20, 6.21 and 6.23; (m) daily diary of the site works; (n) safe guard status of the project; (o) Material delivered to the site and material consumed in the works; (p) Plant and equipment on Site together with number of hours worked by and current of each item; and All incidents affecting the safety and the health and welfare of persons and causing damage to property together with such other records as the Engineer may from time to time require to be kept and provided.



Subject	Ref. GCC	Provision
Labour Laws	6.4	Add at the end following sentence: The Contractor shall comply with the Employer's applicable Labour Laws and regulations and incorporate applicable workplace occupational Safety norms.
Health and Safety	6.7	Add at the end following sentence: "The Contractor shall arrange all medical facilities as per Standard Operation Procedure Guideline (SOP) of ADB / Government of Nepal Guideline for COVID-19 Pandemic and any other Pandemic to its employees engaged under the project and to members of the local communities surrounding the Project area, particularly women." The Contractor shall provide appropriate facilities (latrines, drinking water, and the likes) for workers at construction site.
Contractor's Personnel	6.9	<i>Add the following para at the beginning of Sub Clause 6.9.</i> The Contractor shall appoint the natural persons named in the Bid to the positions of Key Personnel. If not so named, or if an appointed person fails to act in the relevant position of Key Personnel, the Contractor shall submit to the Engineer for consent the name and particulars of another person the Contractor proposes to appoint to such position. If consent is withheld or subsequently revoked, the Contractor shall similarly submit the name and particulars of a suitable replacement for such position. The Contractor shall not, without the Engineer's prior consent, revoke the appointment of any of the Key Personnel or appoint a replacement (unless the person is unable to act as a result of death, illness, disability or resignation, in which case the appointment shall be deemed to have been revoked with immediate effect and the appointment of a replacement shall be treated as a temporary appointment until the Engineer gives his/her consent to this replacement, or another replacement is appointed, under this Sub-Clause). All Key Personnel shall be based at the Site (or, where Works are being executed off the Site, at the location of the Works) for the whole time that the Works are being executed. If any of the Key Personnel is to be temporarily absent during execution of the Works, a suitable replacement shall be temporarily appointed, subject to the Engineer's prior consent. All Key Personnel shall be fluent in the language for communications defined in Sub-Clause 1.4 [Law and Language]. If any of the Key Personnel are not fluent in this language, the Contractor shall make competent interpreter(s) available during all working hours, sufficient for that person to properly perform his/her duties under the Contract.
Child Labour	6.21	<i>Delete the contents within this sub-clause and replace with the followings:</i> <i>"The Contractor shall not employ any child to perform any work, including work that is economically exploitative, or is likely to be hazardous to, or to interfere with, the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral,</i>



Subject	Ref. GCC	Provision
		or social development. "Child" means a child below the statutory minimum age specified under applicable national law in Nepal.
Manner of Execution	7.1	Insert the following paragraphs at the end of Sub-Clause 7.1: The Contractor shall submit complete documents and information pertaining to the method statements for manufacture, installation and construction which the Contractor proposes to adopt or use, (and if applicable such calculations of stresses, strains and deflections and the like that will or may arise in the Works or to the other works comprising the Project or any parts thereof during installation from the use of such methods). The Engineer will then check to see whether, if such method statements are adhered to, the Works can be executed in accordance with the Contract and without detriment to the Works (when completed) and to other works comprising the Project and in a manner which minimizes disruption to road and pedestrian traffic. The Engineer shall inform the Contractor in writing within 21 days after receipt of the above information, a) that the Contractor's proposed method statements for manufacture, installation and construction have the consent of the Engineer; or b) in what respects, in the opinion of the Engineer the Contractor's proposed method statements for manufacture, installation and construction: (i) fail to comply with the Specification and Drawings; (ii) would be detrimental to the Works and/or to the other works comprising the Project; (iii) do not comply with the other requirements of the Contract; or c) as to the further documents or information which is required to enable the Engineer to properly assess the proposed method statements for manufacture, installation and construction. In the event that the Engineer does not give his consent, the Contractor shall take such steps or make such changes in the said method statements or supply such further documents or information as may be necessary to meet the Engineer's requirements and to obtain his consent. The Contractor shall not change the method statements for manufacture, installation and construction which have received the Engineer's consent without further review and consent in writing of the Engineer. Notwithstanding the foregoing provisions of this Sub-Clause, or those certain of the Contractor's proposed method statements for manufacture, installation and construction may be the subject of the consent of the Engineer, the Contractor shall not be relieved of any of its liability or obligation under the Contract.
Taking Over of the Works and Sections	10.1	After the third paragraph, add the following paragraph: "Pursuant to sub-paragraph (a) above, any works related to public safety or which may affect the protection of the Works in any



