Bidding Document For Procurement of

Construction of Double Lane Dual Carriageway Standard Expressway Road, Bridge and Allied Works

Ch: 49 +800 to Ch: 57+400

ICB Contract I.D.: KTFT/ICB/WORKS/R&B/078/079/3

Employer: Kathmandu- Terai/Madesh Fast Track (Expressway) Road Project, Nepali Army, Government of Nepal

August 2021
KATHMANDU

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BIDDING DOCUMENT

TECHNICAL BID
PROCUREMENT OF WORKS

International Competitive Bidding (ICB)

Two Envelope Bidding Procedure

Procurement of

Kathmandu- Terai/Madesh Fast Track (Expressway) Road Project

Construction of Double Lane Dual Carriageway Standard Expressway Road, Bridge and Allied Works

Ch-49 +800 to Ch- 57+400

Issued on: 15 August 2021

Bid Document issued to: All eligible Nepalese and Foreign Bidders

ICB No: KTFT/ICB/WORKS/R&B/078/079/3
Project Name: Kathmandu- Terai/Madesh Fast Track (Expressway) Road Project

Office Name: Kathmandu- Terai/Madesh Fast Track (Expressway) Road Project (KTFT)

Office Address: Bhadrakali, Kathmandu, Nepal

Financing Agency: Government of Nepal

ABBREVIATIONS

BD ..... Bidding Document
BDF……... Bidding Forms
BDS..... Bid Data Sheet
BOQ …….. Bill of Quantities
COF …… Contract Forms
DB…… Design & Build
DBO……..Design Build & Operate
DP ……. Development Partners
DoLIDAR ……. Department of Local Infrastructure Development and Agricultural Roads
DoR …….. Department of Roads
EPC……. Engineering Procurement and Construction
ELI ……. Eligibility
EQC ..... Evaluation and Qualification Criteria
EXP …… Experience
FIN ……. Financial
GCC ..... General Conditions of Contract
GoN ..... Government of Nepal
ICB ..... International Competitive Bidding
ICC..... International Chamber of Commerce
ITB ..... Instructions to Bidders
JV …….. Joint Venture
LIT …….. Litigation
NA …….. Nepali Army
NCB ……... National Competitive Bidding
PAN …… Permanent Account Number
PPA …….. Public Procurement Act
PPMO …… Public Procurement Monitoring Office
PPR ……... Public Procurement Regulations
PL ..... Profit and Loss
PCC …….. Particular Conditions of Contract
SBD..... Standard Bidding Document
R&B…… Road and Bridge
TS..... Technical Specifications
UR…… Unit Rate
VAT …… Value Added Tax
WRQ …….. Works Requirements

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INVITATION FOR BIDS

Government of Nepal (GoN)

Nepali Army

Kathmandu- Terai/Madesh-Fast Track (Expressway) Road Project

Invitation for Bids for the Construction of Double Lane Dual Carriageway Standard Expressway Road, Bridge and Allied Works

Contract Identification No: **KTFT/ICB/WORKS/R&B/078/079/3**

First Date of Publication: 15 August 2021

1. The Government of Nepal [GoN] has allocated funds towards the cost of **Kathmandu-Terai/Madesh-FastTrack (Expressway) Road Project** and intends to apply part of the funds to cover eligible payments under the Contract for Construction of Double Lane Dual Carriageway Standard Expressway Road, Bridge and Allied Works from Ch. 49+800 to Ch. 57+400; Contract ID: KTFT/ICB/WORKS/R&B/078/079/3. Bidding is open to all eligible Nepalese and Foreign Bidders.

2. **Kathmandu- Terai/Madesh-Fast Track (Expressway) Road Project** invites electronic bids from eligible bidders for the Construction of Double Lane Dual Carriageway Expressway Road, Design and Construction of Bridges and Allied Works under International Competitive Bidding - Single Stage, Two Envelop Bidding Procedure, in accordance with but not limited to, the following scope of works;

   2.1 Construction of Double Lane Dual Carriageway Expressway Primary Class (Asian Highway Design Standard 1993) Level of Services (LOS)-A including all the components,

   2.2 Design and Construction of Double Lane Bridges.

   2.3 Details of major components of the proposed Contract are as follows:

   a) Twin Bridges: 14 Nos (Contractor's Design)

   b) River Training Works

   c) Expressway and Service Road Works

   d) Slope Protection/Stabilization Works

   e) Cross Drainage, Vehicle Underpass and Pedestrian Underpass

   f) All associated works such as retaining structures, road furniture and road safety etc.

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

   - Minimum Average Annual Construction Turnover of the best 3 years within the last 10 years: ***[NRs 4,35,00,00,000.00]***
   - Minimum Work experience of similar size and nature: Two Contracts

on Road/Highway/Expressway Works with a value of NPR**. 6,40,00,00,000.00** each, within last 10 years.

- Minimum Work experience of similar size and nature: Two Contract on (EPC/DB/DBO) on Bridge Works with a value of NPR. **3,10,00,00,000.00** each, within last 10 years.
- Submission of Concept paper for Understanding of the Project and Proposed Design for Bridge Works, satisfactory to the Employer

3. Eligible bidders may obtain further information at the office of **Kathmandu-Terai/Madesh-Fast Track (Expressway) Road Project, Nepali Army Headquarter, Bhadrakali, Kathmandu; Telephone:+977-1-4267060, Email: ft-procmgmt@nepalarmy.mil.np,** during office hours, or may visit PPMO website: www.bolpatra.gov.np/egp.

4. A complete set of bidding documents may be downloaded from PPMO's website: www.bolpatra.gov.np. Bidders submitting their bids electronically, should deposit a non-refundable cash deposit of **NRS 20,000 (Twenty Thousand Nepalese Currency),** as a cost of bidding documents in the project's Rajaswa (revenue) account **No. 00101000000001001001, Nepal Bank Limited**, **Bhugolpark, Kathmandu** in favour of KTFT and the scan copy (pdf format) of the bank deposit voucher shall be uploaded by the bidder at the time of electronic submission of the bids.

5. Pre-bid meeting shall be held at the office of **Kathmandu- Terai/Madesh-Fast Track (Expressway) Road Project, Bhadrakali, Kathmandu** at 13:00 hours local time on 13 September 2021.

6. Electronic bids must be submitted through PPMO website www.bolpatra.gov.np/egp, on or before 12:00 hours (local time) on 29 September, 2021. Bids received after this deadline will be rejected.

7. Under the Single Stage, Two Envelope Procedure, Bidders are required to submit the Technical Bid and the Price Bid, as per the provision of ITB 21 of the Bidding Documents. The Bid documents shall be duly signed on each page by authorized personnel. The bids must have the same bidder name in which the bidding documents has been purchased or paid for.

8. The bids will be opened in the presence of Bidders' representatives who choose to attend at 13:00 hours (local time) on 29 September 2021 at the office of **Kathmandu-Terai/Madesh-Fast Track (Expressway) Road Project**, **Bhadrakali, Kathmandu,** Nepal.

9. Bids must be valid for a period of 120 days after bid opening date and must be accompanied by a scanned copy of the bid security in pdf format amounting to a minimum of NPR. 23,15,00,000.00 which shall be valid for 30 days beyond the validity period.

10. If the last date for purchasing or submission falls on a government holiday, then the next working day shall be considered the last date. In such case, the validity period of the bid security shall remain the same as specified for the original last date of bid submission.

11. It is recommended that interested eligible bidders visit the project site to familiarize themselves with the site conditions at site in order to ensure the sufficiency of their bids. Costs incurred for preparation of bid applications and site visits are to be borne by the bidder.

12. **Kathmandu- Terai/Madesh-Fast Track (Expressway) Road Project** reserves the right to accept or reject any or all bid applications, cancel the bidding process and reject all bid applications without assigning any reason whatsoever. The bidder shall have no right to claim any cost associated with the preparation of bidding document under such circumstances.

13. The prospective bidders may also visit Nepali Army website: www.nepalarmy.mil.np/fasttrack/home regarding the Invitation for bids.

Address:

The Project Chief
Kathmandu- Terai/Madesh Fast Track (Expressway) Road Project
Nepali Army,
Bhadrakali, Kathmandu, Nepal
Telephone: +977-1-4267060
Email: ft-procmgmt@nepalarmy.mil.np

PART I: BIDDING PROCEDURES

Section 1 - Instructions to Bidders

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.

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Section 1 - Instructions to Bidders

A. General

1. Scope of Bid

1.1 In connection with the Invitation for Bids indicated in the Bid Data Sheet (BDS), the Employer, as indicated in the BDS, issues this Bidding Document for the procurement of Works as specified in Section 5 (Works Requirements). The name, identification, and number of Contracts of the International Competitive Bidding (ICB) 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 **GoN Funded:** In accordance with its annual program and budget, approved by the GoN, the implementing agency **indicated in the BDS** plans to apply a portion of the allocated budget toward the cost of the project named in the BDS. The GoN intends to apply a portion of the allocated budget to eligible payments under the contract(s) for which this Bidding Document is issued.

Or

Public Entities' own Resource Funded: In accordance with its annual program and budget, approved by the public entity, the implementing agency indicated in the BDS plans to apply a portion of the allocated budget to eligible payments under the contract(s) for which this Bidding Document is issued.

Or

DP Funded: The GoN has applied for or received financing (hereinafter called "funds") from the Development Partner (hereinafter called "the DP") **indicated in the BDS** toward the cost of the project **named in the BDS**. The GoN intends to apply a portion of the funds to eligible payments under the contract(s) for which this Bidding Document is issued.

2.2 DP Funded: Payment by the DP will be made only at the request of the GoN and upon approval by the DP in accordance with the terms and conditions of the financing agreement between the GoN and the DP (hereinafter called the "Loan Agreement"), and will be subject in all respects to the terms and conditions of that Loan Agreement. No party other than the GoN shall derive any rights from the Loan Agreement or have any claim to the funds.

3. Fraud and

3.1 The Government of Nepal (GoN) requires that the procuring

Corruption

entities as well as bidders, suppliers, and contractors and their sub-contractors under GoN/DP-financed contracts, shall adhere to the highest standard of ethics during the procurement and execution of such contracts. In this context , the Employer;

(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) "obstructive practice" means:

(aa) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a GoN/DP investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or

(bb) acts intended to materially impede the exercise of the GoN's/DP's inspection and audit rights provided for under sub-clause 3.5 below.

(b) will reject bid(s) if it determines that the bidder has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;

(c) will sanction a firm or individual, including declaring ineligible, for a stated period of time, to be awarded a GoN/DP-financed contract if it at any time determines that the firm has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for, or in executing, a GoN/DP-financed contract.

3.2 The Bidder shall not carry out or cause to carry out the following acts with an intention to influence the implementation of the procurement process or the procurement agreement :

(a) give or propose improper inducement directly or indirectly,

(b) distortion or misrepresentation of facts,

(c) engaging in corrupt or fraudulent practice or involving in such act,

(d) interference in participation of other competing bidders,

(e) coercion or threatening directly or indirectly to cause harm to the person or the property of any person to be involved in the procurement proceedings,

(f) collusive practice among bidders before or after submission of bids for distribution of works among bidders or fixing artificial/uncompetitive bid price with an intention to deprive the Employer the benefit of open competitive bid price,

(g) contacting the Employer with an intention to influence the Employer with regards to the bids or interference of any kind in examination and evaluation of the bids during the period from the time of opening of the bids until the notification of award of contract.

3.3 PPMO on the recommendation of the Employer may **blacklist** a Bidder for a period of one (1) to three (3) years for its conduct including the following grounds and seriousness of the act committed by the bidder:

(a) if convicted by a court of law in a criminal offence which disqualifies the Bidder from participating in the contract,

(b) if it is established that the contract agreement signed by the Bidder was based on false or misrepresentation of Bidder's qualification information,

(c) if it at any time determines that the firm has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for, or in executing, a GoN/DP-financed contract.

(d) If the Successful Bidder fails to sign the Contract.

3.4 A bidder declared blacklisted and ineligible by the GoN, Public procurement Monitoring Office (PPMO) and/or the DP in case of DP funded project, shall be ineligible to bid for a contract during the period of time determined by the GoN, PPMO and/or the DP.

3.5 The Contractor shall permit the GoN/DP to inspect the Contractor's accounts and records relating to the performance of the Contractor and to have them audited by auditors appointed by the GoN/DP, if so required by the GoN/DP.

3.6 DP Funded: In pursuance of the fraud and corruption policy, the

DP.

(a) Will reject a Bid if it determines that the bidder recommended for award has directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;

(b) Will cancel the portion of the loan/ credit/ grant allocated to a contract if it determines at any time that representative(s) of the GoN or of a beneficiary of the fund engaged in corrupt, fraudulent, collusive, or coercive practices during the procurement or the execution of that contract, without the GoN having taken timely and appropriate action satisfactory to the DP to address such practices when they occur.

3.7 A bidder declared blacklisted and ineligible by the GoN, Public Procurement Monitoring Office (PPMO) and/or the DP in case of DP funded project, may be ineligible to bid for a contract during the period of time determined by the GoN, PPMO and/or the DP.

3.8 In case of a natural person or firm/institution/company which is already declared blacklisted and ineligible by the GoN, any other new or existing firm/institution/company owned partially or fully by such Natural person or Owner or Board of director of blacklisted firm/institution/company; shall not be eligible bidder.

4. Eligible Bidders

4.1 A Bidder may be a natural person, private entity, or government-owned entity—subject to ITB 4.5—or any combination of them in the form of a Joint Venture (JV) under an existing agreement, or with the intent to constitute a legally-enforceable joint venture. In the case of a JV:

(a) all partners shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms. Maximum number of JV and other provision for JV shall be as per specified in the BDS. The qualification requirement of the parties to the JV shall be as specified in Section 3; Evaluation and qualification Criteria, and

(b) the JV shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the parties of the JV during the bidding process and, in the event the JV is awarded the Contract, during Contract execution.

4.2 A Bidder, and all parties constituting the Bidder, shall have the nationality of Nepal or any country or eligible countries mentioned in the BDS. A Bidder shall be deemed to have the nationality of a country if the Bidder is a citizen or is constituted, or incorporated, and operates in conformity with the provisions of the laws of that country. This criterion shall also apply to the determination of the nationality of proposed sub Contractors or suppliers for any part of

the Contract including related services.

4.3 A Bidder shall not have a conflict of interest. A Bidder found to have a conflict of interest shall be disqualified. A Bidder may be considered to be in a conflict of interest with one or more parties in this bidding process, if:

(a) they have controlling partners 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 information about or influence on 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. Participation by a Bidder in more than one Bid will result in the disqualification of all Bids in which the party is involved. However, this does not limit the inclusion of the same sub Contractor in more than one bid; or

(f) a Bidder or any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the Contract that is the subject of the Bid; or

(g) a Bidder or any of its affiliates has been hired (or is proposed to be hired) by the Employer as Engineer for the Contract.

4.4 A firm that is under a declaration of ineligibility by the GoN/DP in accordance with ITB 3, at the date of the deadline for bid submission or thereafter, shall be disqualified. The list of debarred firm is available at the electronic address specified in the BDS.

4.5 Enterprises owned by GoN shall be eligible only if they can establish that they are legally and financially autonomous and operate under commercial law, and that they are not a dependent agency of the GoN.

4.6 Bidders shall provide such evidence of their continued eligibility satisfactory to the Employer, as the Employer shall reasonably request.

4.7 In case a prequalification process has been conducted prior to the bidding process, this bidding is open only to prequalified Bidders.

4.8 Firms shall be excluded in any of the cases, if

(a) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, the Employer'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.

(b) DP Funded: as a matter of law or official regulation, Nepal prohibits commercial relations with that country, provided that the DP is satisfied that such exclusion does not preclude effective competition for the supply of goods or related services required;

(c) DP Funded: a firm has been determined to be ineligible by the DP in relation to their guidelines or appropriate provisions on preventing and combating fraud and corruption in projects financed by them.

4.9 Domestic Bidder shall be eligible only if the bidder has obtained Permanent Account Number (PAN) and Value Added Tax (VAT) Registration Certificate(s) and Tax Clearance Certificate or proof of submission of income return as stated in BDS from the Inland Revenue Office. Foreign bidder shall be eligible only if the bidder submits the documents indicated in the BDS at the time of bid submission and a declaration to submit the document(s) indicated in the BDS at the time of contract agreement.

5. Eligible Materials, Equipment and Services

5.1 The materials, equipment and services to be supplied under the Contract shall have their origin in any source countries as defined in 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.

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)

Part II Requirements

Section 5 – Employer's Requirements (WRQ)

Section 6 – Preamble to Bill of Quantities/Schedule of Prices

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 Invitation for Bids issued by the Employer is not part of the Bidding Document.

6.3 The Employer is not responsible for the completeness of the Bidding Document and their Addenda, if they were not obtained directly from the source stated by the Employer in the Invitation for Bids.

6.4 The Bidder is expected to examine all instructions, forms, terms, and specifications in the Bidding Document. Failure to furnish all information or documentation required by the Bidding Document may result in the rejection of the bid.

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

7.1 A prospective Bidder requiring any clarification of the Bidding Document shall contact the Employer in writing at the Employer's address indicated in the BDS or raise any question or curiosity during the pre-bid meeting if provided for in accordance with ITB 7.4. The Employer shall be required to make available as soon as possible the answer to such question or curiosity in writing to any request for clarification, provided that such request is received as mentioned in BDS. 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 encouraged to visit and examine the Site of Works and its surroundings and obtain for itself, on its own risk and responsibility, all information that may be necessary for preparing the bid and entering into a Contract for execution of the Works. The costs of visiting the Site shall be at the Bidder's own expense.

7.3 The Bidder and any of its personnel or agents will be granted permission by the Employer to enter upon its premises and lands for the purpose of such visit, but only upon the express condition that the Bidder, its personnel, and agents will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any

other loss, damage, costs, and expenses incurred as a result of the inspection.

7.4 The Bidder's designated representative is invited to attend a pre-bid meeting, if provided for in the BDS. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.

7.5 The Bidder is requested, as far as possible, to submit any questions in writing, to reach the Employer as mentioned in BDS.

7.6 Minutes of the pre-bid meeting, including the text of the questions raised, without identifying the source, and the responses given, together with any responses prepared after the meeting, will be transmitted promptly to all Bidders who have acquired the Bidding Document in accordance with ITB 6.3. Any modification to the Bidding Document that may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an addendum pursuant to ITB 8 and not through the minutes of the pre-bid meeting.

7.7 Non attendance 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.

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) Completed Schedules, in accordance with ITB 12;

(c) Bid Security, in accordance with ITB 19;

(d) Alternative Technical Bids, at Bidder's option and if permissible, in accordance with ITB 13;

(e) Written confirmation authorizing the signatory of the Bid to commit the Bidder, in accordance with ITB 20.2;

(f) Documentary evidence in accordance with ITB 17 establishing the Bidder's qualifications to perform the Contract;

(g) Technical Proposal in accordance with ITB 16;

(h) In the case of a bid submitted by a JV, the JV agreement, or letter of intent to enter into a JV including a draft agreement, indicating at least the parts of the Works to be executed by the respective partners; and

(i) Any other required documents, which is not against the provision of Procurement Act/Regulation and Directives issued by PPMO as specified in the **BDS**.

11.3 The Price Bid shall comprise the following:

(a) Letter of Price Bid;

(b) Completed Schedule of Prices and Schedule of Payment in accordance with ITB 12 and ITB 14, or as stipulated in the BDS;

(c) alternative price Bids, at Bidder's option and if permissible, in accordance with ITB 13;

(d) Any other document required in the BDS.

11.4 The Bidder is solely responsible for the authenticity of the documents submitted by the Bidder.

12. Letter of Bid and Schedules

12.1 The Letter of Technical Bid and Priced Bid, Schedules, and all documents listed under Clause 11, shall be prepared using the relevant forms in Section 4 (Bidding Forms), if so provided. The

forms must be completed without any alterations to the text, and no substitutes shall be accepted. All blank spaces shall be filled in with the information requested.