Subject	Ref. GCC	Provision
		respect, as determined by the Engineer, shall not be deemed to be minor outstanding works or defects which will not substantially affect the use of the Works within the meaning of this Sub-Clause."
The Contract Price	14.1	<i>Add the following paragraph at the end of Sub-clause 14.1:</i> The Contractor shall also pay royalties, tolls, value added tax and income tax. With respect to the income taxes including taxes on the Contractor's staff, personnel and labour, the Contractor shall perform such duties in regard to Tax Deductions at Source (TDS) thereof as may be applicable by the laws and regulations of Nepal.
	21.1	<i>Add new GCC Sub-clause 21.1 as follows:</i> The Contractor shall have the nationality of an ADB member country. 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.
	21.2	<i>Add new GCC Sub-clause 21.2 as follows:</i> The materials, equipment and services to be supplied under the Contract shall have their origin in eligible source countries 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.



Chudaraj Dhakal
Project Director

Section 9 - Contract Forms

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

Table of Forms

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Notice of Intention for Award of Contract

[on letterhead paper of the Employer]

[date of notification]

Shudraj Dhakal
Project Director

To: [name of the Bidder]
 Attention: [insert name of the Bidder's authorized representative]
 Address: [insert address of the Bidder's authorized representative]
 Telephone/Fax numbers: [insert telephone/fax numbers of the Bidder's authorized representative]
 E-mail Address: [insert e-mail address of the Bidder's authorized representative]

This is to notify you of our intention to award the contract [insert name of the contract and identification number, as given in the Bid Data Sheet]. You have [insert number of days as specified in ITB 41.1 of the BDS] days from the date of this notification to (i) request for a debriefing in relation to the evaluation of your Bid; and/or (ii) submit a bidding-related complaint in relation to the intention for award of contract, in accordance with the procedures specified in ITB 41.1 and 46.1.

The summary of the evaluation are as follows:

1. List of Bidders

Name of Bidder	Bid Price as Read Out at Opening	Evaluated Bid Price

2. Reason/s Why Your Bid Was Unsuccessful

.....

3. The Successful Bidder

Name of Bidder:	
Address:	
Accepted Contract Amount:	
Duration of Contract:	
Scope of the Contract Awarded:	
Amount Performance Security Required:	

Authorized Signature:

Name and Title of Signatory:

Name of Agency:



[Signature]
[Name] **Praraj Dhakal**
Project Director

Letter of Acceptance

[on letterhead paper of the Employer]

To: [Name and address of the contractor]

Subject: Contract No. [please specify]

This is to notify you that your Bid dated [date] for execution of the [name of the contract and identification number, as given in the Bid Data Sheet] for the Accepted Contract Amount in the equivalent of [amount in words and figures and name of currency], as corrected and modified in accordance with the Instructions to Bidders is hereby accepted by our Agency.

You are requested to furnish the Performance Security within 28 days in accordance with the Conditions of Contract and any additional security required as a result of the evaluation of your bid, using for that purpose the Performance Security Form included in Section 9 (Contract Forms) of the Bidding Document.

Authorized Signature:

Name and Title of Signatory:

Name of Agency:

Attachment: Contract Agreement



Contract Agreement

THIS AGREEMENT made the [date] day of [month], [year], between [name of the Employer] (hereinafter "the Employer"), of the one part, and [name of the contractor] (hereinafter "the Contractor"), of the other part:

Smmf.
Deedaraj Dhakal
 Project Director

WHEREAS the Employer desires that the Works known as [name of the contract] should be executed by the Contractor, and has accepted a Bid by the Contractor for the execution and completion of these Works and the remedying of any defects therein.