13. Alternative Bids

13.1 Unless otherwise 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 When specified in the BDS pursuant to ITB 13.1, and subject to ITB 13.4 below, Bidders wishing to offer technical alternatives to the requirements of the Bidding Document must first price the Employer's design or requirements as described in the Bidding Document and shall further provide all information necessary for a complete evaluation of the alternative by the Employer, including drawings, design calculations, technical specifications, breakdown of prices, and proposed design and construction methodology and other relevant details.

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 Schedules shall conform to the requirements specified below.

14.2 The Bidder shall submit a Price bid for the whole of the works described in ITB 1.1 by filling in prices for all items of the Works, as identified in Section 4 (Bidding Forms). In case of Unit Rate Contracts, the Bidder shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items against which no rate or price is entered by the Bidder will not be paid for by the Employer when executed and shall be deemed covered by the rates for other items and prices in the Bill of Quantities.

14.3 The price to be quoted in the Letter of Price Bid shall be the total price of the Bid, excluding any discounts offered.

14.4 Unconditional discounts, if any, and the methodology for their application shall be quoted in the Letter of Price Bid, in accordance with ITB 12.1.

14.5 If so indicated in ITB 1.1, bids are invited for individual Contracts or for any combination of Contracts (packages). Bidders wishing to offer any price reduction for the award of more than one Contract shall specify in their bid the price

reductions applicable to each package, or alternatively, to individual Contracts within the package. Price reductions or discounts shall be submitted in accordance with ITB 14.3, provided the bids for all Contracts are submitted and opened at the same time.

14.6 Unless otherwise provided in the BDS and the Conditions of Contract, the prices quoted by the Bidder shall be fixed. If prices quoted by the Bidder are subject to adjustment during the performance of the Contract in accordance with the provisions of the Conditions of Contract, the Bidder shall furnish the indices and weightings for the price adjustment formulae in the Table of Adjustment Data in Section 4 (Bidding Forms) and the Employer may require the Bidder to justify its proposed indices and weightings.

14.7 The bidder is subject to local taxes such as VAT, social charges or income taxes on nonresident international personnel, and also duties, fees, levies on amounts payable by the employer under the Contract. All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause, as of the date 30 days prior to the deadline for submission of bids, shall be included in the rates and prices and the total bid price submitted by the Bidder.

15. Currencies of Bid and Payment

15.1 The bid unit rates and the prices shall be quoted by the bidder entirely in Nepalese currency if not otherwise specified in the BDS.

15.2 Bidders shall indicate the portion of the bid price that corresponds to expenditures incurred in Nepalese currency 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 three convertible foreign currencies included in daily publication of Nepal Rastra Bank foreign currency exchange rate 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 30 days prior to the deadline for submission of bids published by Nepal Rastra Bank. Bidders should note that for the purpose of payments, the exchange rates confirmed by Nepal Rastra Bank as the selling rates prevailing 30 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 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 34 if margin of preference for domestic bidders is applicable in accordance with ITB 34.

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 non-responsive.

18.2 In exceptional circumstances, prior to the expiration of the bid validity period, the Employer may request Bidders to extend the period of validity of their Bids. The request and the responses shall be made in writing. If a bid security is requested in accordance with ITB 19, it shall also be extended 30 days beyond the deadline of the extended validity period. A Bidder may refuse the request without forfeiting its bid security. A Bidder granting the request shall not be required or permitted to modify its Bid and to include any additional conditions against the provisions specified in Bid Documents.

19. Bid Security

19.1 The Bidder shall furnish as part of its bid, in original form, a bid security as specified in the BDS. In case of e-submission of bid, the Bidder shall upload scanned copy of Bid security letter at the time of electronic submission of the bid. The Bidder accepts that the scanned copy of the Bid security shall, for all purposes, be equal to the original. The details of original Bid Security and the scanned copy submitted with e-bid should be the same otherwise the bid shall be non-responsive.

19.2 The bid security shall be, at the Bidder's option, in any of the following forms:

(a) an unconditional bank guarantee from Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law or;

(b) a cash deposit voucher in the Employer's Account as specified in BDS.

In the case of a bank guarantee, the bid security shall be submitted
either using the Bid Security Form included in Section IV (Bidding Forms) or in another Form acceptable to the Employer. The form must include the complete name of the Bidder. The bid security shall be valid for minimum thirty (30) days beyond the original validity period of the bid, or beyond any period of extension if requested under ITB 18.2.

19.3 The bid security issued by any foreign Bank outside Nepal must be counter guaranteed by a Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law in Nepal.

19.4 Any bid not accompanied by an enforceable and substantially compliant bid security, if required in accordance with ITB 19.1, shall be rejected by the Employer as nonresponsive. In case of e-Submission, if the scanned copy of an acceptable Bid Security letter

is not uploaded with the electronic Bid then Bid shall be rejected.

19.5 The bid security of unsuccessful Bidders shall be returned within three days, once the successful bidder has furnished the required performance security and signed the Contract Agreement pursuant to ITB 41.1 and ITB 42.1.

19.6 The bid security shall be forfeited if:

(a) a Bidder requests for withdrawal or modification of its bid, except as provided in ITB 18.2:

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

(ii) from the period twenty-four hours prior to bid submission deadline up to the period of bid validity specified by the Bidder on the Letter of Technical Bid and Price Bid, in case of hard copy submission.

(b) a Bidder changes the prices or substance of the bid while providing information pursuant to clause 27.1;

(c) a Bidder involves in fraud and corruption pursuant to clause 3.1;

(d) the successful Bidder fails to:

(i) furnish a performance security and evidence of line of Credit in accordance with ITB 41.1;

(ii) sign the Contract in accordance with ITB 42.1; or

(iii) accept the correction of arithmetical errors pursuant to clause 32 ;

19.7 The Bid Security of a JV shall be in the name of the JV that submits the bid. If the JV has not been legally constituted at the time of bidding, the Bid Security shall be in the names of all future partners as named in the letter of intent mentioned in ITB 4.1.

20. Format and Signing of Bid

20.1 The Bidder shall prepare one original of the documents comprising the bid as described in ITB 11 and clearly mark it "ORIGINAL". Alternative bids, if permitted in accordance with ITB 13, shall be clearly marked "ALTERNATIVE". In addition, the Bidder shall submit copies of the bid in the number specified in the BDS**,** and clearly mark each of them "COPY." In the event of any discrepancy between the original and the copies, the original shall prevail.

In case of e-submission of bid, the Bidder shall submit his bid electronically in PDF or web forms files as specified in ITB Clause 21.1(b), If a Bidder submits both the electronic bid and a bid in hard copy within the bid submission deadline, then the submitted Bids shall be accepted for evaluation provided that the facts and figures in hard copy confirm to those in electronic bid. If there is any major discrepancy in fact and figures in the electronic bid and bid in hard copy, it shall be treated as two separate bids from one Bidder and

both the Bids shall be disqualified, as per ITB Clause 4.3 (e).

20.2 The original and all copies of the bid shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Bidder. This authorization shall consist of a written confirmation as specified in the BDS and shall be attached to the bid. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the bid, except for un-amended printed literature, shall be signed or initialed by the person signing the bid.

20.3 Any amendments such as interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the bid.

D. Submission and Opening of Bids

21. Sealing and Making of Bids

21.1 Bidders may always submit their bids by mail or by hand or by courier. 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, by hand or by courier

i. Bidders shall enclose the original of the Technical Bid, and the original of the Price Bid and each copy of the Technical Bid and Price Bid, including alternative bids, if permitted in accordance with ITB 13, in separate sealed envelopes, duly marking the envelopes as: "ORIGINAL TECHNICAL BID", "ORIGINAL PRICE BID", "ALTERNATIVE BID" and "COPY OF TECHNICAL BID" and "COPY OF PRICE BID". These envelopes containing the original and the copies shall then be enclosed in one single envelope.

ii. The inner and outer envelopes shall:

(aa) bear the name and address of the Bidder;

(bb) be addressed to the Employer as provided in BDS 22.1;

(cc) bear the specific identification of this bidding process indicated in BDS 1.1;

(dd) The outer envelope and the inner envelope containing 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.

iii. The inner envelope containing the Price Bid shall bear a warning not to open until advised by the Employer in accordance with ITB 25.7

iv. 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.

(b) Electronic Bid Submission **P**rocedures: Bidders submitting Bids electronically shall follow the electronic bid submission procedure specified in this clause as follows:

i. For e-submission, the bidder is required to register in the e-GP portal https://www.bolpatra.gov.np. for downloading and submitting the bid electronically.

ii. Interested bidders may either purchase the bidding documents from the Employer's office as specified in the invitation for bid (IFB) or bidders registered in the e-GP portal of PPMO may download the bidding document from http://www.bolpatra.gov.np after login. If bidders choose to download the bidding document and submit the bid electronically, then the cost of the bidding document shall be deposited as specified in IFB. In addition, electronic scanned copy (.pdf format) of the bank deposit voucher/cash receipt should also be submitted along with the electronic bid files.

iii. The bidder shall then prepare/fill the documents and forms included in the issued bid documents or the downloaded bid documents from the e-GP portal of PPMO - http://www.bolpatra.gov.np. as applicable. The required documents and forms shall be prepared in PDF form and/or shall be filled in the web forms in the e-GP system as specified below:

Technical Bid:

S. N.	Document	Requirement	Remarks
1	Letter of Technical Bid	Mandatory	PDF/Web Forms
2	Bid Security (Bank Guarantee)	Mandatory	PDF
3	Company/Firm Registration Certificate	Mandatory	PDF
4	VAT registration Certificate	Mandatory	PDF
5	Tax Clearance Certificate/Tax return submission evidence/evidence of time extension	Mandatory	PDF
6	Power of Attorney of Bid signatory	Mandatory	PDF
7	Business Registration (Licence) Certificate	Mandatory, if Applicable	PDF
8	Bank Voucher for cost of bid document	Mandatory	PDF
9	Joint venture agreement	Mandatory	Mandatory in case of JV Bids Only

10	Qualification Information	Mandatory	Web Forms (Experience, Turnover, etc.)
11	Additional Document , if any	If relevant	PDF

Price Bid;

S. N.	Document	Requirement	Remarks
1	Letter of Price Bid	Mandatory	PDF/Web Forms
2	Applicable Price Adjustment Table	Mandatory if applicable	No Price adjustment will be treated if the indices in the Price Adjustment Table are not provided.
3	Completed Bill of Quantities and Schedule of Prices	Mandatory	Complete Cost as per proposed Bill of Quantities (for Employer's Design Works) and Schedule of Prices (for Contractor's Design Works)

Note:

a) Bidders (all partners in case of JV) should verify/update their profile documents as appropriate for the specific bid before submitting their bid electronically.

iv) The Bidder shall then upload the PDF bid files and submit the complete bid online through e-GP portal of PPMO- http://www.bolpatra.gov.np within the specified date and time.

v) Bidders are advised to download the bid submission report to ensure that all the documents/ files are up to date and complete.

vi) The Bidder / Bid shall meet the following requirements and conditions for e-submission of bids;

aa) The e-submitted bids must be readable through open standards interfaces. Unreadable and or partially submitted bid files shall be considered incomplete and shall not be considered for further bid evaluation.

bb) In addition to electronically submitted PDF files/web forms, the Bidder shall be required to submit original bid security letter/ documents and clarifications as specified in ITB Clause 27. If a bidder does not submit the original Bid security letter and requested documents and or clarifications within the specified time limit then the bid shall not be considered for furt00her evaluation.

cc) If major discrepancy is found between the electronically submitted PDF bid files and the documents/ clarifications provided by the Bidder as per ITB Clause 27, then the bid shall not be considered for further evaluation.

dd) The facility for submission of bid electronically through e-submission is to promote transparency, non-discrimination, equality of access, and open competition in the bidding process. The Bidders are fully responsible to use the e-submission facility properly in e-GP portal of PPMO-http://www.bolpatra.gov.np as per specified procedures and in no case the Employer shall be held liable for Bidder's inability to use this facility.

ee) When a bidder submits electronic bid through the PPMO e-GP portal, it is assumed that the bidder has prepared the bid by studying and examining the complete set of the Bidding documents including specifications, drawings and conditions of contract.

ff) Bidders who submit electronic bid should deposit the bidding document fee as specified in IFB and upload the scan copy (in pdf format) of the deposit voucher at the time of bid submission. The deposited amount shall be verified by the Employer during the bid evaluation process. The submitted Bid shall be non-responsive and shall not be evaluated if the cost for bidding document is not deposited as specified in the IFB.

22. Deadline for Submission of Bids

22.

22.1 Bids must be received by the Employer at the address and no later than the date and time indicated in the BDS.

In case of e-submission, the standard time for e-submission is Nepal Standard Time as set out in the server. The e-procurement system will accept the e-submission of bid from the date of publishing of notice and will automatically not allow the e-submission of bid after the deadline for submission of bid.

The Employer may, at its discretion, extend the deadline for the

submission of bids by amending the Bidding Document in accordance with ITB 8, in which case all rights and obligations of the Employer and Bidders previously subject to the deadline shall thereafter be subject to the deadline as extended.

23. Late Bids

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

24. Withdrawal, and Modification of Bids

24.1 A Bidder may withdraw, or modify its bid after it has been submitted either in hard copy or by e-submission. Procedures for withdrawal or modification of submitted bids are as follows:

(i) Bids submitted in hard Copy

a) Bidders may withdraw or modify its bids by sending a written notice in a sealed envelope, duly signed by an authorized representative, and shall include a copy of the authorization in accordance with ITB 20.2 before 24 hours prior to the deadline of submission of bids. The corresponding modification of the bid must accompany the respective written notice. All notices must be:

(aa) prepared and submitted in accordance with ITB 20 and ITB 21, and in addition, the respective envelopes shall be clearly marked "WITHDRAWAL", "MODIFICATION;" and

(bb) received by the Employer twenty four hour prior to the deadline prescribed for submission of bids, in accordance with ITB 22.

(cc) The bidder shall clearly specify on envelope whether "MODIFICATION"' is of Technical Bid or Price Bid.

ii) E-submitted bids.

a) Bidder may submit modification or withdrawal prior to the deadline prescribed for submission of bid through e-GP system by using the forms and instructions provided by the system. Once a Bid is withdrawn, bidder will not be able to submit another bid response for the same bid.

24.2 Bids requested to be withdrawn in accordance with ITB 24.1 shall be returned unopened to the Bidders after completion of the bid opening.

24.3 Bidder may submit request for withdrawal or modification only one time.

24.4 No bid may be withdrawn if the bid has already been modified.

24.5 Except in case of any modification or correction in bid document

made by procuring entity, Bidder may submit request for withdrawal or modification only one time.

24.6 In case of hard copy bid, no bid may be withdrawn if the bid has already been modified; except in case of any modification or correction in bid document by procuring entity.

24.7 Request for withdrawal or modification must be made through the same medium of submission. Request for withdrawal or modifications through different medium shall not be considered.

24.8 The following provisions apply for withdrawal or modification of the Bids:

(i) In case of bids submitted in hard copy no bid shall be withdrawn or modified in the interval between 24 hours prior to the deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Letter of Bid or any extension thereof.

(ii) In case of e-submitted bids no bids shall be withdrawn or modified in the interval between deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Letter of Bid or any extension thereof.

25. Bid Opening

25.1 The Employer shall open the bids in public at the address, date and time specified in the BDS in the presence of Bidders` designated representatives and anyone who choose to attend. Then the Employer shall segregate the Technical Bid and Price Bid separately. The Price Bids will remain unopened and will be held in custody of the Employer until the specified time of their opening. If the Technical Bid and Price Bid are submitted together in one inner envelope, the Employer may reject the entire Bid.

25.2 The Employer shall download the e-submitted Bid files. The e-procurement system allows the Employer to download the e-submitted bid files (report) only after bid opening date and time after login simultaneously by at least two members of the Bid Opening Committee.

25.3 After downloading each e-bid, electronically submitted Technical Bid shall be opened at first in the same time and date as specified above. Electronic Bids shall be opened one by one and read out. The e-submitted technical bids must be readable through open standards interfaces. Unreadable and or partially submitted bid files shall be considered incomplete.

25.4 Thereafter, envelopes marked "WITHDRAWAL" shall be opened and read out and the envelope with the corresponding Bid shall not be opened, but returned to the Bidder. No bid withdrawal shall be permitted unless the corresponding

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

25.5 All other envelopes holding the Technical Bid shall be opened one at a time, reading out: the name of the Bidder; whether there is a modification; the presence of a bid security and any other details as the Employer may consider appropriate. Only Technical Bids read out and recorded at bid opening shall be considered for evaluation. No bid shall be rejected at opening of Technical Bids except for late bids, in accordance with ITB 23.1.

25.6 The Employer shall prepare a record of the opening of Technical Bids that shall include, as a minimum: the name of the Bidder and whether there is a withdrawal, or modification; and the presence or absence of a bid security. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record.

25.7 At the end of the evaluation of the Technical Bids, the Employer will invite bidders who have submitted substantially responsive Technical Bids and who have been determined as being qualified for award to attend the opening of the Price Bids. The date, time, and location of the opening of Price Bids will be advised in writing by the Employer. Bidders shall be given reasonable notice for the opening of Price Bids.

25.8 The Employer will notify Bidders in writing who have been rejected on the grounds of their Technical Bids being substantially nonresponsive to the requirements of the Bidding Document and return their Price Bids unopened.

25.9 The Employer shall conduct the opening of Price Bids of all Bidders who submitted substantially responsive Technical Bids, in the presence of Bidders` representatives who choose to attend at the address, on the date, and time specified by the Employer. The Bidder's representatives who are present shall be requested to sign a register evidencing their attendance.

25.10 All envelopes containing Price Bids shall be opened one at a time and the following read out and recorded:

a) the name of the Bidder;

b) whether there is a modification;

c) the Bid Prices, including any discounts and alternative offers; and

d) any other details as the Employer may consider appropriate.

Only Price Bids, discounts, modifications, and alternative offers read out and recorded during the opening of Price Bids shall be considered for evaluation. No Bid shall be rejected at the opening of Price Bids.

25.11 The Employer shall prepare a record of the opening of Price Bids that shall include, as a minimum, the name of the Bidder, the Bid Price (per lot if applicable), any discounts, modifications and alternative offers. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record.

E. Evaluation and Comparison of Bids

26. Confidentiality

26.1 Information relating to the examination, evaluation, comparison, and post qualification of bids and recommendation of Contract award, shall not be disclosed to Bidders or any other persons not officially concerned with such process until information on Contract award is communicated to all Bidders.

26.2 Any attempt by a Bidder to influence the Employer in the evaluation of the bids or Contract award decisions may result in the rejection of its bid.

26.3 Notwithstanding ITB 26.2, from the time of bid opening to the time of Contract award, if any Bidder wishes to contact the Employer on any matter related to the bidding process, it may do so in writing.

27. Clarification of Bids

27.1 To assist in the examination, evaluation, and comparison of the Technical and Price Bids, and qualification of the Bidders, 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 case of e-submission of bid, upon notification from the Employer, the bidder shall also submit the original of documents comprising the Technical and Price Bid as per ITB 11 for verification of submitted documents for acceptance of the e-submitted bid.

27.2 If a Bidder does not provide clarifications of its bid by the date and time set in the Employer's request for clarification, its bid 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. Determination of Responsiveness

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

29.2 A substantially responsive 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.

29.3 The Employer shall examine the technical aspects of the Bid submitted in accordance with ITB 16, Technical Proposal, in particular, to confirm that all requirements of Section 5 (Employer's Requirements) have been met without any material deviation, reservation or omission.

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

29.5 In case of e-submission bids, the Employer evaluates the bid on the basis of the information in the electronically submitted bid files. If the Bidder cannot substantiate or provide evidence to establish the information provided in e-submitted bid through documents/ clarifications as per ITB Clause 27, the bid shall not be considered for further evaluation.

29.6 In Case, a corruption case is being filed to Court against the Natural Person or Board of Director of the firm/institution /company or any partner of JV, such Natural Person or Board of Director of the firm/institution /company or any partner of JV such bidder's bid shall be excluded from the evaluation, if public entity receives instruction from Government of Nepal.

29.7 Except in case of e-submission, the Financial Bid of the bidder, which is evaluated as substantially non-responsive in technical bid, shall be returned to the respective bidders.

30. Nonconformities, Errors, and Omissions

30.1 Provided that a bid is substantially responsive, the Employer may waive any non-conformities in the bid that do not constitute a material deviation, reservation or omission.

30.2 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.

30.3 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 may be adjusted, for comparison purposes only, to reflect the price of a missing or non-conforming item or component. The adjustment shall be made using the methods indicated in Section 3 (Evaluation and Qualification Criteria).

30.4 If minor discrepancies are found such as in technical specification, description, feature which do not make the bid to be rejected, then the cost, which is calculated to the extent possible due to such differences shall be included while evaluating the bid.

30.5 If the value of such non-conformities is found to be more than fifteen percent of the quoted amount of the bidder on account of minor discrepancies pursuant to ITB 30.4, such bid shall be considered ineffective in substance and shall not be involved in evaluation.

31. Qualification of the Bidder

31.1 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).

31.2 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.

31.3 An affirmative determination of qualification shall be a prerequisite for the opening and evaluation of a Bidder's Price Bid. A negative determination shall result into the disqualification of the Bid, in which event the Employer shall return the unopened Price Bid to the Bidder.

32. Correction of Arithmetical Errors

32.1 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; and

(c) if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a) and (b) above.

32.2 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.

33. Conversion to Single Currency

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

34. Domestic Preference

34.1 Unless otherwise specified in the BDS, a domestic preference shall be a factor in bid evaluation.

35. Subcontractors

35.1 The Employer may permit subcontracting for certain specialized works as indicated in Section 3. When subcontracting is permitted by the Employer, the specialized sub-contractor's experience shall be considered for evaluation. Section 3 describes the qualification criteria for sub-contractors.

Bidders may propose subcontracting up to the percentage of total value of contracts or the volume of works as specified in the BDS.

36. Evaluation of Price Bids

36.1 The Employer shall evaluate Price Bid of each bid for which the Technical Bid has been determined to be substantially responsive. The Employer shall use the criteria and methodologies listed in this Clause. No other evaluation criteria or methodologies shall be permitted.

36.2 To evaluate a Price bid, the Employer shall consider the following:

(a) the bid price, excluding Value Added Tax, Provisional Sums, and the provision, if any, for contingencies in the Summary Bill of Quantities, for Unit Rate Contracts, or Schedule of Prices for lump sum Contracts, but including Day work items, where priced competitively;

(b) price adjustment for correction of arithmetic errors in accordance with ITB 32;

(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 33;

(e) adjustment for nonconformities in accordance with ITB 30.3;

(f) application of all the evaluation factors indicated in Section 3 (Evaluation and Qualification Criteria);

36.3 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.

36.4 If this Bidding Document allows Bidders to quote separate prices for different Contracts, and to award multiple Contracts to a single Bidder, the methodology to determine the lowest evaluated price of the Contract combinations, including any discounts offered in the Letter of Bid, is specified in Section 3 (Evaluation and Qualification Criteria).

36.5 If the bid for an Unit Rate Contract, which results in the lowest Evaluated Bid Price is seriously unbalanced or front loaded **or extremely low** in the opinion of the Employer, the Employer may require the Bidder to produce detailed price analysis for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analysis, taking into consideration the schedule of estimated Contract

payments, the Employer may require that the amount of the performance security be increased at the expense of the Bidder as **mentioned in BDS** to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract **or may consider the bid as non-responsive**.

36.6 In case of e-submission bids, the Employer evaluates the bid on the basis of the information in the electronically submitted bid files. If the Bidder cannot substantiate or provide evidence to establish the information provided in e-submitted bid through documents/ clarifications as per ITB Clause 27, the bid shall not be considered for further evaluation.

36.7 In Case, a corruption case is being filed to Court against the Natural Person or Board of Director of the firm/institution /company or any partner of JV, such Natural Person or Board of Director of the firm/institution /company or any partner of JV such bidder's bid shall be excluded from the evaluation, if public entity receives instruction from Government of Nepal.

37. Comparison of Bids

37.1 The Employer shall compare all substantially responsive bids in accordance with ITB 36.2 to determine the lowest evaluated bid.

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

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

F. Award of Contract

39. Award Criteria

39.1 The Employer shall award the Contract to the Bidder whose offer has been determined 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.

40. Letter of Intent to Award the Contract/ Notification of Award

40.1 The Employer shall notify the concerned Bidder whose bid has been selected in accordance with ITB 39.1 within seven days of the selection of the bid, in writing that the Employer has intention to accept its bid and the information regarding the name, address and amount of selected bidder shall be given to all other bidders who submitted the bid.

40.2 If no bidder submits an application pursuant to ITB 43.1 within a period of seven days of the notice provided under ITB 40.1, the Employer shall, accept the bid selected in accordance with ITB 39.1 and Letter of Acceptance shall be communicated to the

selected bidder prior to the expiration of period of Bid validity, to furnish the performance security and sign the contract within fifteen days.

40.3 At the same time, the Employer shall affix a public notice on the result of the award on its notice board and may make arrangements to post the notice into its website, if it has; and if it does not have, into the website of the Public Procurement Monitoring Office, identifying the bid and lot numbers and the following information: (i) name of each Bidder who submitted a Bid; (ii) bid prices as read out at Bid Opening; (iii) name and evaluated prices of each Bid; (iv) name of bidders whose bids were rejected and the reasons for their rejection; and (v) name of the winning Bidder, and the Price it offered, as well as the duration and summary scope of the Contract awarded.

In Case, a corruption case is being filed to Court against the Natural Person or Board of Director of the firm/institution /company or any partner of JV, such Natural Person or Board of Director of the firm/institution /company or any partner of JV such bidder's bid shall be excluded from the evaluation, if public entity receives instruction from Government of Nepal.

41. Performance Security and Line of Credit

41.1 Within Fifteen (15) days of the receipt of Letter of Acceptance from the Employer, the successful Bidder shall furnish the performance security in accordance with the Conditions of Contract, as specified below from Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law in Nepal using Sample Form for the Performance Security included in Section 9 (Contract Forms), or another form acceptable to the Employer. The performance security issued by any foreign Bank outside Nepal must be counter guaranteed by Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law in Nepal.

i) If bid price of the bidder selected for acceptance is up to 15 (fifteen) percent below the approved cost estimate, the performance security amount shall be 5 (five) percent of the bid price.

ii) For the bid price of the bidder selected for acceptance is more than 15 (fifteen) percent below of the cost estimate, the performance security amount shall be determined as follows:

Performance Security Amount = [(0.85 x Cost Estimate –Bid Price) x 0.5] + 5% of Bid Price.

The Bid Price and Cost Estimate shall be inclusive of Value Added Tax.

Within Fifteen (15) days of the receipt of Letter of Acceptance from

the Employer, the successful Bidder shall furnish the Letter of Commitment for Bank's Undertaking for Line of Credit of the amount as specified in the BDS, using Sample Form for the Line of Credit included in Section 9 (Contract Forms); and at the date and time as designated for signing of the agreement, he shall be present in person or be represented through a legally authorized representative at the Employer's office for signing of contract agreement on his part.

41.2 Failure of the successful Bidder to submit the above-mentioned Performance Security and Line of Credit or to make his appearance/ representation to sign the Contract Agreement shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security without prejudice to any other remedies the Employer has under the applicable law. 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. In such case, the award process shall be repeated according to ITB 40.

42. Signing of Contract

42.1 The Employer and the successful Bidder shall sign the Contract Agreement within the period as stated ITB 41.1.

42.2 Within thirty (30) days from the date of issuance of notification pursuant to ITB 40.1 unsuccessful bidders may request in writing to the Employer for a debriefing seeking explanations on the grounds on which their bids were not selected. The Employer shall promptly respond in writing to any unsuccessful Bidder who, requests for debriefing.

42.3 If the bidder whose bid has been accepted fails to sign the contract as stated ITB 42.1, the Public Procurement Monitoring Office shall blacklist the bidder on recommendation of the Public Entity.

43. Complain and Review

43.1 If a Bidder is dissatisfied with the Procurement proceedings or the decision made by the Employer in the intention to award the Contract, it may file an application to the Chief of the Public Entity (Employer) within Seven (7) days of providing the notice under ITB 40.1 by the Public Entity, for review of the proceedings stating the factual and legal grounds.

43.2 Late application filed after the deadline pursuant to ITB 43.1 shall not be processed.

43.3 The chief of Public Entity(Employer) shall, within five (5) days after receiving the application, give its decision with reasons, in writing pursuant to ITB 43.1:

(a) whether to suspend the procurement proceeding and indicate the procedure to be adopted for further proceedings; or

(b) to reject the application.

The decision of the chief of Public Entity shall be final for the Bid amount, less than Rupees Twenty Million (NRs. 20,000,000).

43.4 If the Bidder is not satisfied with the decision given in accordance with ITB 43.3, or the decision is not given within five (5) days of receipt of application pursuant to ITB 43.1, it can, within seven (7) days of receipt of such decision, file an application to the Review Committee of the GoN, stating the reason of its disagreement on the decision and furnishing the relevant supporting documents. The application may be sent by hand, by post, by courier, or by electronic media at the risk of the Bidder itself.

43.5 Late application filed after the deadline pursuant to ITB 43.4 shall not be processed.

43.6 Within three (3) days of the receipt of application from the Bidder, pursuant to ITB 43.4, the Review Committee shall notify the concerning Public Entity to furnish its procurement proceedings, pursuant to ITB 43.3.

43.7 Within three (3) days of receipt of the notification pursuant to ITB 43.6, the Public Entity shall furnish the copy of the related documents to the Review Committee.

43.8 The Review Committee, after inquiring from the Bidder and the Public Entity, if needed, shall give its decision within one (1) month of the receipt of the application filed by the Bidder, pursuant to ITB 43.4.

43.9 The Bidder, filing application pursuant to ITB 43.4, shall have to furnish a cash amount or Bank guarantee from Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law equivalent to one percent (1%) of its quoted amount with the validity period of at least ninety (90) days from the date of the filing of application pursuant to ITB 43.4.

43.10 If the claim made by the Bidder pursuant to ITB 43.4 is justified, the Review Committee shall return the security deposit pursuant to ITB 43 to the applicant, within seven (7) days of such decision made.

Section 2 - Bid Data Sheet

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

A. General

ITB 1.1	The number of the Invitation for Bids is : **ICB 3**
ITB 1.1	The Employer is: **Kathmandu- Terai/Madesh Fast Track (Expressway) Road Project (KTFT)** **Nepali Army** **Bhadrakali, Kathmandu, Nepal** **Tel: +977 1 4267060** **Email:ft-procmgmt@nepalarmy.mil.np**
ITB 1.1	The name of the ICB is: **Construction of Double Lane Dual Carriageway Expressway Road, Bridge and Allied Works** The identification number of the ICB is: **KTFT/ICB/WORKS/R&B/078/079/3** The number and identification of lots comprising this ICB is: **one**
ITB 2.1	The name of the Project is: **Kathmandu- Terai/Madesh-Fast-Track (Expressway) Road Project (KTFT)** The Development Partner(DP) is: **Not Applicable** The implementing agency is: **Government of Nepal** **Nepali Army** **Kathmandu- Terai/Madesh Fast Track (Expressway) Road Project (KTFT)** **Bhadrakali, Kathmandu, Nepal**
ITB 4.1 (a)	Maximum number of partner in a joint venture shall be : **3 (three)**
ITB 4.2	Eligible countries - **All Countries**
ITB 4.4	A list of debarred firms is available at **http:/www.ppmo.gov.np**

ITB 4.9	Tax Clearance Certificate or Proof of submission of income return for: Fiscal Year 2019/2020 or latest as legally acceptable and applicable in bidder's respective country and Certificate of Incorporation. The foreign bidder shall declare to submit the following documents at the time of contract agreement Company Registration VAT /PAN Registration But, Resident foreign bidder shall submit PAN/VAT certificate and tax clearance certificate for Fiscal Year **2076/077** or proof of submission of Income Return for **2077/2078.** The Domestic Bidder shall submit Tax Clearance Certificate for Fiscal Year **2076/2077** or Tax Return Submission for Fiscal Year **2077/2078".**

B. Bidding Document

ITB 7.1	For **clarification purposes** only, the Employer's address is: Attention: **Kathmandu- Terai/Madesh Fast Track (Expressway) Road Project (KTFT)** Street Address: **Nepali Army** **Bhadrakali, Kathmandu** Country: **Nepal** Telephone: **+977 1 4267060** Email: **ft-procmgmt@nepalarmy.mil.np** Clarifications shall be sought in writing. The bidder may seek clarifications through email or directly through a letter. The employer shall provide clarifications in writing and shall be shared to all firms obtaining the Bid Documents and shall be issued to all the applicants in the form of addenda/addendum.
ITB 7.4	A Pre-Bid meeting **shall** take place at the following date, time and place: Date: 13 September 2021 Time: 13:00 hours Place: KTFT Project Office
ITB 7.5	Time for request: Requests for clarification should be received by the Employer no later than 15 days prior to the deadline for submission of bids.

C. Preparation of Bids

ITB 10.1	The language of the bid is: **English**
ITB 11.2 (i)	The Bidder shall submit with its bid the following additional documents: Not Applicable
ITB 11.3 (b)	In accordance with ITB 12 and ITB 14, the following schedules shall be submitted with the bid, including the Bill of Quantities and Schedule of Prices: Not Applicable.
ITB 11.3 (d)	The Bidder shall submit with its bid the following additional documents: (a) (Not Applicable)
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 14.6	Price adjustment: There will be no Price Adjustment for the Contractor's Design Works with Lump Sum Prices. But, Employer's Design Works with Unit Rate (UR) will be subject to price Adjustment.
ITB 15.1	The bid unit rates and the prices shall be quoted by the bidder entirely in Nepalese currency.
ITB 18.1	The bid validity period shall be: One Hundred Twenty (120) days.
ITB 19.1	The Bidder shall furnish a bid security, from Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law with a minimum of NPR 23,15,00,000.00 which shall be valid for 30 days beyond the validity period of the bid.
ITB 19.2 (b)	Employer's Account to deposit the Bid Security (if in Cash): Name of Office: District Treasury Control Office, Payment Center-2 Bank Name: Nepal Bank Limited Office Code no: 345013587 Bank Address: Bhugolpark, Kathmandu Account Number: 00201000002003000001
ITB 20.1	In addition to the original of the bid, the number of copies is: Electronic copy only.
ITB 20.2	The written confirmation of authorization to sign on behalf of the Bidder shall indicate: a) The name and description of the documentation required to demonstrate the authority of the signatory to sign the Bid such as a Power of Attorney;

	and (b) In the case of Bids submitted by an existing or intended JV, an undertaking signed by all parties (i) stating that all parties shall be jointly and severally liable, and (ii) nominating a Representative who shall have the authority to conduct all business for and on behalf of any and all the parties of the JV during the bidding process and, in the event the JV is awarded the Contract, during contract execution.

D. Submission and Opening of Bids

ITB 21.1	Bidders shall submit their bids electronically only. Electronic bids must be submitted through PPMO website **www.bolpatra.gov.np/egp.**
ITB 25.1	The bid opening shall take place at: Street Address: **KTFT Office, Bhadrakali** Floor: Procurement Management Division City: **Kathmandu** Country: **Nepal** Date: 29 September **2021** Time: 13:00 Hours Nepal Standard Time (NPT)

E. Evaluation and Comparison of Bids

ITB 33.1	The currency that shall be used for bid evaluation and comparison purposes to convert all bid prices if permitted and expressed in various currencies into a single currency is: Nepalese Currency.
ITB 34.1	**Domestic Preference:** Applicable as per Criteria 1.6 of Section 3.
ITB 35.1	Contractor's proposed subcontracting: Maximum percentage of subcontracting permitted is: up to 25% of the total contract amount.
ITB 36.4	If this Bidding Document allows Bidders to quote separate prices for different Contracts and to award multiple Contracts to a single Bidder: **Not Applicable**
ITB 36.5	The amount of the performance security be increased by Eight (8) percent of the quoted bid price.

F. Award of Contract

ITB 41.1	Letter of Commitment for Bank's Undertaking for Line of Credit shall be of NPR 1,41,00,00,000.00 Nepalese Rupees or equivalent US$.

Section 3 - Evaluation and Qualification Criteria

This Section contains all the criteria that the Employer shall use to evaluate bids and qualify Bidders through post-qualification exercise. GoN requires bidders to be qualified by meeting predefined, precise minimum requirements. The method sets pass-fail criteria, which, if not met by the bidder, results in disqualification. In accordance with ITB 32 and ITB 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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Table of Criteria

1 Evaluation

The evaluation will be carried out on the basis of the criteria and methodologies set out in the ITB Clause 36 in line with the Public Procurement Act and Regulations.

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 5 (Employer's Requirements).

1.2 Multiple Contracts (Not Applicable)

Pursuant to Sub-Clause 36.4 of the Instructions to Bidders, if Works are grouped in multiple contracts, evaluation will be as follows:

When, Works are grouped in multiple contracts and pursuant to Sub-Clause 36.4 of the Instructions to Bidders, the Employer will evaluate and compare Bids on the basis of a contract, or a combination of contracts, or as a total of contracts in order to arrive at the least cost combination for the Employer by taking into account discounts offered by Bidders in case of award of multiple contracts.

Qualification Criteria for Multiple Contracts:

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

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

N is the minimum number of contracts as per Note (2) of 2.4.2 Specific Construction Experience

V is the minimum value of a single contract as per Note (3) of 2.4.2 Specific Construction Experience

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

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

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

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

etc.

and

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

1.3 In Case, other than Multiple Contracts

Bidders have the option to Bid for any one or more Contracts. The contracts will be awarded to the Bidder or Bidders offering the lowest evaluated cost to the Employer, subject to the selected Bidder(s) meeting the required qualification which shall be the sum of the minimum requirements for respective individual contracts as specified under items Required Bid Capacity as per 2.3.3. Under this case, Contract shall be awarded based on Least Cost Combination to the Employer.

1.4 Completion Time

An alternative Completion Time, if permitted under ITB 13.2, will be evaluated as follows:

(Not Permitted)

1.5 Alternative Technical Solutions

Not Applicable

1 .6 Domestic Preference

In comparing domestic bids with foreign bids, a Domestic preference as per ITB 34.1 shall be granted to eligible domestic contractors, as defined below, in accordance with the following provisions.

(a) For application of domestic preference, all responsive bids shall first be classified into the following two categories:

(i) **Category I:** Bids offered by domestic contractors (domestic bidder firms, intuitions, or company either in single or in joint venture (all partners)) ; and

(ii) **Category II:** Bids offered by International firms, intuitions or company or collaboration with domestic firms, intuitions, company

(b) The lowest evaluated bid of each category shall then be determined by comparing all evaluated bids in each category among themselves.

(c) Such lowest evaluated bids shall next be compared with each other and if, as a result of this comparison, a bid from **Category I** is found to be the lowest, it shall be selected for the award of contract.

(d) If, however, as a result of the comparison under (c) above, the lowest bid is found to be from **Category II**, it shall be further compared with the lowest evaluated bid from **Category I**. For the purpose of this further comparison only an upward adjustment (domestic preference) shall be made to the lowest evaluated bid price of **Category II** by **adding an amount equal to Five(5%)** of the bid price. If, after such comparison, the **Category I** bid is determined to be the lowest, it shall be selected for the award of contract; if not, the lowest evaluated bid from **Category II** shall be selected.

1.7 Quantifiable Nonconformities, Errors and Omissions

The evaluated amount of quantifiable nonconformities, errors and/or omissions shall be determined by ascertaining the price of such effect on an equal basis by adjusting the same to the quoted price of the bid. A bid having minor deviations and having no material deviation to cause any serious effect upon the scope, quality, characteristics, terms and conditions, performance or any other requirements stated in the bidding documents and acceptable to the Employer can be considered to be substantially responsive.