The Employer and the Contractor agree as follows:

1. In this Agreement, words and expressions shall have the same meanings as are respectively assigned to them in the Contract documents referred to.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement. This Agreement shall prevail over all other Contract documents.
 - (a) Letter of Acceptance,
 - (b) Letter of Technical Bid,
 - (c) Letter of Price Bid,
 - (d) Adenda Nos. [insert addenda numbers if any]
 - (e) the Particular Conditions of Contract – Part A,
 - (f) Particular Conditions of Contract – Part B,
 - (g) List of Eligible Countries that was specified in Section 5 of the Bidding Document
 - (h) General Conditions of Contract,
 - (i) Specifications,
 - (j) Drawings,
 - (k) Completed Schedules including Bill of Quantities,
 - (l) The JV Undertaking (if the Contractor is a JV), and
 - (m) Any other documents shall be added here.
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 [name of the borrowing country] on the day, month and year indicated above.

Signed by

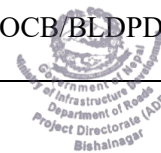
Signed by

for and on behalf of the Employer
in the presence of

for and on behalf the Contractor
in the presence of

Witness, Name, Signature, Address, Date

Witness, Name, Signature, Address, Date



Chudaraj Dhakal
Project Director

Performance Security

[Bank's name, and address of issuing branch or office]

Beneficiary: [Name and address of the Employer]

Date:

Performance Guarantee No.:

We have been informed that [name of the contractor] (hereinafter called "the Contractor") has entered into Contract No. [reference number of the contract] dated [date] with you, for the execution of [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 [name of the bank] hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of [name of the currency and amount in words]¹[amount in figures] such sum being payable in the types and proportions of currencies in which the Contract Price is payable, 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 [date] day of [month], [year],² 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 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.³

.....
[Signature(s) and seal of bank (where appropriate)]

If the bank issuing performance security is located outside the Employer's country, it shall be counter-guaranteed or encashable by a bank in the Employer's country.

¹ The guarantor shall insert an amount representing the percentage of the accepted contract amount specified in the contract and denominated either in the currency(ies) of the contract or in any freely convertible currency acceptable to the Employer.

² Insert the date 28 days after the expected expiry of defect notification period. The Employer should note that in the event of an extension of the time for completion of the contract, the Employer would need to request an extension of this guarantee from the guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the Employer might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [6 months][1 year], in response to the Employer's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee."

³ Or the employer may use "Uniform Rules for Demand Guarantees (URDG), ICC Publication No. 458, except that subparagraph (ii) of Sub-article 20(a) is hereby excluded" as appropriate.



[Signature]
Chudaraj Dhakal
Project Director

Advance Payment Security

[Bank's name, and address of issuing branch or office]

Beneficiary: *[Name and address of the Employer]*

Date:

Advance Payment Guarantee No.:

We have been informed that *[name of the contractor]* (hereinafter called "the Contractor") has entered into Contract No. *[reference number of the contract]* dated *[date]* with you, for the execution of *[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 *[name of the currency and amount in words]*¹ *[amount in figures]* is to be made against an advance payment guarantee.

At the request of the Contractor, we *[name of the bank]* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of *[name of the currency and amount in words]*² *[amount in figures]* 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 and cash flow support 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 ninety percent (90%) of the Contract Price has been certified for payment, or on the *[date]* day of *[month]*, *[year]*,³ 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 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.⁴

.....
[Signature(s) and seal of bank (where appropriate)]

If the bank issuing advance payment security is located outside the Employer's country, it shall be counter-guaranteed or encashable by a bank in the Employer's country.

¹ The guarantor shall insert an amount representing the amount of the advance payment denominated either in the currency(ies) of the advance payment as specified in the Contract, or in any freely convertible currency acceptable to the Employer.

² Footnote 1.

³ Insert the expected expiration date of the time for completion. The Employer should note that in the event of an extension of the time for completion of the contract, the Employer would need to request an extension of this guarantee from the guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the Employer might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [6 months] [1 year], in response to the Employer's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee."

⁴ Or the employer may use "Uniform Rules for Demand Guarantees (URDG), ICC Publication No. 458, except that subparagraph (ii) of Sub-article 20(a) is hereby excluded" as appropriate.