2. Qualification

2.1 Eligibility

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

2.1.1 Nationality

Nationality in accordance with ITB Sub-Clause 4.2.	must meet requirement	must meet requirement	must meet requirement	not applicable	Forms ELI –1; ELI –2 with attachments

2.1.2 Conflict of Interest

No conflicts of interest in accordance with ITB Sub-Clause 4.3.	must meet requirement	existing or intended JV must meet requirement	must meet requirement	not applicable	Letter of Technical Bid

2.1.3 Government-owned Entity

Applicant required to meet conditions of ITB Sub-Clause 4.5.	must meet requirement	must meet requirement	must meet requirement	not applicable	Forms ELI -1, ELI - 2 with attachments

2.1.4 GoN/DP Eligibility

Not having been declared ineligible by Development Partner, as described in ITB Sub-Clause 4.4.	must meet requirement	must meet requirement	must meet requirement	Not applicable	Letter of Technical Bid

2.1.5 UN Eligibility

Not having been declared ineligible based on a United Nations resolution or Employer's country law, as described in ITB Sub-Clause 4.8.	must meet requirement	must meet requirement	must meet requirement	Not applicable	Letter of Technical Bid

2.1.6 VAT and PAN Registration

a. Domestic Bidder	Bidders required to meet conditions of ITB Sub-Clause 4.9.	must meet requirement	existing or intended JV must meet requirement	must meet requirement	Not applicable	PAN and VAT registration certificate Tax Clearance/Tax

						Return
b. Foreign Bidder	Bidders required to meet conditions of ITB Sub-Clause 4.9.	must meet requirement	existing or intended JV must meet requirement	must meet requirement	Not applicable	Declaration to submit PAN and VAT Registration Certificate at the time of Contract agreement

2.2 Pending Litigation

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

2.2.1 Pending Litigation

All pending litigation shall be treated as resolved against the Applicant and so shall in total not represent more than 75 percent of the Applicant's net worth	must meet requirement by itself or as partner to past or existing JV	not applicable	must meet requirement by itself or as partner to past or existing JV	not applicable	Form LIT – 1

2.3 Financial Situation

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

2.3.1 Historical Financial Performance

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 **5 (Five) years** to demonstrate the current soundness of the bidder's financial position. As a minimum, the bidder's net	must meet requirement	not applicable	must meet requirement	not applicable	Form FIN - 1 with attachments

worth for the last year, calculated as the difference between total assets and total liabilities should be positive.					

Note:

a) In-case of more than one financial statements for a year (in-case when the bidder is working in different joint ventures at the same period) a consolidated financial statement should be submitted showing all income and expenditures.

b) The financial information provided by a Bidder shall be reviewed in its entirety to allow a truly informed judgment, and the pass-fail decision on the financial position of the Bidder shall be determined.

2.3.2 Average Annual Construction Turnover

Minimum average annual construction turnover of **NPR 4,35,00,00,000.00** calculated as total certified payments received for contracts in progress or completed, within best three years out of last Ten fiscal years.	must meet requirement	must meet requirement	must meet 25% of the requirement	must meet 40% of the requirement	Form FIN - 2

2.3.3 Required Bid Capacity					
The bidding capacity of the bidder should be equal to or more than NPR 7,95,00,00,000.00	must meet requirement	must meet requirement	must meet 25 % of the requirement	must meet 40% of the requirement	For m FIN -3,4

2.4 Experience

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

2.4.1 General Construction Experience

Experience under construction contracts in the role of contractor, subcontractor, or management contractor for at least the last **5 (five)** years**.**					Form EXP -1

2.4.2 Specific Construction Experience

(a) Contracts of Similar Size and Nature

Similar Experience;					
(1) Participation as Prime contractor, management contractor, or subcontractor, in at least 2 (two) contracts within the last Ten Years, each with a value of at least **NPR 6,40,00,00,000.00** that includes Construction of Double Lane Dual Carriageway Road or Highway or Expressway of minimum four lane standard (minimum 20m formation width) and 5.5 (Five and Half) Km in length that have been successfully or substantially completed and shall be similar to the proposed works.	must meet requirement	must meet requirement	not applicable	not applicable	Form EXP - 2(a)
(2) Participation as Prime contractor, management contractor, or subcontractor, in at least 2 (Two) contracts within the last Ten Years, each with a value of at least **NPR 3,10,00,00,000.00** that includes EPC/Turnkey or Design and Build or Design, Build and Operate of Bridge Works with at least 5 (Five) numbers of double lane Bridges of 150m length and at least one pier height ≥ 12m) that have been successfully or substantially completed and shall be similar to the proposed works.	must meet requirement	must meet requirement	not applicable	not applicable	Form EXP - 2(a)

Note:

a) The evaluation will be based on the specified criteria and the declaration made by the Bidder and to substantiate the above mentioned qualifications, the bidder shall submit the certificates of successful completion/substantial completion from the respective Employers.

b) Construction Experience in key Activities

For the above or other contracts executed during the period stipulated in 2.4.2(a) above, a minimum construction experience in the following key activities:					
(i**) Expressway Road Works:** For the above or other contracts executed, the bidder should have successfully completed at least the following work activities within agreed contract period in the last 10 years**.** **a)** The bidder should have successfully completed at least **26,000 Cum** of asphalt concrete or dense bituminous Macadam work . **b)** The bidder should have successfully completed at least **31,000 Cum** of RCC Concrete Grade ≥ M20 for road structures other than bridges.	must meet requirement	must meet requirement	not applicable	must meet requirement	Form EXP - 2(b)

2.5 Understanding about the project and proposed design

Understanding about the project					
Submission of concept paper highlighting detail about understanding of the project from planning to completion stage including surveying, geotechnical/geophysical investigation, environmental and social safeguard study, designing, construction, operation and maintenance for Bridge Works satisfactory to the Employer.	must meet requirement	must meet requirement	not applicable	not applicable	Form DES – 1(a)
Understanding about the Proposed design					
Submission of design methodology for the Bridge Works including design finalization	must meet requirement	must meet requirement	not applicable	not applicable	Form DES – 1(b)

procedure, assurance about design and relevant codes satisfactory to the Employer.					

2.6 Personnel

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

S.N.	Position	No.	Minimum Academic Qualification	Total Work Experience [Years]	Experience in Similar Works [years]
For the Contractor's Design (for Design only)					
1.	Bridge Engineer (Design)	3	Master's Degree in Bridge Engineering or Structural Engineering	15	Seven Years of experience in the related field and shall have experience of Design Works of Two Bridges of Minimum 200m Length.
2.	Highway Engineer (Design)	1	Master's Degree in Highway or Transportation Engineering	15	Seven Years of experience in the related field and shall have experience of Design of Highway/Expressway including Inter-change of at least one Highway/Expressway project.
3.	Highway Engineer (Pavement Design)	1	Master's Degree in Highway or Transportation Engineering	15	Seven Years of experience in the related field and shall have experience of Design of Road/Highway/Expressway pavement of at least one Highway/Expressway project.
4.	Geotechnical Engineer	2	Master's Degree in Geotechnical Engineering	15	Five Years of experience in the related field and shall have experience in Geotechnical report of Open and Deep/Pile Foundations for at least one multi span Bridge.
5.	Geologist	1	Master's Degree in Geology	15	Five Years of experience in the related field and shall have experience in geological investigation on slope, highway
6.	Hydrologist	1	Master's Degree in Hydrology/Water Resources	15	Five Years of experience in the related field and shall have experience in Hydrological analysis report of at least one multi span Bridge.
For the Construction of all works					
7.	Project Manger	1	Bachelor's Degree in Civil Engineering	20	Ten years of experience in the related field as a Project Manager or Contract Manager or Equivalent and shall have experience of at least one Road/Highway/Expressway or one bridge with 15m pier Height of 100m length contract.
8.	Deputy Project Manager/Contract Manager	1	Bachelor's Degree in Civil Engineering	15	Seven Years of experience in the related field as a Deputy project Manager or Contract Manager or

S.N.	Position	No.	Minimum Academic Qualification	Total Work Experience [Years]	Experience in Similar Works [years]
					equivalent and shall have experience of at least one Road/Highway/Expressway or bridge contract.
9.	Quality Manager	1	Bachelor's Degree in Civil Engineering	15	Seven Years of experience in the related field and shall have experience in supervision of at least one Highway/Expressway Project.
10.	Health, Safety and Environment Protection Engineer	1	Bachelor's Degree in Civil Engineering / Environment / Occupational Health and Safety	12	Five Years of experience in the related field and shall have experience in supervision of at least one Highway Project
11.	Highway Engineer (Supervision)	2	Bachelor's Degree in Civil Engineering	12	Five Years of experience in the related field and shall have experience in supervision of at least one Highway/Expressway Project.
12.	Bridge Engineer (Supervision)	1	Master's Degree in Structural Engineering Or Bridge Engineering	15	Seven Years of experience in the related field and shall have experience in Supervision Bridge Works of Highway/Expressway Project.
13.	Geotechnical Engineer	1	Master's Degree in Geotechnical Engineering	15	Five Years of experience in the related field and shall have experience in supervision of Slope stability works in at least one Highway/Expressway Project.
14.	Geologist	1	Master's degree in Geology	15	Five Years of experience in the related field and shall have experience in geological investigation on slope, highway and bridge foundation.

Note:

a) The bidder must submit the evidences/certificates of all above requirements along with the bid. The evaluation is based on pass/fail criteria. If the bidder failed to submit the above requirements the bidder will be disqualified.

b) The proposed personnel shall be assigned to the project works and shall not be changed during implementation of the project unless otherwise agreed by the Employer, if awarded the contract.

c) The Bidder shall provide details of the proposed personnel and their experience records in the relevant Information Forms included in Section 4 (Bidding Forms).

d) The bidder must submit the duly signed Curriculum Vitae for the above mentioned personnel. The successful bidder if awarded the contract shall be responsible for the deployment of the necessary personnel for timely completion of the project. The number of personnel shown are indicative only and shall be used solely for the purpose of the evaluation of the bidder.

2.7 Equipment

The Bidder must demonstrate that it has the key equipment listed hereafter:

No.	Equipment (Type and Minimum Capacity)	Quantity Min. (Nos.)	Remarks
1.	Hydraulic Excavator - ≥1.1 cum rock bucket	5	
2.	Loader- ≥3 Cubic Meter	5	
3.	Concrete mixing station (Fully computerized Automatic Batching Plant) Min. production capacity of - ≥60cum/hr	1	
4.	Concrete transit Mixer Truck - >6cum	4	
5.	Mobile Crane - ≥50Ton	2	
6.	Pile Driving/Boring Machine - ≥1.20m diameter with Tremie, Funnel all complete	1	
7.	Dump Trucks/Dumpers - ≥25t capacity	12	
8.	Generator - ≥200KVA	1	
9.	Motor Graders with Blade width≥3.75m	4	
10.	Asphalt Batching Plant≥60Ton/hr Capacity	1	
11.	Asphalt paver Machine with paving width≥3.75m and having Sensor for level control	1	
12.	Pneumatic Roller≥10Ton Capacity	3	
13.	Vibratory Steel Roller≥12Ton Capacity	2	
14.	Water Tanker ≥ 6000liters capacity	2	
15.	Bitumen Distributor≥3000 liters capacity	1	
16.	Concrete Pump Car≥20Ton capacity	1	
17.	Cargo Crane Truck≥80cum/hr capacity	1	

Note:

a) The bidder must submit the evidences/certificates of all above requirements along with the bid. The evaluation is based on pass fail criteria. If the bidder failed to submit the above requirements, the bid will be disqualified.

b) In case of Equipment to be leased/hired the same procedures as mentioned above shall apply. The Bidder must demonstrate that it has the required equipment and bidder shall provide details of the proposed equipment in the relevant information forms included in Section 4 (Bidding Forms).

c) The Bidder/Leaseholder shall be solely responsible for the data provided. However, this shall not limit the right of employer to verify the authenticity of submitted information.

d) The Bidder shall provide further details of proposed items of equipment using the relevant Form in Section 4 (Bidding Forms).

e) The numbers of proposed equipment shown above are indicative only which shall be used solely for the purpose of evaluation of the bidder for qualification purpose only. The bidder must demonstrate that, based on known commitments, they will be available for timely use for this contract. The bidder shall be solely responsible for deployment of adequate no. of necessary equipment for timely completion of the contract.

f) The availability of the specified equipment may be subject to verification prior to contract award. The terms of any lease or hire agreement for equipment should include provision that the equipment will remain on the site (or be vested in the employer) in the event of default of Contractor.

Section 4 - Bidding Forms

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

Table of Forms

Letter of Technical Bid

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

Date: .....
Bidding 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) Clause 8;

(b) We offer to execute in conformity with the Bidding Documents the following Works:
.....

(c) Our bid shall be valid for a period of **120 (One hundred twenty**) 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) If our bid is accepted, we commit to obtain a performance security in accordance with the Bidding Document;

(e) Our firm, including any subcontractors or suppliers for any part of the Contract, have nationalities from eligible countries or any countries **[insert the nationality of the Bidder, including that of all parties that comprise the Bidder if the Bidder is a consortium or association, and the nationality of each Subcontractor and Supplier];** and meet the requirements of ITB 3.7, & 3.8**,**

(f) 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;

(g) We are not participating, as a Bidder or as a subcontractor, in more than one bid in this bidding process in accordance with ITB 4.3, other than alternative offers submitted in accordance with ITB 13;

(h) Our firm, its affiliates or subsidiaries, including any Subcontractors or Suppliers for any part of the contract, has not been declared ineligible by the law of Nepal or official regulations or by an act of compliance with a decision of the United Nations Security Council;

(i) We are not a government owned entity / We are a government owned entity but meet the requirements of ITB 4.5;[1]

(j) 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 agreement is prepared and executed;

(k) Commissions or gratuities, if any, paid or to be paid by us to agents relating to this bid, and to contract execution if we are awarded the contract, are listed below:

[1] *Use one of the two options as appropriate.*

Name and address of agents	Amount and currency	Purpose of commission or gratuity
1. 2. [if none, state "none"]		

(l) We including any subcontractors or suppliers for any part of the contract do not have any conflict of interest in the proposed procurement proceedings and we have not been blacklisted as per ITB 3.4 and punished for an offense relating to the concerned profession or business;

(m) We agree to permit the Employer or its representative to inspect our accounts and records and other documents relating to the bid submission and to have them audited by auditors appointed by the Employer;

(n) If our Bid is accepted, we commit to mobilizing key equipment and personnel in accordance with the requirements set forth in Section 3 (Evaluation and Qualification Criteria) and our technical proposal, or as otherwise agreed with the Employer;

(o) We are solely responsible for the authenticity of the documents submitted by us. The document and information submitted by us are true and correct. If any document/information given is found to be concealed at a later date, we shall accept any legal actions by the Employer; and that

(p) We are committed to submit the Letter of Commitment for Bank's Undertaking for Line of Credit of ……..Millions at the time of executing the contract agreement, if the bid is awarded to us.

Name .....

In the capacity of .....

Signed .....

Duly authorized to sign the Bid for and on behalf of .....

Date .....

Letter of Price Bid
(Please Refer to Price Bid)

Bill of Quantities and Schedule of Prices
(Please Refer Price Bid)

Schedule of Payment Currencies
(Please Refer to Price Bid)

Tables of Adjustment Data

(Refer Price Bid)

Bid Security

Bank's Name, and Address of Issuing Branch or Office
(On Letter head of the Commercial bank or any Financial Institution eligible to issue Bank Guarantee as per prevailing Law)

Beneficiary: ..... name and address of Employer …….
Date: ……...
Bid Security No.: .....

We have been informed that . ……. .[insert name of the Bidder] (hereinafter called "the Bidder") intends to submit its bid (hereinafter called "the Bid") to you for the execution of ……... name of Contract . …… under Invitation for 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……. …….. *(insert the name and address of Bank)* do hereby irrevocably undertake to pay you any sum or sums not exceeding in total of . . ……..*(insert the amount in figures*) (. ……..) *(insert the amount in words*) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Bidder is in breach of its obligation(s) under the bid conditions, because the Bidder:

(a) has withdrawn or modified its Bid during the period of bid validity specified in the Form of 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.
(d) is found to have been involved in fraud and corruption

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

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

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

Note:

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

Bidder's 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 hereunder.

Form ELI – 1: Bidder's Information Sheet

Bidder's Information	
Bidder's legal name	
In case of JV, legal name of each partner	
Bidder's country of constitution	
Bidder's year of constitution	
Bidder's legal address in country of constitution	
Bidder's authorized representative (name, address, telephone numbers, fax numbers, e-mail address)	

Attached are copies of the following original documents.

1. In case of single entity, articles of incorporation or constitution of the legal entity named above, in accordance with ITB 4.1 and 4.2.

2. Authorization to represent the firm or JV named in above, in accordance with ITB 20.2.

3. In case of JV, letter of intent to form JV or JV agreement, in accordance with ITB 4.1.

4. In case of a government-owned entity, any additional documents not covered under 1 above required to comply with ITB 4.5.

Form ELI - 2: JV Information Sheet

Each member of a JV must fill in this form

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

Form LIT - 1: Pending Litigation

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

Pending Litigation			
❑ **No pending litigation in accordance with Criteria 2.2 of Section 3 (Evaluation and Qualification Criteria)** ❑ **Pending litigation in accordance with Criteria 2.2 of Section 3 (Evaluation and Qualification Criteria)**			
Year	**Matter in Dispute**	**Value of Pending Claim in US$ Equivalent**	**Value of Pending Claim as a Percentage of Net Worth**

Form FIN - 1: Financial Situation

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

Financial Data for Previous 5 Years [in NRs or Equivalent US$]					
	Year 1	**Year2**	**Year3**	**Year4**	**Year5**

Information from Balance Sheet

Total Assets					
Total Liabilities					
Net Worth					
Current Assets					
Current Liabilities					

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 five years, as indicated above, complying with the following conditions.

- All such documents reflect the financial situation of the Applicant or partner to a JV, and not sister or parent companies.
- Historic financial statements must be audited by a certified accountant.
- Historic financial statements must be complete, including all notes to the financial statements.
- Historic financial statements must correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted).

Note: Financial reports, including balance sheets, profit and loss statements and auditor's reports for the last 5 years should be attached. All financial reports shall be either certified copies of the Annul Accounts submitted to the Inland Revenue offices or Company Registrar's office; or shall be notarial certified as True copies of originals.

Form FIN - 2: Average Annual Construction Turnover

Each Bidder or member of a JV must fill in this form. The information supplied should be the Annual Turnover of the Bidder or each member of a JV in terms of the amounts billed to clients for each year for work in progress or completed in US Dollars at the rate of exchange **at the end of the period reported**.

Annual Turnover Data for the Last 10 Years (Construction only)			
Year	**Amount Currency**	**Exchange Rate**	**US$ Equivalent**
		Average Annual Construction Turnover	

Bidder shall have to submit the relevant documentary evidence to substantiate the facts/figures.

Form FIN - 3: Bid Capacity

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

Bid Capacity = [(7 x A) – B]

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

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

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

Total Bid Capacity:

Signature of Bidder

Bidder shall have to submit the relevant documentary evidence to substantiate the facts/figures.

Form FIN-4: Current Contract Commitments / Works in Progress

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

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

Signature of Bidder

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

Note 1: "B" shall be calculated as : $B = \sum \left[\frac{(e) \times (a)}{(f)} \right] x12$ **, If (f) is less than 12, then value of (f) shall be taken as 12.**

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

Form EXP – 1:General Construction Experience

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

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

Bidder shall have to submit the relevant documentary evidence to substantiate the facts/figures.

Form EXP – 2 (a):Specific Construction Experience

Fill up one (1) form per contract.

Contract of Similar Size and Nature			
Contract No . . . . . of	**Contract Identification**		
Award Date		**Completion Date**	
Role in Contract	❑ **Contractor**	❑ **Management Contractor**	❑ **Subcontractor**
Total Contract Amount	**US$ ……..**		
If partner in a JV or subcontractor, specify participation of total contract amount	**Percent of Total**	**Amount**	
Employer's Name **Address** **Telephone/Fax Number** **E-mail**			
Description of the similarity in accordance with Criteria 2.4.2(a) of Section 3			
Note: **Refer criteria 2.4.2(a) against which the bidder is required to demonstrate similarity in the box on the right-hand-side**.			

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

Fill up one (1) form per contract

Contract with Similar Key Activities			
Contract No . . . . . of	**Contract Identification**		
Award Date		**Completion Date**	
Role in Contract	❑ **Contract or**	❑ **Management Contractor**	❑ **Subcontractor**
Total Contract Amount	**US$ …….**		
If partner in a JV 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 Criteria 2.4.2(b) of Section 3			
Note: **The criteria 2.4.2 (b) against which the bidder is required to demonstrate in the box on the right-hand-side production rates achieved by him on previous contracts.**			

Form DES- 1 (a): Format for Understanding about the project

Bidder to submit a brief description for the followings, to show his understanding about the project;

1. Knowledge about project area
2. Knowledge about planning stage
3. Approach towards surveying and types of surveys to be done,
4. Approach for geotechnical investigation and reporting details
5. Types of environmental and social safeguard study to be done including the way such studies shall be conducted, Environmental Protection Plan
6. Approach for designing
7. Procurement detailing including subcontracting
8. Construction stage detailing (approach, quality assurance and control mechanism)
9. Health Safety Plan
10. Finalization of construction & modality of handover
11. Mechanism for operation and maintenance

Form DES- 1 (b): Format for the Concept for Proposed Design

Bidder to submit a brief description for the followings, to show his understanding about the design of the Bridge Works;

1. Design methodology
2. Design finalization procedure
3. Assurance about design
4. Relevant codes for design

Form PER – 1: Proposed Personnel

Bidders should provide the names of suitably qualified personnel to meet the specified requirements for each of the positions listed in Section 3 (Evaluation and Qualification Criteria). The data on their experience should be supplied using the Form below for each candidate.

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

***As listed in Section 3 (Evaluation and Qualification Criteria).**

Form PER – 2: Resume of Proposed Personnel

The Bidder shall provide all the information requested below. Fields with asterisk (*) shall be used for evaluation.

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

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

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

Form EQU-1 Proposed Equipment

The Bidder shall provide adequate information to demonstrate clearly that it has the capability to meet the requirements for the key equipment listed in Section 3 (Evaluation and Qualification Criteria). A separate Form shall be prepared for each item of equipment listed, or for alternative equipment proposed by the Bidder. The Bidder shall provide all the information requested below, to the extent possible. Fields with asterisk (*) shall be used for evaluation.

For the equipment under Bidder's ownership

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

(ii) For the Equipment to be leased/hired

No.	Equipment Type and Characteristics	Total Nos. of Equipment under the ownership of lease/hire provider	No. of Equipment engaged/committed for other works	Nos. of Equipment proposed to be leased/hired for this contract
1.				
2.				
3.				
4.				

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

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

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

Technical Proposal Format

1. **Personnel**
2. **Equipment**
3. **Site Organization**
4. **Method Statement**
5. **Mobilization Schedule**
6. **Construction Schedule**
7. **Schedule of Sub-contractors**
8. **Planned Progress Chart (S-Curve)**
9. **Bidder's Quality Manual**
10. **Bidder's Health and Safety Manual**
11. **Bidder's Environment Protection Procedures**
12. **Schedule of Proposed Material's suppliers, manufactures,**
13. **Schedule of proposed Imported Materials**
14. **Schedule of proposed Imported Equipment and plant**
15. **Others**

1. Personnel

a) In addition to the key personnel prescribed in Section 3- Clause 2.6, bidder shall submit a schedule comprised of all the proposed manpower indicating position/categories and numbers of each category to be employed in this contract. The following table is provided for guidance purpose only.

S.N	Position/Category	Nos.	Remarks
1	**Project Manager**	**1**	
2	**Deputy Project Manager**	**1**	
----	**----------**		
----	**----------**		
----	**----------**		
----	**----------**		
----	**----------**		
----	**Skilled Laborers**		
----	**Unskilled laborers**		

b) Bidder shall include a histogram table and graph detailing the utilization of manpower along the project duration. The following table is provided for guidance purpose only.

Manpower	Months								
	1	**2**	**3**	**4**	**..**	**..**	**..**	**..**	**..**
Key Personnel									
Administrativa Staff									
Site Supervisión Staff									
Drivers/ Operators									
Skilled workers									
Unskilled workers									
Others									

2. Equipment

a) In addition to the key plant and equipment prescribed in Section 3-Clause 2.7, the bidder shall submit a schedule comprised of all equipment and plant indicating categories and number for each category to be employed in this contract. The following table is provided for guidance purpose only.

S.N.	Type of Equipment & Plant	Nos.	Remarks

b) Bidder shall include a histogram table and graph detailing the utilization of Equipment and Plant along the project duration. The following table is provided for guidance purpose only.

Type of Equipment and Plant	Months								
	1	2	3	4	..	..	..	..	..

3. Site Organization

The Bidder shall show herein an Organogram format the organization of his site personnel showing clearly designated duties and responsibilities and the chain of command throughout the structure. Included in the chart shall be the names of respective personnel.

4. Method Statement

The Bidder shall provide here a brief description of the Works. The description shall indicate how each activity is to be undertaken. The method statement shall comprise brief description of work, references, responsibilities, material required, equipment required, manpower required,

safety hazards and control measures, quality control measures, preparatory works if any, construction procedure and attachments relevant to the execution of the intended activity.

5. Mobilization Schedule

The Bidder shall provide here a general description of the arrangements and methods which he proposes to adopt for the detailed site investigation, design and execution of the Works which shall include but not be limited to:-

i) Mobilization period including periods required for establishing the Contractor's offices, workshops etc. and the facilities required for the Engineer and his staff if applicable.

ii) Mobilization procedure for the detailed site investigation and design works.

iii) Sources of Contractor's equipment and mobilization periods for items of plant.

6. Work Schedule

The Bidder shall provide here his proposed schedule for carrying out necessary survey, investigations, designs and construction of the Works within the prescribed Time for Completion of the works. The schedule shall be presented in the form of a linked **bar chart** showing main construction activities with **appropriate logic links and Milestones.** The proposed schedule shall include the establishment of contractor's site camp and offices, mobilization of manpower and equipment, detailed site survey and soil/geotechnical investigation, detailed design including approval of construction drawings, submission of construction plan and other required documents, execution of major work activities, testing and commissioning, as built drawings and submission of close out report as a minimum.

7. Schedule of Subcontractors

The bidder shall enter in the following table a list of the sections and appropriate value of the work for which he proposes to use subcontractors, together with the names and addresses of the proposed subcontractors. The bidder shall also enter a statement of similar works previously executed by the proposed subcontractors, including description, location and value of work, year completed, and name and address of the employer/engineer.

Item Nos.	Description of work	Approximate value (US$ or equivalent)	Name and address of Subcontractor	Statement of similar works executed

Notwithstanding such information the bidder, if awarded the Contract, contractor shall remain entirely and solely responsible for the satisfactory execution and completion of the Works assigned the sub-contractor and the maintenance of such works as specified in the Contract.

8. Planned Progress Chart (S-Curve)

Bidder to submit an expected progress chart (S-Curve) showing the expected progress against the proposed duration of the works. No amount shall be shown which may be the reason for rejection of the bid. The proposed progress curve shall be prepared based on the proposed work schedule.

9. Bidder's Quality Manual

Bidder shall submit a copy of his/her Quality Manual. If the Quality Manual is not available, the bidder shall submit a general description outlining the plans, process, and procedures to be implemented for the quality assurance and control of the project works.

10. Bidder's Health and Safety Manual

Bidder shall submit a copy of his/her Health and Safety Manual. If the Health and Safety Manual not available, the bidder shall submit a general description outlining the plans, process, and procedures for the fulfillment of the Health and Safety requirements of the contract works**.**

11. Bidder's Environment Protection Plan

Bidder shall submit a copy of his/her Environment Management Plan. If the Environment Management Plan not available, the bidder shall submit a general description outlining the plans, process, and procedures for the fulfillment of Environmental protection requirements of the contract works.

12. Details of Proposed materials with manufactures, supplier's information

Bidder to submit the schedule of proposed materials with manufacturer/supplier and place of inspection of the materials required for the execution of the works as below.

S.N.	Description of Material	Manufacturer	Supplier	Place of Inspection of the Material
1	Cement			
2	Re-bars			
	Etc.			

13. Details of Proposed to be Imported materials if any

If the Bidder wishes to import any materials, to be utilized for the contract in compliance with this bid document and the rules and regulation of Nepal, shall submit a schedule of the materials proposed to be imported through Master List based on the Bill of Quantities and/or Schedule of Prices.

14.Details of Proposed to be Imported Equipment, if any

If the Bidder wishes to import any construction equipment to be utilized for the contract, in compliance with this Bid and the rules and regulation of Nepal, shall submit a schedule of the equipment so proposed to be imported Equipment.

15.Others (insert additional requirement if applicable]

PART II REQUIREMENTS

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Section 5. Employer's Requirements
(Provided separately bound)

Note:

Tender/Bid Drawings for the Employer's Design Works and Indicative Drawings for Contractor's Design Works are provided in separately bound volume

Section 6- Preamble of Bill of Quantities/Schedule of Prices (Refer to Price Bid)

PART III CONDITIONS OF CONTRACT AND CONTRACT FORMS

Table of Contents

Section 7: General Conditions of Contract

The General Conditions of Contract shall be the FIDIC Conditions of Contract for Construction, for Building and Engineering Works **Designed by the Employer**, Multilateral Development Bank Harmonized Edition, June 2010, published by the Fédération Internationale des Ingénieurs-Conseils (FIDIC) , available at http://www.fidic.org/

Section 8: Particular Conditions of Contract

Notes on the Particular Conditions of Contract

The PCC complements the GCC to specify data and contractual requirements linked to the special circumstances of the Country, the Employer, the Engineer and overall Project and the Contract works requirement. **Whenever there is a conflict, the provisions herein shall prevail over those in the GCC.**

Part A - Contract Data of the PCC includes data to complement the GCC.

Part B - Special Provisions of the PCC are prepared for this contract only in compatible with Project specific requirements .

The provisions found in the Special Provisions (Particular Conditions – Part B) take precedence over the equivalent provisions found under the same Sub-Clause number(s) in the General Conditions, and the provisions of the Contract Data (Particular Conditions Part A) take precedence over the Special Provisions (Particular Conditions – Part B).

Note :

1. Clause numbers in the PCC correspond to those in the GCC.

2. This contract includes both of the Employer's design and the Contractor's design Works. Although the GCC correspond to the Employer's design Works, the Part A- Contract data and Part B- Special provisions are prepared to address both Employer's design and the Contractor's design Works.

Particular Condition Part A: Contract Data

Conditions	Ref. GCC	Data
Employer's name and address	1.1.2.2 &1.3	Kathmandu- Terai / Madhesh Fast Track (Expressway) Road Project (KTFT) Nepali Army Headquarter Bhadrakali, Kathmandu, Nepal Tel: +977 1 4267060 Email:ft-procmgmt@nepalarmy.mil.np
Engineer's name and address (if applicable)	1.1.2.4 & 1.3	M/s Yooshin Engineering Corporation, Korea - Korea Expressway Corporation, Korea - Pyunghwa Engineering Consultants Ltd. Korea in Association with Garima International Design Associates Nepal Pvt. Ltd. (GIDAN), Nepal and SITARA Consult Pvt. Ltd, Nepal, Ward No.-10, Buddhanagar, Kathmandu, Nepal
Time for Completion	1.1.3.3	1000 days from the date of Commencement
Defects Notification Period	1.1.3.7	1825 Days
Sections	1.1.5.6	Not Applicable (NA)
Electronic transmission systems (if applicable)	1.3	Through Official Email ID: ft-procmgmt@nepalarmy.mil.np
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	Within 14(Fourteen)days prior to Commencement Date
Engineer's Duties and Authority	3.1(B)(ii)	Variations resulting in an increase of the Accepted Contract Amount shall require prior approval of the Employer.
Performance Security	4.2	i) If bid price of the bidder selected for acceptance is up to 15 (fifteen) percent below the approved cost estimate, the performance security amount shall be 5 (five) percent of the bid price. ii) For the bid price of the bidder selected for acceptance is more than 15 (fifteen) percent below of the cost estimate, the performance security amount shall be determined as follows: Performance Security Amount = [(0.85 x Cost Estimate –Bid Price) x 0.5] + 5% of Bid Price. The Bid Price and Cost Estimate shall be inclusive of Value Added Tax. Performance Security submitted to the Employer shall be "an Unconditional (on demand) Bank Guarantee" from a recognized Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per

<table>
<tr><td></td><td></td><td>prevailing Law of Nepal acceptable to the Employer. In case if the institution issuing the security is located outside Nepal, it shall have counter guarantee from the Commercial bank or financial institution acceptable located in Nepal acceptable to the .Employer to make it enforceable.
The performance security form shall be in the format of the Bidding Document, Section 9 Contract forms.</td></tr>
<tr><td>Milestones</td><td>4.26</td><td><table>
<tr><td>Description of Mile stones</td><td>Time for Completion</td><td>Delay Damages</td></tr>
<tr><td>Completion of detail Survey, geological and hydrological studies, geotechnical investigations , submission of all reports, completion of detailed design and drawings for the Contractor’s Design Works</td><td>180 days from the Commencement date</td><td>0.05 % (as a percentage of the Design Price per day of delay)</td></tr>
<tr><td>Completion of All Construction Works</td><td>1000 days from the Commencement date</td><td>0.05% (as a percentage of the Contract Price per day of delay)</td></tr>
</table></td></tr>
<tr><td>Normal working hours</td><td>6.5</td><td>Normal working hours shall be 08.00 to 18.00 every day inclusive of two-hour break. Saturdays and Public Holidays are non-working days.</td></tr>
</table>

Delay damages for the Works	8.7 & 14.15(b)	The liquidated damage for whole of the works shall be 0.05 % of the final Contract Price per day, in the currencies and proportions in which the Contract Price is payable.
Maximum amount of delay damages	8.7	10 % of the final Contract Price.
Provisional Sums	13.5.(b)(ii)	5%
Adjustments for Changes in Cost	13.8	There will be no price adjustment for the Contractor's design works. The total payment for adjustment for changes in cost shall be limited to 25% of the initial contract price exclusive of the Contractor's Design Works.
Total advance payment	14.2	Not exceeding 20% of Contract price excluding Provisional Sum (PS) as per PPA and PPR. The amount not exceeding half the amount of the approved advance may be paid for the first time and the remaining amount may be paid on the basis of the work progress.
Amortization for repayment of Advance Payment	14.2(b)	Amortization Rate shall be: 25%
Percentage of Retention	14.3	05(Five) %
Limit of Retention Money	14.3	Five Per cent (05%) 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	02 (Two) % of the Accepted Contract Amount.
Currencies for payment of Contract Price	14.15	Local Currency (NPR)
Proportions or amounts of Local and Foreign Currencies are:	14.15	Local Currency (NPR): 70% Foreign Currency (US$):30%
Maximum total liability of the Contractor to the Employer	17.6	The product of 1.15 times the accepted Contract Price.
Periods for submission of insurance: a. evidence of insurance. b. relevant policies	18.1	14 (Fourteen) days from the Commencement date 21 (Fourteen) days from the commencement date

Insurance of Contractor's Equipment	18.2(b)	Replace this sub-clause as below: "The 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. The 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. 15 (Fifteen) Million with no limit on the number of occurrences.
Amount of insurance required for liability for breach of professional duty	18.5(a)	1.15 times Design Price
Insurance required against liability for fitness for purpose	18.5(b)	Yes, for the Contractor's Design Works
Period of insurance required for liability for breach of professional duty	18.5	2825 Days
International Arbitration	20.6(a)	International arbitration shall be: (i) Administered by: Singapore International Arbitration Centre (SIAC) shall be the institution to administer the arbitration (ii) Conducted in accordance with the rules of: the United Nations Commission on International Trade Law (UNCITRAL)
Domestic Arbitration	20.6(b)	Domestic arbitration shall be: (i) Administered by: Nepal Council of Arbitration (NEPCA) shall be the institution to administer the arbitration (ii) Conducted in accordance with the rules of: the United Nations Commission on International Trade Law (UNCITRAL)
Place of Arbitration	20.6	Kathmandu, Nepal

Particular Conditions, Part B: Special Provision

General Conditions	Ref.GCC	Data
Base Date	**1. 1. 3**	Delete 1.1.3 "Base Date" and substitute as follows: "Base Date" means the date 30 days prior to the last date for submission of the Bid/Tender. **"**PPA" means Public Procurement Act, 2063(2007), the Procurement Law of the Country(Nepal). "PPR" means Public Procurement Regulations, 2064(2007), the Procurement Law of the Country(Nepal)
Contract Agreement	**1.6**	Replace the first line of the paragraph by the following: "The parties shall enter into a Contract Agreement within 15 days after the Contractor receives the Letter of Acceptance.
Assignment	**1.7**	***Add the following text at the end of Sub-Clause 1.7:*** "Any change to the legal or beneficial shareholding of the Contractor or in any joint venture partnership or consortium which would have the effect of changing the effective control of the Contractor shall be deemed to be an assignment requiring the consent of the Employer under this clause."
Care and Supply of Documents	**1.8**	***Add the following text at the end of Sub-Clause 1.8:*** Irrespective of the above, the Contractor shall be responsible for the production of detailed construction drawings as may be necessitated by his work program 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.
Delayed Drawings and Instructions	**1.9**	**Add the following paragraph before the first paragraph of this Sub Clause;** This Sub Clause is not applicable for the Contractor's Design Works."
Joint and Several Liability	**1.14**	**Add the following at end of the clause :** "The contractor shall not handover the responsibility of the contract to any one member or some members of Joint Venture or any other parties, not involved in the contract."
Inspection and Audit by the Bank	**1.15**	**Replace the Provision by the following:** **"Inspection and Audit by the Employer** The Contractor shall permit the Employer and /or persons appointed by the Employer to inspect the Site and /or the Contractor's accounts and records audited by auditors appointed by the Employer if required by the /Employer. "

Employer's Financial Arrangements	**2.4**	**Delete the words "before commencement date and thereafter" appearing in the first line of first paragraph of this sub clause;** **Delete the second paragraph of this sub clause entirely:**
Engineer's Duties and Authority	**3.1**	***Add the following provisions at the end of Sub Clause 3.1:*** (e) Approving subcontracting of any part of the Works as per Sub-Clause 4.4 (f) Issuing the Notice for Commencement of the Works as per Sub-Clause 8.1 (g) Fixing Rates or Prices as per Sub-Clause 13:
Contractor's General Obligations	**4.1**	***Add the following paragraph at the end of sub clause 4.1(d):*** The Contractor shall also be responsible for the preparation of "As Built" drawings of all completed permanent works. The Contractor shall supply two copies of draft prints of all such "As Built" drawings for the Engineer's review and when approved by the Engineer, shall supply six final prints together with a reproducible copy in electronic format or as may be otherwise approved by the Engineer. The amount to be withheld for failing to produce "as-built" drawings by the date mentioned above is NRs.1,500,000.00 (One million and five hundred thousand only) from payments due to the Contractor. The Contractor shall, where applicable, comply with the requirements stated in the Environmental Management Plan when provided in the Contract Document.
Performance Security	**4.2**	***Delete and replace the second paragraph with the following text:*** The Contractor shall deliver the Performance Security to the Employer within fifteen (15) days after receiving the Letter of Acceptance.
Contractor's Representative	**4.3**	**Add the following sentence at the end of this sub-clause :** "For the Contractors consisting of a joint venture the Contractor's representative shall be from the Lead Partner."
Subcontractors	**4.4**	***Add new text to this Sub-Clause 4.4, after item (d) as follows:*** (e) The maximum amount of sub-contracting shall be 25 % of the Contract Price **(f)** In the event of approved subcontracting the Contractor shall ensure that Subcontractors do not further sub-let their contract; **(g)** The Contractor shall not terminate the engagement of a subcontractor without the prior written consent of the Employer." (h) The Contractor shall keep a log showing the following information on the Sub Contractors, suppliers and transporters engaged in the contract works: • Name and Address

		• Copy of Sub Contracting Agreement • Works and value contract • Commencement and completion dates • Copy of payment certificates
Co-operation	**4.6**	***Add the following text after the final paragraph:*** **"**The provisions of Sub-Clause 4.6 notwithstanding, the Contractor shall allow free passage to other contractors working under contract to the Employer through and over the Site in the furtherance of their obligations under their contracts."
Setting Out	**4.7**	Add the following paragraph in between first and second paragraph; "If the Contractor finds an error in any items of reference, the Contractor shall give a Notice to the Engineer describing it: (a) within 30 days calculated from the Commencement Date, if the items of reference are specified in the Employer's Requirements; or (b) as soon as practicable after receiving the items of reference, if they are issued by the Engineer."
Site Data	**4.10**	***At the end of the Sub-Clause add new paragraph with the following text:*** "For the Contractor's design works : (i) The Contractor shall be responsible for any data or information acquired and or generated or likely to be acquired and or generated related with the design of works as specified under the Contractor's design works. (ii) The Employer shall be responsible for genuineness and reasonableness of the data or information provided to the Contractor by the Employer and the Engineer or his representative. However, the Contractor shall perform its own investigation with due diligence to verify the accuracy and completeness of all such data or information. The Contractor shall be deemed to have also satisfied himself before tendering with: (a) Existing conditions and nature of existing roads and bridges and other means of access to the Site; (b) Presence of artificial obstructions on ground or underground or above ground, boulders, released water or the like; (c) People's rights and interests which may be interfered with or affected by the construction and completion of the Works, and remedying of any defects therein; (d) Geological, Geotechnical, Hydrological and climatic conditions and the effects there from; (e) Stability of existing slopes in the Site; and (f) Nature of the surface and subsurface on or in which the

		Permanent Works or Temporary Works are to be executed or in the immediate vicinity of the works and the nature and extent of surface water or water contained in the subsoil to which the Works may be affected by rainfall. The contractor shall be fully responsible for any of his failure, error or omission in obtaining any relevant information which may in any way influence or affect the execution of the works."
Rights of Way and Facilities	**4.13**	***Insert the following text as the first paragraph of Sub-Clause 4.13:*** **"**The Contractor shall ascertain the location of all existing public utilities and other structures which may be encountered during the execution of the Works. He shall temporarily support or divert and subsequently reinstate all such utilities and structures as necessary and to the satisfaction of the Engineer. As soon as any such utilities or structure is encountered during the performance of the Contract, the Contractor shall make a record of the location and description of such service or structure and shall send the same forthwith to the Engineer. Where permanent diversion or support of such service or structure is rendered necessary as the unavoidable result of the execution of the Works in accordance with the Contract, the Engineer after consultation with the Employer will instruct the Contractor regarding the works to be carried out without any financial obligation of the Employer."
Access Route	**4.15**	At the end of this Sub-Clause add the following : "The Contractor shall pay attention towards the permissible load-bearing capacities of the existing road and bridges along the public road network. The Contractor shall be responsible for verifying and demonstrating that any of his vehicles or equipment which he intends to pass over any of these and other existing road and bridges in the area will not damage or endanger the integrity or safety of the bridges and roadways, any associated structures, other traffic and vehicles or the general public. The Contractor has the obligation to verify, through the Competent Authority, the suitability of the roads and bridges to withstand the foreseen transport loads and to execute all the works necessary to upgrade / strengthen the above-mentioned infrastructures. The Contractor shall submit to the Engineer a copy of all such requests for approval or permission within 30 days of submission of the original request to the Competent Authority, including all supporting drawings, calculations and other information."
Transport of Goods	**4.16**	Add the following paragraph at the end of Sub-clause4.16: The Contractor shall adequately record the condition of roads, agricultural land and other infrastructure prior tothe start of transporting materials, goods and equipment,and construction.

Protection of the Environment	**4.18**	Add the following paragraphs at the end of Sub-clause 4.18: The Contractor shall, to the satisfaction of the Engineer, take all necessary precautions for the efficient protection of all surface and sub-surface watercourses against all kinds of pollution arising from the execution of the works. The Contractor shall ensure that at all locations where his labor force are living or working, other than labor living in their own homes, adequate facilities are provided to collect and treat all sewage and wastewater and lo ensure that the outflows from such treatment facilities comply with recognized national or international standards for sewage treatment discharges. The Contractor shall ensure that fuel wood is not used firewood and as a means of heating during the preparation or processing of any materials forming part of the Works. 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 ensure that any cut or fill slopes are planted with grass or other approved plant cover as soon as possible to protect them from erosion. This planting shall follow the recommendations in the Nepal manual entitled "Vegetative Structures for Stabilizing Highway Slopes" (DOR), or the requirements of the Specification as directed by the Engineer. The water used in the construction shall not be allowed to affect water availability in the local communities. Where a scarcity of water is expected to arise, the Contractor shall explore and tap alternative sources of safe water. In case of interference with the water supply of a settlement, the Contractor is liable to provide the affected population with potable drinking water from the alternative sources with no extra cost to the contract or local people. The Contractor shall also comply all the national ,provincial and local environmental 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 set forth in the EMP 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 Report	**4.21**	***Insert the following text after the last paragraph of the Sub Clause 4.21:*** "The Contractor shall keep a Site Diary wherein full details of all work carried out each day shall be recorded. The Site Diary may be prepared in sections relating to different parts of the works being carried out in different locations if applicable. The Contractors shall submit a copy of the Site Diary progress record every week to the Engineer.

Fossils	**4.24**	***Insert the following text after the first paragraph:*** All materials and things of any kind obtained from excavations or found on or under the Site, or under any additional Site which the Contractor may be allowed to occupy, shall remain the property of the Government and shall not be used in the works or sold or otherwise disposed of without the written authority of the Engineer unless otherwise expressly provided in the Specification/Employer's Requirements.
Add the new following sub-clause 4.25 to after sub-clause 4.24		
Site Meetings	**4.25**	***Add new Sub-Clause 4.25 with the following text:*** The Engineer shall arrange regular site meeting and prepare the minutes of the meetings. The Engineer shall summon all parties concerned to the first Site Meeting where the date, time and place of future meetings shall be decided. It is the duty of the Contractor and his Representative to participate in the Site Meetings. The purpose of the Site Meetings is to co-ordinate the Works with the Contractor, to review the progress of the Works in relation to the Programme and to record understandings and agreed arrangements regarding the conduct and execution of the Works. The Minutes of the Site Meetings shall be numbered consecutively Minutes shall be delivered to the parties of participants not later than 14 days from the date of the meeting. Matters recorded in Minutes of the Site Meetings are deemed acceptable to all parties, unless comments/objections to the minutes have been given not later than one week from the date of receipt of the Minutes of Meeting. .Minutes shall be deemed to have been received by the parties unless a notice has been given to the Engineer not later than three week from the date of the Meeting stating of not receipt of the Minutes at the following meeting that the Minutes were not received and there is no evidence to the contrary.
Mile Stone	**4.26**	"The Employer shall require the Contractor to complete certain parts of Works within certain times as described in the Employer's requirement as "Milestones" The Contractor shall complete the works of each Milestone (including all works which is stated in Employer's Requirement as being required for the Milestone to be considered complete) within the time for completion of the Milestone as stated in the Contract Data , calculated from the Commencement date. The Contractor shall include, in the Detailed programme and each revised programme, under sub-paragraph (a) of Sub-Clause 8.3(Programme), the time for completion of each Milestone. Sub-paragraph (d) of Sub-Clause 8.4(Advance Warning) and Sub-Clause 8.5(Extension of Time for Completion) shall apply to each Milestone, such that "Time for Completion under Sub-Clause 8.5 shall be read as the Time for Completion of such Milestone under this Sub-Clause. The Contractor may apply, by the Notice to the Engineer, for a

		Milestone Certificate not earlier than 14 days before the works of the Milestone will, in the Contractor's opinion, be complete. The Engineer shall , within 28 days after receiving the Contractor's notice : (a) issue the Milestone Certificate to the Contractor, stating the date on which the works of the Milestone were completed in accordance with the Contract , except for any minor outstanding work and defects (as shall be listed in the Milestone Certificate); or (b) Reject the application, giving reasons and specifying the work required to be done and defects required to be remedied by the Contractor to enable the Milestone Certificate to be issued. The Contractor shall then complete the work referred to in sub-paragraph (b) of this Sub-Clause before issuing a further Notice of application under this Sub-Clause. If the Engineer fails either to issue the Milestone Certificate or to reject the Contractor's application within the above period of 28 days, and if the works of a Milestone are complete in accordance with the Contract, the Milestone Certificate shall be deemed to have been issued on the date which is 14 days after the date stated in the Contractor's Notice of application. If the Contractor fails to complete the works of the Milestone within the time of completion of the Milestone (with any extension under this Sub-Clause) : (i) the Contractor shall subject to Sub-Clause 20.1(Claims) , pay Delay Damages to the Employer for this default; (ii) such Delay Damages shall be the amount stated in the Contract Data , for every day which shall elapse between the time for completion for the Milestone(with any extension under this Sub-Clause) and the date stated in the Milestone Certificate; the total amount of Delay Damages for all Milestones shall not exceed the maximum amount stated in the Contract Data(this shall not limit the Contractor's liability for Delay Damages in any case of fraud , gross negligence, deliberate default or reckless misconduct by the Contractor."
Domestic Preference Security	**4.27**	If the Contractor consists of a joint venture which is awarded the Contract through the application of the domestic preference, the Contractor: **(i)** throughout the execution of the Contract, shall not modify the work-sharing characteristics of the joint venture with which it satisfied the criteria of eligibility for the award of the Contract under domestic preference; and **(ii)** concurrently with the above Performance Security, the Contractor shall provide additional security ("the domestic preference security") of 1.0 (one)% of the Contract Price to guarantee that such characteristics of the joint venture will not be so modified.
Error in Employer's in Requirement	**4.28**	If the Contractor finds an error, fault or defect in the Employer's Requirements for the Contractor's Design

		Works, as a result of scrutinizing them under Sub-Clause 4.29 (The Contractor's Design Obligation), the Contractor shall give a Notice to the Engineer within 45 days calculated from the Commencement Date. If, after expiry of this period, the Contractor finds an error, fault or defect in the Employer's Requirements, the Contractor shall also give a Notice to the Engineer describing the error, fault or defect. The Engineer shall then proceed as specified under Sub-Clause 3.5 [*Determinations*] to agree or determine: (a) whether or not there is an error, fault or defect in the Employer's Requirements; (b) whether or not (taking account of cost and time) an experienced contractor exercising due care would have discovered the error, fault or other defect: • when examining the Site and the Employer's Requirements before submitting the Tender; or • if the Contractor's Notice is given after the expiry of the period stated in the first paragraph of this Sub-Clause, when scrutinizing the Employer's Requirements under Sub-Clause 4.29 [*The Contractor's Design Obligations*]; and (c) what measures (if any) the Contractor is required to take to rectify the error, fault or defect . If the Contractor suffers delay as a result of the error, fault or defect, the Contractor shall be entitled subject to EOT
The Contractor's Design Obligation	**4.29**	The Contractor shall carry out, and be responsible for the design of the Contractor's Design Works as stipulated in the Employer's Requirement. The Contractor shall submit the names, qualification and

		experiences of the Design Key Experts (Designers), to the Engineer for consent. The Contractor shall submit all the required design and drawings accompanied by detailed calculations, including design philosophy, references (if any) and standards, to the Employer, in accordance with the Employer's Requirements, for review, before commencement of the construction works. The Contractor warrants that he and his designers have the experience and capability necessary for the design. The contractor and his designers at all reasonable times shall be available to discuss with the Engineer whichever design matter, until issue of the Performance Certificate.
Design Error	**4.30**	If errors, omissions, ambiguities, inconsistencies, inadequacies or other defects are found in the Contractor's design and/or the Contractor's Documents, they and the Works shall be corrected in accordance with Sub-Clause 7.5 [*Rejection*]. If such Contractor's Documents were previously the subject of a Notice of No-objection given (or deemed to be given) by the Engineer. All corrections and resubmissions under this Sub-Clause shall be at the Contractor's risk and cost.
Tests after Completion	**4.31**	If Tests after Completion are specified for the Contractor's Design Works in the Employer's Requirements, this Sub Clause shall apply. The Employer shall: (a) provide all electricity, water, sewage (if applicable), equipment, fuel, consumables, instruments, labour, materials, and suitably qualified, experienced and competent staff, as are necessary to carry out the Tests after Completion efficiently and properly; and b) carry out the Tests after Completion in accordance with: (i) the Employer's Requirements, (ii) the O&M Manuals to which the Engineer has given (or is deemed to have been given) a Notice of No-

		objection, (iii) such guidance as the Contractor may be required to give during the course of these tests; and in the presence of such Contractor's Personnel as either Party may reasonably request. The timing of the Tests after Completion shall be as stated in the Employer's Requirements (if not stated, as soon as is reasonably practicable) after the Works or Section (as the case may be) have been taken over under Clause 10 [*Employer's Taking Over*]. The Engineer shall give a Notice to the Contractor, of not less than 21 days, of the date on which and place at which the Tests after Completion will be carried out. This Notice shall also include a test programme showing the estimated timing for each of such tests. Unless otherwise agreed with the Contractor, these tests shall be carried out on this date. If the Contractor does not attend at the time and place stated in the Engineer's Notice (or otherwise agreed with the Contractor), the Employer may proceed with the Tests after Completion, which shall be deemed to have been made in the Contractor's presence, and the Contractor shall be deemed to have accepted the readings as accurate. The results of the Tests after Completion shall be compiled and evaluated by both Parties. Appropriate account shall be taken of the effect of the Employer's prior use of the Works.
Rates of Wages and Conditions of Labor	**6.2**	***Insert the following text after the first paragraph:*** The Contractor's scales of wages shall be such as to ensure that there is no differentiation between wages for men and women for work of equal value.

Labor Laws	**6.4**	***Add the following text at the end of Sub-Clause 6.4:***The Contractor and sub contractors shall comply with all applicable laws.
Health and Safety	**6.7**	***Add the following sentence at the end of Para 1 of sub-clause 6.7:*** The Contractor shall conduct health and safety programs for workers employed under the project, and shall include information on the trafficking of women and the risk of sexually transmitted diseases, including HIV/AIDS in such programmes .The Contractor shall also follow the COVID-19 protocols at the site during construction period.
Prohibition of harmful child labor	**6.21**	***Add the following sentence at the end of Para 1 of sub-clause 6.21:*** 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, or social development. "Child" means a person below the statutory minimum age specified under applicable national, provincial or local law of Nepal.
Add new sub-clause 6.25and 6.26		
Keeping Records of Contractor's Materials, Equipment and Incidents	**6.25**	Add new GCC Sub-clause 6.25: The Contractor shall prepare and submit to the Engineer on a monthly basis detailed records showing: (i) materials delivered to the Site and materials consumed in the Works; (ii) plant and equipment on Site together with number of hours worked by and current condition of each item ; and (iii)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 tobe kept and provided.
Contractor's Employees	**6.26**	Add new GCC Sub-clause 6.26: To the maximum extent possible, the Contractor's unskilled labour shall be drawn from the area of influence of the road. defined as within 2 hours walk of the place of work. Every effort shall be made to establish a gender balance within the local labour force with the employment of 50%female labour. The Contractor should give preference for employment as labour or any other category of the employees to one member per household of those households identified as losing land or livelihood as a result of the land acquisition process. The Engineer may identify such people to the Contractor and he shall be required to offer them employment on the same terms and conditions as the rest of his local labour force.
Commencement of Works	**8.1**	Delete the first paragraph and insert with following: "The Employer shall give a Notice to the Contractor stating the Commencement Date 14 days before the Commencement Date." . Delete the "Sub-Clauses 8.1 (b) and 8.1 (d)".
Time for Completion	**8.2**	***Insert the following new paragraph at the end ::***

		"c) Handing over all documents that are required to be delivered to the Employer prior to the Taking –Over Certificate being issued as stated in the Employer's Requirements."
Extension of Time of Completion	**8.4**	***Add the following text at the end of Sub-Clause 8.4:*** "The Engineer shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Engineer for a decision upon the effect of a Compensation Event or Variation and submitting full supporting information at least 21 days prior to the intended completion date. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date. The allowing of an extension of time for completion shall not entitle the Contractor to any additional payment. Where, in the opinion of the Contractor, additional costs have been incurred as a result of the cause or the event for which an extension of time for completion has been allowed, such costs shall be well documented and may be claimed separately, in accordance with the provisions of Clause 20.1."
Bonus	**8.13**	***Add new Sub Clause 8.13:*** "The Contractor shall be paid a bonus calculated at the rate of *0.015%* of the final contract price for each day that the completion of the works is earlier than the Time of Completion pursuant to Conditions of Contract Sub Clause 8.2. The total amount of Bonus shall not exceed *3%* of the final contract price.
Cost of Remedying Defects	**11.2**	Add the following at the end of Sub-clause 11.2: Upon the completion of construction, the Contractor shall fully reinstate pathways, other local infrastructure, and agricultural land to at least their pre-project condition as recorded by the Contractor in consonance with its obligation in Sub-clause 4.16.
Measurement and Evaluation	**12**	**This Clause is not applicable for the Contractor's Design Works**.
Right to Vary	**13.1**	**Add at the end of item a) of third paragraph "in the case of the Employer's Design Works."**
Adjustments for Changes in Cost	**13.8**	**Add the following paragraph before the first paragraph of this sub clause;** "This sub-Clause is not applicable for the Contractor's design Works." ***Add New paragraphs with the following texts at the end of this Sub-Clauses:*** "**The base cost indices or prices:** The base cost indices or prices shall be those prevailing on the day 28(twenty eight) days prior to the latest date for submission of bids. Current indices or prices shall be those prevailing 49(Forty Nine) days prior to the period to which a particular Payment Certificate is related. If at any time the current indices are not available, provisional indices determined by the Engineer shall be used, subject to subsequent correction of the amounts paid to the contractor when the applicable indices become available. **Sources of Indices and Weightings:** The sources of indices

		shall be those listed in the Bidding Forms- Table of Price Adjustment data, as approved by the Engineer. Indices shall be appropriate for their purpose and shall relate to the Contractor's proposed source of supply of inputs on the basis of which his Contract shall have been computed. As the proposed basis for price adjustment, the Contractor shall have submitted with his bid the tabulation of Weightings and Source of Indices in the Bidding Forms, which shall be subject to approval by the Engineer. **Weightings:** The weightings for each of the factors of cost given in the Bidding Forms shall be adjusted if, in the opinion of the Engineer, they have been rendered unreasonable, unbalanced or inapplicable as a result of varied or additional work already executed or instructed under Clause 13.1 or for any other reason. **Subsequent Legislation:** If, after the date 30 days prior to the latest date for submission of bids for the Contract, there occur changes to any National Statute, Ordinance, Decree, or other Law or any regulation or by-law of any local or other duly constituted authority, or the introduction of any such Statute, Ordinance, Decree, Law, regulation or by-law which causes additional or reduced cost to the Contractor, other than under the preceding sub-clauses of this clause, in the execution of the Contract, such additional or reduced cost shall, after due consultation with the Employer and the Contractor, be determined by the Engineer and shall be added to or deducted from the Contract Price and the Engineer shall notify the Contractor accordingly, with a copy to the Employer. The total payment for adjustment for changes in cost shall be limited to 25% of the initial contract price exclusive of the Contractor's Design Works. The price adjustment shall commence after 12 (twelve) months from the commencement date. "
The Contract Price	**14.1**	Delete the entire text of this sub clause and replace with the following; "The total Contract price shall be the summation of : (i) The price for the Employer's design works including the Preliminary and General Works,: the amount calculated as the product of measured quantity of the works accomplished and unit rate ; and (ii) The price for the Contractor's design works : fixed lump sum price as stated in price schedule."
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." Add the following paragraph at the end of this sub clause; "In case of the repayment of the Advance Payment, if the Contractor is not able to complete the contract within the stipulated time of completion of contract, the Employer shall be entitled to claim the interest at the rate of 10 (ten) % per year of the outstanding principle amount of the Advance Payment inclusive of the outstanding principle advance payment amount."

Amortization for repayment of Advance Payment	**14.2(b)**	Delete "when 90 percent (90%) of the Accepted Contract Amount less Provisional Sum in fifth and sixth lines and replace with: "When 80 percent (80%) of the Accepted, Contract Amount less Provisional Sum and VAT."
Currencies of Payment	**14.15**	Add the following paragraphs at the end of this sub-clause: "Notwithstanding the foregoing, the Contract Price shall be paid in the single currency (Local Currency) only. However, for the rate of exchange to foreign currency, exchange policies and guidelines of Nepal Rastra Bank (Central Bank of Nepal) shall apply. The Currency of Payment and the proportion of Local and Foreign Currency (US$) for exchange shall be as specified in the Contract Data"
Termination By Employer	**15.2**	***Add Sub clause (g), (h), (i)*** The Employer may terminate the Contract at any time if the contractor : g) does not commence the work as per the Contract, h) abandons the work without completing, ***i)*** persistently fails to achieve progress as per the Contract.

Corrupt or Fraudulent Practices	**15.6**	***Replace sub-clause: (a; (b); (c) and (d) by:*** **(a)** (vi) "corrupt practice" means the offering, giving, receiving, or soliciting, directly or indirectly, anything of value to influence improperly the actions of another party; (vii) "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; (viii) "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; (ix) "collusive practice" means an arrangement between two or more parties designed to achieve an improper purpose, including influencing improperly the actions of another party. (x) "obstructive practice" means: deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a GoN/DP investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or (xi) acts intended to materially impede the exercise of the GoN's/DP's inspection and audit rights provided for under sub-clause 1.15 (b) will sanction a firm or individual, including declaring ineligible, for a stated period of time, to be awarded a GoN/DP-financed contract if it at any time determines that the firm has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for, or in executing, a GoN/DP-financed contract.
Employer's risk	**17**.3	Add the following paragraph at the end Sub-clause 17.3: In the interpretation of Sub-clause 17.3 (f) the term "use or occupation by the Employer's' shall not be taken to mean or to imply that use or occupation of the works(roads) by the general public is in any way an Employer's risk, nor shall it be taken to mean or imply that use of the works as a means of travel by any agent or servant of the Employer is in any way an Employer's risk.
Insurance of the Works and Contractor's Equipment	**18.2**	***The Insuring Party shall be the Contractor.***
Insurance of the Works and Contractor's Equipment	**18.2**	***Add the following text after Sub-paragraph 18.2 (e)(iv):*** It shall be the responsibility of the Contractor to notify the insurance company of any change in the

		nature and extent of the Works and to ensure the adequacy of the insurance coverage at all times during the period of the Contract.
		Add new Sub Clause 18.5 after 18.4
Liability for breach of professional duty	**18.5**	To the extent that the Contractor is responsible for the design of part of the Permanent Works under Sub-Clause 4.1 [*Contractor's General Obligations*], and/or any other design under the Contract, and consistent with the indemnities specified in Clause 17 [*Care of the Works and Indemnities*]: (a) the Contractor shall effect and maintain professional indemnity insurance against liability arising out of any act, error or omission by the Contractor in carrying out the Contractor's design obligations in an amount not less than that stated in the Contract Data (if not stated, the amount agreed with the Employer); and (b) if stated in the Contract Data, such professional indemnity insurance shall also indemnify the Contractor against liability arising out of any act, error or omission by the Contractor in carrying out the Contractor's design obligations under the Contract that results in the Works (or Section or Part or major item of Plant, if any), when completed, not being fit for the purpose(s) for which they are intended under Sub-Clause 4.1 [*Contractor's General Obligations*]. The Contractor shall maintain this insurance for the period specified in the Contract Data.
Consequence of Force Majeure	**19.4**	***Replace the provision of Sub Clause 19.4 (b) as follows:*** If the event or circumstances is of the kind described in sub-paragraphs (i) to (iv) of Sub Clause 19.1[Definition of Force Majeure] and, .in the case of sub paragraphs (ii) and (iv), occurs in the Country, payment of any such cost. In the case of sub paragraph (iii) occurs then cost compensation shall be applicable only if the Force Majeure situation exists for more than three consecutive days and the cost compensation shall only made for the cost incurred during the period after the first 3 days . However if the total Force Majeure situation exceeds 7

		days period in a calendar month then the cost compensation shall be applicable for the period in excess of seven days even if the Force majeure situation did not exist continuously for more than three days .
Appointment of the Dispute Board	**20.2**	Delete the entire text of this Sub Clause.
Failure to Agree on the Composition of the Dispute Board	**20.3**	Delete the entire text of this Sub Clause.
Obtaining Dispute Board's Decision	**20.4**	Delete the entire text of this Sub Clause.
Amicable Settlement	**20.5**	Delete the entire text of this sub clause and replace with the following; "If a party is not satisfied with the Determinations of the Engineer under sub clause 3.5 (Determinations), the party may give a Notice of Dissatisfaction (NOD) to the Engineer with a copy to the other party within 21 days of receiving Notice of Engineer's Determination. Where a NOD has been given both Parties shall attempt to settle the Dispute amicably by mutual consent before the commencement of Arbitration. However, unless both Parties agree otherwise, arbitration may be commenced on or after the twenty-eighth (28th) day after the day on which this NOD was given, even if no attempt at amicable settlement has been made."
Failure to Comply with Dispute Board's Decision	**20.7**	Delete the entire text of this Sub Clause.
Expiry of Dispute Board's Appointment	**20.8**	Delete the entire text of this Sub Clause.
Use of Explosives		**Insert New Clause 21:**
Compliance with Regulations for Explosives	**21.1**	**T**he Contractor shall comply with all relevant ordinances, instructions and regulations which the Government, or other person or persons having due authority, may issue from time to time regarding the handling, transportation, storage and use of explosives.
Permission for Blasting	**21.2**	The Contractor shall at all times maintain full liaison with and inform well in advance, and obtain such permission as is required from all Government authorities, public bodies and private parties whatsoever concerned or affected, or likely to be concerned or affected by blasting operations.
Engineer's Approval for Use of Explosives	**21.3**	No explosives of any kind shall be used by the Contractor without the prior consent of the Engineer in writing and the Contractor shall provide, supply, handle, store and transport all explosives, ancillary materials and stores and all other things of every kind whatsoever required for blasting operation, all at his own expense in a manner approved in writing by the Engineer and acceptable to the police and military authorities.
Records of Explosives	**21.4**	Throughout the execution of the Contract, the Contractor shall account, on a continuous basis, to the satisfaction of the Engineer and the police and military authorities for all explosives brought on to the Site and for all explosives

		consumed in the Works. The Contractor shall remove all unused explosives from the Site on completion of the Works or shall dispose of such explosives in a manner acceptable to the police and military authorities.

Section 9: Contract Forms

Table of Forms

Letter of Intent

[on letterhead paper of the Employer]

. . . . . **date**. . . . . .

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

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

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

This is to notify you that, it is our intention to award the contract ……. **dated** …….. for execution of the . . . . . .**name of the contract and identification number, as given in the Contract Data/SCC** to you as your bid price . . . . . .**amount in figures and words in Nepalese Rupees/US$ ……** as corrected and modified in accordance with the Instructions to Bidders is hereby selected as substantially responsive lowest evaluated bid.

Authorized Signature: .....

Name: .....

Title: .....

CC:
[Insert name and address of all other Bidders, who submitted the bid]
[Notes on Letter of Intent
The issuance of Letter of Intent is the information of the selection of the bid of the successful bidder by the Employer and for providing information to other unsuccessful bidders who participated in the bid as regards to the outcome of the procurement process. This standard form of Letter of Intent to Award should be filled in and sent to the successful Bidder only after evaluation and selection of substantially responsible lowest evaluated bid

Letter of Acceptance

[on letterhead paper of the Employer]

. . . . . **date**. . . . . .

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

Subject: . . . . . **Notification of Award**

This is to notify that your Bid dated . . . . **date** . . . . for execution of the . . . . . .**name of the contract and identification number, as given in the Contract Data/PCC** . . . . . for the Contract price of the equivalent of **[amount in figures and words in the currency…….……]**, as corrected in accordance with the Instructions to Bidders is hereby accepted by our Agency..

You are hereby instructed to contact this office to sign the formal contract agreement within 15 days. As per the Conditions of Contract, you are also required to submit Performance Security and **Letter of Commitment for Bank's Undertaking for Line of Credit** as specified in PCC, consisting of a Bank Guarantee in the format included in Section 9 (Contract Forms) of the Bidding Document.

The Employer shall forfeit the bid security, in case you fail to furnish the Performance Security and to appear in person or thorough a duly authorized representative to sign the contract agreement within the specified period.

Authorized Signature: .....

Name and Title of Signatory: .....

Contract Agreement

THIS AGREEMENT made the . . . . .day of . . . . . ., ..., between . . . . . **name of the Employer**. . . . . (hereinafter "the Employer"), of the one part, and . . . . . **name of the Contractor**. . . . .(hereinafter "the Contractor"), of the other part:

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:
    1. Addenda to the Contract Agreement (if any);
    2. the Letter of Acceptance/Award
    3. Letter of Technical and Price Bid
    4. the Particular Conditions Part A – Contract Data;
    5. the Particular Conditions Part B - Special Provisions
    6. these General Conditions (GCC);
    7. the Employer's Requirements including the Specifications;
    8. the Drawings;
    9. Schedules;
    10. the JV Undertaking (If the Contractor is in JV);
    11. the Minutes of the Contract Negotiation (if any);
    12. other documents forming part of the Contract
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 design, execute and complete 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 design, execution and completion of the works remedying of defects therein and, the final contract Price at the times and in the manner prescribed by the Contract.

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

Signed by	Signed by .....
for and on behalf of the Employer	for and on behalf the Contractor
in the presence of	in the presence of
Witness, Name, Signature, Address, Date	Witness, Name, Signature, Address, Date

Letter of Commitment for Bank's Undertaking for Line of Credit

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

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

Date:
Contract No:

Name of Contract :

To:

[Name and address of the Employer]

CREDIT COMMITTMENT No: [insert number]

We are pleased to know that [name of Contractor] (hereinafter called "the Contractor") has been awarded the Contract for the execution of the Works of **[description of works]** for above contract.

Furthermore, we understand that, according to your conditions, the Contractor's Financial Capacity i.e. Liquid Asset must be substantiated by a Letter of Commitment of Bank's Undertaking for Line of Credit.

At the request of, and arrangement with, the Contractor, we [name and address of the Bank] do hereby agree and undertake that [name and address of the Contractor] will be provided by us with a revolving line of credit, for execution of the Works viz. [insert name of the works], for an amount not less than US$ …….[in figure] (in words) for the sole purpose of the execution of the above Contract. This Revolving Line of Credit will be maintained by us until **[Insert "Initial Contract Period"]** required by the Procuring Entity/Employer.

This committed line of credit shall not be terminated or cancelled without the prior written approval of Employer.

In witness whereof, authorised representative of the Bank has hereunto signed and sealed this Letter of Commitment.

Signature	Signature
Name :	Name :
Designation:	Designation:

Performance Security

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

Beneficiary: .....*Name and Address of Employer* .....

Date: .....

Performance Guarantee No.: .....

We have been informed that . . . . . ***name and address of the Contractor***. . . . . (hereinafter called "the Contractor") has entered into Contract No. . . . . ***reference number of the Contract***. . . . . dated . . . . . .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 and address of the Bank***. . . . . hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of . . . . . ***name of the currency and amount in figures****. . . . . *(. . . . . ***amount in words***. . . . .) such sum being payable in US$, upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein.

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

. . . . . .

Seal of Bank and Signature(s)

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

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

**** Insert the date thirty days after the end 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 [six months], in response to the Employer's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee".**

Advance Payment Security

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

Beneficiary: .....*Name and Address of Employer* .....

Date:.....

Advance Payment Guarantee No.: .....

We have been informed that . . . . . ***name and address of the Contractor***. . . . . (hereinafter called "the Contractor") has entered into Contract No. . . . . ***reference number of the Contract***. . . . . dated . . . . . .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 of . . . ***name of the currency and amount in figures****. . . . . *(. . . . . ***amount in words***. . . . .) is to be made against an advance payment guarantee.

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

It is a condition for any claim and payment under this guarantee to be made that the advance payment referred to above must have been received by the Contractor on its account number . . . . . ***Contractor's account number***. . . . . *at* . . . . . ***name and address of the Bank***. . . . . .

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

. . . . . .

Seal of Bank and Signature(s)

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

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

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

BIDDING DOCUMENT

PRICE BID

PROCUREMENT OF WORKS

International Competitive Bidding (ICB)

Two Envelope Bidding Procedure for

Procurement of

Kathmandu- Terai/Madesh Fast Track (Expressway) Road Project

Construction of Double Lane Dual Carriageway Standard Expressway Road, Bridge and Allied Works,

Ch: 49+800 to Ch. 57+400

Issued on: 15 August 2021

Bid Document issued to: To all eligible National and Foreign Bidders

Contract Identification No: KTFT/ICB/WORKS/R&B/078/079/3

Project Name: Kathmandu- Terai/Madesh Fast Track (Expressway) Road Project

Office Name: Kathmandu- Terai/Madesh Fast Track (Expressway) Road Project (KTFT)

Office Address: Bhadrakali, Kathmandu, Nepal

Financing Agency: Government of Nepal

Table of Contents

1. Letter of Price Bid

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

Date: .....

Name of the contract: .....

Invitation for Bid No.: .....

To: ……....

We, the undersigned, declare that:

(a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (ITB) Clause 8;
(b) We offer to execute in conformity with the Bidding Documents the following Works:
(c) The total price of our Bid, excluding any discounts offered in item (d) below is:
(d) The discounts offered and the methodology for their application are:
(e) Our bid shall be valid for a period of ***120 (One Hundred Twenty)*** days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
(f) If our bid is accepted, we commit to obtain a performance security in accordance with the Bidding Document;
(g) We understand that this bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed;
(h) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive;
(i) We agree to permit the Employer/DP or its representative to inspect our accounts and records and other documents relating to the bid submission and to have them audited by auditors appointed by the Employer; and
(j) If awarded the contract, the person named below shall act as our Representative:

Name: .....

In the capacity of .....

Signed ……...

Duly authorized to sign the Bid for and on behalf of ……

Date ……....

2. Table of Price Adjustment Data
(Applicable to Employer's Design Works only)

[To be used if Price Adjustment if applicable as per GCC 13.8]

Code	Index Description	Source of Index*	Base Value and Date	Employer's Proposed Weighting Range (coefficient)	Bidder's Proposed Weighting (coefficient)**
1	2	3	4	5	6
	Non - adjustable (A)			0.15	0.15
	Labor (b)			0.05-0.15	
	Materials (c)			0.55-0.65	
	Equipment usage (d)			0.10-0.20	
		Total		**1.00**	**1.00**

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

(a) Labor: "National Salary and Wage Rate Index"- "Construction Labor" of Nepal Rastra Bank

or

rate fixed by District Rate Fixation Committee

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

(c) Equipment usage:

"National Wholesale Price Index" - " Machinery and Equipment " of Nepal Rastra Bank

or

"Fuel" Price fixed by Nepal Oil Corporation.

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

3. 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 local currency requirements. **[Insert the names of 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 x B**	**Percentage of Net Bid Price (NBP) $\frac{100xC}{NBP}$**
Local currency		**1.00**		
Foreign Currency US Dollar (US$)				
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 30 days prior to the deadline for submission of bids published by the source specified in BDS 15.
- The Bidder may fill separate tables for the Employer's Design Works and the Contractor's Design Works.

4. Tables of Adjustment Data

(Not Applicable)

Table A - Local Currency

Index Code	Index Description	Source of Index	Base Value and Date	Bidder's Local Currency Amount	Weighting range (in %) to be applied	Bidder's Proposed Weighting
To be entered by the Employer	Nonadjustable	—	—	—	15	0.15 (fixed)
	labour				-	
	fuel				-	
	Steel				-	
	Cement				-	
	Bitumin				-	
	-					
	-					
			Total		**1.00**	**1.00**

Table B - Foreign Currency

Name of Currency: .....

If the Bidder wishes to quote in more than one foreign currency, this table should be repeated for each foreign currency.

Index Code	Index Description	Source of Index	Base Value and Date	Bidder's Currency in Type/Amount	Equivalent in FC1	Bidder's Proposed Weighting
To be entered by the Employer	**Nonadjustable**	—	—	—		A: _____ B: _____ C: _____ D: _____ E: _____
				Total		**1.00**

Note:
As per GCC 1.1, "Base Date" means the date 30 days prior to the latest date for submission and completion of the tender

Section 6:- Preamble of Bill of Quantities/ Schedule of Prices

Preamble of Bill of Quantities (For the Employer's Design Works including Preliminary and General Works)

General

1. The Bill of Quantities shall be read in conjunction with the Instructions to Bidders, General and Particular Conditions of Contract, Technical Specifications, and Drawings.
2. The quantities given in the Bill of Quantities are estimated and provisional, and are given to provide a common basis for bidding. The basis of payment will be the actual quantities of work ordered and carried out, as measured by the Contractor and verified by the 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. For any item for which measurement is based on records made before or during construction the records shall be prepared and agreed between the Engineer and the Contractor. Should the Contractor carry out such work without the prior agreement of the Engineer, the Engineer

may request the Contractor to carry out investigations to confirm the extent of the work and the quantity of work certified for payment shall be solely at the Engineer's discretion. The cost of any such investigation shall be borne by the Contractor.

4. The rates and prices bid in the priced Bill of Quantities shall, except as otherwise provided under the Contract, include all construction equipment, labor, supervision, materials, erection, maintenance, insurance, profit, taxes, and duties, together with all general risks, liabilities, and obligations set out or implied in the Contract.

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

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

7. General directions and descriptions of work and materials are not necessarily repeated nor summarized in the Bill of Quantities.

References to the relevant sections of the Contract documentation shall be made before entering prices against each item in the priced Bill of Quantities.

8. The method of measurement of completed work for payment shall be in accordance with **Standard Specifications for Road and Bridge Works-2073, published by Department of Roads, Ministry Physical Planning and Infrastructure or its latest version**.

9. Arithmetic errors will be corrected by the Engineer 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 Engineer there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price shall be corrected.

(b) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and

(c) if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is

related to an arithmetic errors, in which case the amount in figures shall prevail subject to (a) and (b) above.

Daywork

Work shall not be executed on a daywork basis except by written order of the Engineer. Bidders shall enter basic rates for daywork items in the Schedules, which rates shall apply to any quantity of daywork ordered by the Engineer. Nominal quantities have been indicated against each item of daywork, and the extended total for Daywork shall be carried forward as a Provisional Sum to the Summary Total Bid Amount. Unless otherwise stated, payments for daywork shall be subject to price adjustment in accordance with the provisions in the Conditions of Contract. The currency of bid and payment for the daywork shall be as per the contract for the BOQ items of works.

Daywork Labor

(i) In calculating payments due to the Contractor for the execution of daywork, 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 daywork to the time of return to the original place of departure, but excluding meal breaks and rest periods. Only the time of classes of 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.

(ii) The Contractor shall be entitled to payment in respect of the total time that labor is employed on daywork, calculated at the basis rates entered by him in the Schedule of Daywork Rates for 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 law of Nepal, 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.

Daywork Materials

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 for 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.

(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 will be paid in accordance with the terms for Labor and Constructional Plant in this Schedule.

Daywork Contractor's Equipment

(i) The Contractor shall be entitled to payments in respect of Contractor's Equipment already on Site and employed on daywork at the basic rental rates entered by him in the Schedule of Daywork Rates for 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 consumable, and all overhead profit and administrative costs related to the use of such equipment. The cost of drivers, operators and assistants will be paid for separately as described under the section on Daywork Labor.

(ii) 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.

Provisional Sums

Provisional Sums included and so designated in the Bill of Quantities shall be expended in whole or in part at the direction and discretion of the Engineer in accordance with the Conditions of Contract.

Preamble of Schedule of Prices (For the Contractor's Design Works)

1. General

The Schedule of Prices, shall be read in conjunction with the Conditions of Contract, the Employer's Requirements (the scope of Works, Technical Specifications and the Drawings) for details of the description, performance, quality and strength of materials and the workmanship, conditions, obligations and liabilities generally which shall be complied with in carrying out the Contract. This Schedule shall also be read in conjunction with the Instructions to Bidders, the Data for Bidders, the Bid Forms, the Data Sheets (if any) and any Addenda that may be issued at a later date.

a. The brief descriptions of the items of work given in this Schedule are purely for the purpose of Payment and shall in no way modify or supersede the detailed descriptions of the work given in the

Employer's Requirement and Technical Specification and elsewhere in the Bid Document.

b. The cost of providing materials, executing the work as shown and described on the Drawings and in the Employer's Requirements/ Specifications, complying with all conditions, obligations and liabilities described in the Conditions of Contract, Employer's Requirements/Specifications and this Schedule, whether or not the aforesaid are expressly stated in the Bidding document, and all taxes, royalties, overhead charges and profit shall be deemed to be included in the bid.

c. All Prices in the Price Schedule shall be for work complete in every respect. The Prices shall therefore include, but not be limited to, all labour, materials, plant equipment and supervision to execute the item as required and shall include for carriage, handling, cutting and waste, the preparation of drawings where required, the storage, protection and completion of the work, testing, all incidental charges and expenses whatsoever, overheads and establishment charges as applicable and Contractor's profit for the completion of works in a satisfactory manner to the Employer/Engineer and as shown on drawings, specifications and Bid documents.

d. All Prices in the Price Schedule shall include submission of work Programme, QMS, HSE Manual, EMAP, Monitoring and control procedures, work methodologies, project progress report, project completion report etc.

e. If any item in this Schedule is not priced by the Bidder, it will be deemed to have been priced as nil.

2. Provisional Sums

Amounts allocated under Provisional Sums may be expended in whole, in part or not at all as per the instructions of the Engineer.

a. The total sum paid to the Contractor shall include only such amounts, for the work, supplies or services to which the Provisional Sum relates, as the Engineer shall have instructed.

b. The Provisional sum for General Item, International Consultant for KTFT, Human Resources Development, Environmental Mitigation and other associated works shall be used for local project support programs like water supply, education, road & track improvement, health, electrification, community support etc.

3. The Bidder to submit details of work

a. The successful bidder (Contractor) shall submit the details of works/quantities with anticipated cost to be carried out under each sub item of works mentioned in the Schedule of Prices and the Schedule of Payment.

Bill of Quantities and Schedule of Prices

(Provided Separately Bound)

Schedule of Payment (For the Works Designed by the Contractor with lump Sum Prices)

(Provide along with Bill of Quantities and Schedule of Prices)

Schedule of Payment (For the Works Designed by the Contractor with lump Sum Prices)

Project Name: Kathmandu-Terai/Madhesh Fast Track(Expressway) Project (KTFT Road)

ICB Contract ID: KTFT/ICB/WORKS/R&B/078/079/03

Contract Package : - 3

Schedule of Price Item No.	Particulars (as per the Schedule of Prices)	Quantity Payment Percentage Corresponding to the Relevant Item of Schedule of Prices	Remarks
1.	Conduct detailed survey, geo-physical and geo-technical investigation, hydrological investigation and preparation of detailed design and construction drawings for the Contractor's Design Works comprising 14 Nos. of Twin Bridges and associated works as per the Employer's Requirement.	i) 40% upon completion of detailed survey, geo-physical and geo-technical investigation, hydrological investigation and submission of the relevant particulars to the Engineer. ii) 50% upon completion of detailed design and Construction drawings for the Bridges and associated works and approved by the Engineer. iii) 10% upon the completion of as-built drawings and O & M Manual for the Contractor's Design Works and approved by the Engineer.	
2	Construction of foundations, sub-structures (Pier and Abutments), super structures, protection works; approach slab, wing/return walls, Asphalt overlay, including utility works e.g. electrical and lighting works, optical fiber works, ; ancillary. for double lane bridges(twin) all complete as per the employer's requirement and as per the Employer's Requirement and condition of contract for the Bridges and associated works as outlined below; (a) CH 49+880 to CH 50+120, approx. 240	i) 25% for the construction of Bridge Foundations: payable on prorate basis upon the Engineer's Approval. ii) 10% for the construction of Bridge Substructures: payable on prorate basis upon the Engineer's Approval. iii) 40% for the construction Bridge Super-structures: payable on prorate basis upon the Engineer's Approval. iv) 5% for the protection of Bridge Piers and Abutments:	

Project Name: Kathmandu-Terai/Madhesh Fast Track(Expressway) Project (KTFT Road)

ICB Contract ID: KTFT/ICB/WORKS/R&B/078/079/03

Contract Package : - 3

Schedule of Price Item No.	Particulars (as per the Schedule of Prices)	Quantity Payment Percentage Corresponding to the Relevant Item of Schedule of Prices	Remarks
	m length (Kathmandu) (b) CH 49+890 to CH 50+130, approx. 240m length (Terai) i. (a) CH 50+205 to CH 50+285, approx. 80m length (Kathmandu) (b) CH 50+215 to CH 50+295, approx. 80m length (Terai) ii. (a) CH 50+440 to CH 50+560, approx.120 m length (Kathmandu) (b) CH 50+450 to CH 50+570, approx.120 m length (Terai) iii. (a) CH 50+684 to CH 50+789, approx.105 m length (Kathmandu) (b) CH 50+695 to CH 50+800, approx.105 m length (Terai) iv. (a) CH 50+879 to CH 50+939, approx.60 m length (Kathmandu)	payable on prorate basis upon the Engineer's Approval. v) 10% for the construction of Bridge approaches, installation of barriers and laying pavement wearing course and finishing of the Bridges: payable on prorate basis upon the Engineer's Approval. vi) 10% for final load test of the completed Bridges payable upon approval and acceptance by the Engineer.	

Project Name: Kathmandu-Terai/Madhesh Fast Track(Expressway) Project (KTFT Road)

ICB Contract ID: KTFT/ICB/WORKS/R&B/078/079/03

Contract Package : - 3

Schedule of Price Item No.	Particulars (as per the Schedule of Prices)	Quantity Payment Percentage Corresponding to the Relevant Item of Schedule of Prices	Remarks
	(b) CH 50+890 to CH 50+950, approx.60 m length (Terai) v. CH 51+425 to CH 51+440, approx. 15m length (Ref concept. Drawing for bridge width) -Both Kathmandu and Terai. vi. CH 51+980 to CH 52+000 approx. 20 m length (Ref concept. Drawing for bridge width) -Both Kathmandu and Terai. vii. CH 52+464 to 52+484 approx. 20 m length ((Ref concept. Drawing for bridge width) - Both Kathmandu and Terai. viii. CH 52+658 to 52+678 approx. 20 m length ((Ref concept. Drawing for bridge width) - Both Kathmandu and Terai. ix. CH 53+250 to 53+270 approx. 20 m length ((Ref concept.		

Project Name: Kathmandu-Terai/Madhesh Fast Track(Expressway) Project (KTFT Road)

ICB Contract ID: KTFT/ICB/WORKS/R&B/078/079/03

Contract Package : - 3

Schedule of Price Item No.	Particulars (as per the Schedule of Prices)	Quantity Payment Percentage Corresponding to the Relevant Item of Schedule of Prices	Remarks
	Drawing for bridge width) - Both Kathmandu and Terai. x. (a)CH 54+799 to CH 55+039, approx.240m length (Kathmandu) (b)CH 54+813 to CH 55+053, approx.240m length (Terai) xi. (a)CH 55+478 to CH 55+538, approx.60m length (Kathmandu) (b)CH 55+476 to CH 55+536 approx.60m length (Terai) xii. (a) CH 56+666 to CH 56+716, approx.50m length (Kathmandu) (b)CH 56+664 to CH 56+714 approx.50m length (Terai) xiii. (a)CH 57+119 to CH 57+294, approx.175m length (Kathmandu) (b)CH 57+111 to CH 57+286		

Project Name: Kathmandu-Terai/Madhesh Fast Track(Expressway) Project (KTFT Road)

ICB Contract ID: KTFT/ICB/WORKS/R&B/078/079/03

Contract Package : - 3

Schedule of Price Item No.	Particulars (as per the Schedule of Prices)	Quantity Payment Percentage Corresponding to the Relevant Item of Schedule of Prices	Remarks
	approx.175m length (Terai) **Note:** ***Width of each bridge is 11.8 m as per standard and as per the indicative drawings. The Bridge width may increase at the curved sections for extra widening.** ***The length and height of the Bridges may vary during design as per design requirements.**		

Bidding Document for Procurement of

Construction of Double Lane Dual Carriageway Standard Expressway Road, Bridge and Allied Works

CH 49+800 to CH 57+400

Part II: Requirements

Section 5. Employer's Requirements

ICB Contract ID: KTFT/ICB/WORKS/R&B/078/079/3

Project Name: Kathmandu- Terai/Madhesh Fast Track (Expressway) Road Project

Office Name: Kathmandu- Terai/Madhesh Fast Track (Expressway) Road Project (KTFT)

Office Address: Bhadrakali, Kathmandu, Nepal

Financing Agency: Government of Nepal

Section 6. Works Requirements.

This section comprises the scope of works, design criteria, technical requirements, specifications, supplementary information, construction requirements etc. for the proposed work Contract.

TABLE OF CONTENTS

List of Tables

1 Project Summary

Nepal is a predominantly mountainous country situated between India and China as a landlocked country with limited navigable watercourses, Nepal has to rely mostly on road transport for moving passenger and freight traffic. Road network development is challenging and expensive due to terrain conditions characterized by fragile mountains, often very steep and crossed by numerous rivers of different sizes, hydrological and hydraulic characteristics. This has resulted in slow and inequitable distribution of road lengths across the country. Therefore, road density is low and a number of remote regions in the country disconnected to the national road network.

Government of Nepal (GoN) has allocated funds from its own resources towards the cost of construction of 72.529 kilometers of Kathmandu Terai/Madhesh Fast Track (Expressway) (KTFT). The Nepali Army is the implementing agency on behalf of the GON. The Nepali Army has engaged JV of M/S Yooshin Engineering Corporation, Korea - Korea Expressway Corporation, Korea - Pyunghwa Engineering Consultants Ltd. Korea In Association with Garima International Design Associates Nepal Pvt. Ltd. (GIDAN), Nepal and SITARA Consult Pvt. Ltd, Nepal) as a Design and Supervision Consultant (DSC).

The project road runs along the Bagmati river and Lal Bakaiya river corridor which originates at Sano Kokhana and travels through Naikhandi, Damsintar, Malta, Lanedanda, Ranisera, Rajdamar, Chhatiwan and reaches to Nijgadh where it connects with the Mahendra Highway. The total length of the expressway is 72+529.46 km whereas the existing road length is 246 km via Nijgadh-Hetauda-Narayangadh-Mungling-Kathmandu. This project after completion expects to shorten the travelling distance from Kathmandu to Nijgadh by 173.50 km and save travelling time by more than seven hours.

The GON has declared the KTFT as a national pride project. The expressway is categorized as per the standard of the Asian Highway and is aiming at a high-class connection between Kathmandu and Terai with high traffic volume. The expressway alignment starts from Khokana and ends at Nijgadh. The expressway consists of 4 Lane including 3-4m wide median with 50m to 100m right of way (RoW). Particularly, RoW of Ch. 0+000-9+000 is 50m and RoW of Ch. 9+000-72+529.46 is 100m. This contract starts at Ch. 49+800 and ends at Ch. 57+400

2 PROJECT SITE DESCRIPTION

2.1 General

This contract work starts at Ch. 49+800 (X=615779.6847 Y=3025442.3653) and ends at Ch. 57+400 (X=619868.4511 Y=3020071.6952). The total length of this contract is 7.60 km. This contract area lies in hilly zone with flat terrain. The expressway road alignment passes along Bakaiya river. The expressway alignment crosses Bakaiya river and other minor rivers. Only Bakaiya river is perennial, and all others flow during rainy season only. The expressway road is linked with Hetauda-Dharan-Chatara highway (Ch. 48+000) at Shripur Village with gravel road. The gravel road is approximately one (1) km long and connecting expressway at Rajdamar village near Nepal Army Basecamp. This earthen road is planned as access road to transport construction material from Hetauda to Shripur village and to the project site. The access road is approximately 1 km long with average width 4m. The access road plan is presented in figure below.

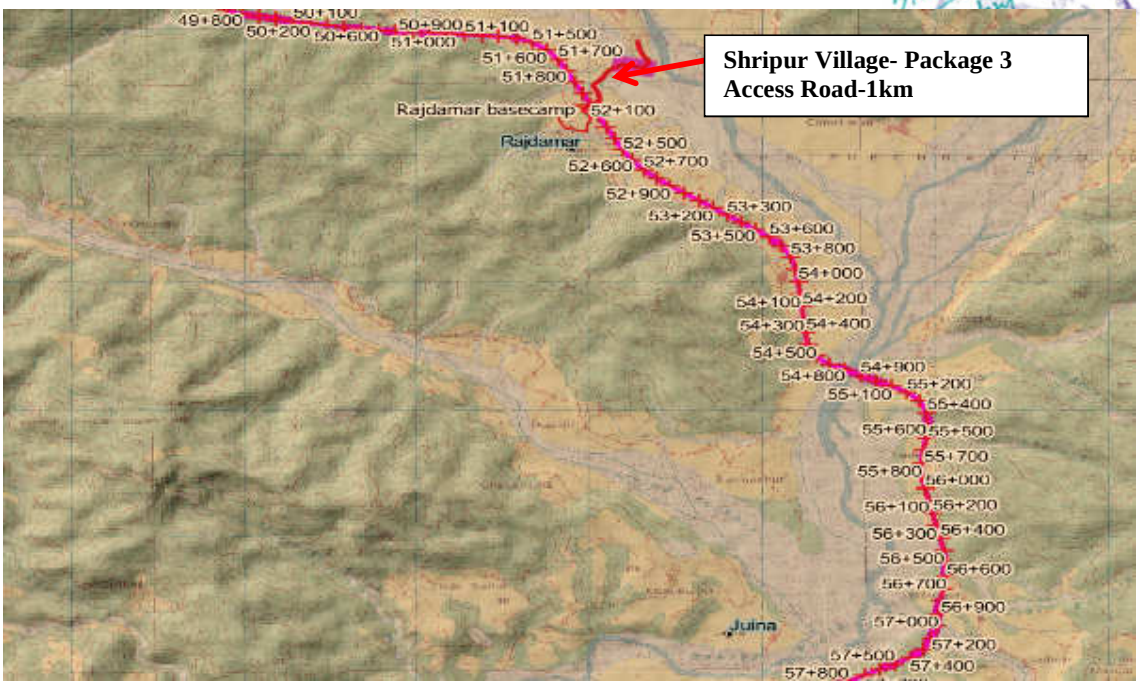


Figure 2-1 : Proposed access road

Permanent and temporary benchmarks (BM) had been established for reference along the expressway alignment to carry out the design and construction survey. A pair of BMs had been established near major bridges for reference. The locations of the BMs are shown in following table.

Table 2-1: Location of Benchmarks

SN	Name	Easting	Northing	Reduced Level	Remarks/Reference
1	_RJ1	617911.6307	3024334.179	295.0315	Near House
2	_RJ2	619058.7338	3023287.774	270.3019	Water tap
3	_RJ3	619082.1992	3023346.058	269.8889	House
4	_RJ4	618680.9428	3023564.239	281.3715	House
5	_RJ5	618223.5106	3024069.935	283.8757	House
6	_RJ6	618063.905	3024141.063	290.0917	Electric pole
7	_RJ7	616976.1508	3024998.76	323.0392	Retaining wall
8	_RJ8	617110.8267	3024985.512	318.2347	Helipad
9	_RJ9	616976.1508	3024998.7600	323.0392	Tree
10	_RJ10	616782.6385	3024935.795	332.9017	Sal tree
11	_RJ11	616531.6246	3025031.192	334.4604	Tree
12	_RJ12	617959.7348	3027192.043	485.1092	Gabion wall
13	_RJ14	617593.3268	3026947.362	478.9176	Tree
14	_RJ15	617467.6256	3027011.182	478.8912	House
15	_RJ17	617786.0981	3024679.261	296.6699	Tree
16	_RJ18	616870.1092	3026579.65	454.6513	Tree
17	_RJ19	617162.363	3026680.7000	465.4827	House

18	_RJ20	616270.015	3025075.575	338.7769	Stone/Tree
19	_RJ21	615995.9986	3025143.396	354.197	Stone/Tree
20	_RJ23	616233.9691	3025573.237	364.2232	Tree
21	_RJ24	615745.837	3025467.675	350.759	Stone
22	_RJ25	615748.9616	3025829.239	359.8105	Stone/Tree
23	_RJ26	616123.2952	3026179.019	391.4564	Stone/Tree
24	_RJ28	616444.9768	3026120.100	409.9664	Electric pole
25	_RJ29	616571.3483	3026120.100	409.9664	House
26	_RJ30	616829.2788	3026145.024	421.601	Transmission line
27	_RJ31	616955.4071	3026238.262	449.818	Electric pole

2.2 Built Structures

The existing structures within the alignment are as follow.

Table 2.2: As built structure details

SN	Description	Chainage	Size/Length (m)	Remarks
1	Box culvert	51+210.84	1x6x5	
2	Single cell pipe culvert	51+095	1.2 dia.	
3	Single cell pipe culvert	51+611	1.2 dia.	
4	Single cell pipe culvert	51+865	1.2 dia.	
5	Single cell pipe culvert	52+100	1.2 dia.	
6	Double cell pipe culvert	54+560	1.2 dia.	
7	Double cell pipe culvert	53+131	1.2 dia.	
8	Side drain	51+116	96	Partially completed (Approximately 40m remaining)
9	Side drain	51+467	460	Left side
10	Toe wall	51+487	245	Left side
11	Side drain	52+007	380	Right side
12	Side drain	52+667	540	Right side
13	Toe wall	52+927	255	Left side
14	Masonry wall	50+599	27.5	Left side
15	Masonry wall	51+146.83	80	Left side
16	Masonry wall	54+509	140	Left side
17	Masonry wall	54+609	50	Left side
18	Masonry wall	54+669	20	Right side
19	Masonry wall	58+710	70	Right side
20	Masonry wall	58+790	100	Right side
21	Masonry wall	58+900	160	Right side
22	RE wall	55+670	340	Both side

In addition, in some section cutting and filling works are completed and meets the formation level. All remaining works to be completed by the contractor as per the Bill of Quantities, schedule of prices and/or instructions of the Engineer.

2.3 Site Clearance:

Site clearance works for Contract Package-3 is almost completed. Site clearance may be required at the virgin areas where no track was opened and to acquire the right of way of the Expressway.

2.4 Existing Features/ Utilities

The following main features/utilities exists along Contract Package-3.

Rivers: Three river watercourses are found across/along contract package-3. Among them Bakaiya river is perennial river with high flow in rainy season and low flow during dry season and remaining two rivers (Boksi and Harda rivers) flow during rainy season only.

Agricultural Land: Approximately 65.5 hector agricultural land are found in contract package- 3 along the expressway alignment.

Village/Settlement: There are five villages along the expressway along the alignment namely Rajdamar, Pawas, Katle-Dovan-Katle khola, Athar Bigaha, Harda-Matokori.

Social, Economic and Cultural Status: Social, economic and cultural status of the area is complex. The villages are living as a mix society along the alignment with different ethnicity, religion, education, occupation and different income level. In total 425 HHs and total population 2257 are living along the alignment with majority of females (51%) and males (49%). Similarly, Tamang (34%), Newar (15%) and Brahmin (14%) are ethnic settlement in the area. Hindus (54%) are ethnic majority in the project site followed by Buddhist (20%) and remaining others. Literacy rate is 87% which is quite good in the project area. Agriculture (23%) and wedge labor (24%) are main occupation of local people in the project area. Main source of income is wedge labor (29%) which is followed by agriculture (28%) and service (15%) and business (14%).

Electricity: The project site is almost electrified.

Water Supply and Sewerage Line: The local government is providing water supply system in the project site. Almost half (>43%) of households had a public tap and around 29% people are dependent on private taps. Remaining are depend on wells, irrigation canal and waterfalls.

Similarly, about 56% of households have good toilet facility and about 11% people have ordinary toilets and 1% people have public toilets and remaining one-third households did not have access to any toilet facility.

Communication facility (Telephone): Good communication facility is available within the project area.

2.5 Construction Materials

The potential sources of construction materials are Lal Khola (river), Bakaiya river and Juina river for this contract work. The required construction material shall be entirely managed and procure by the successful bidder contractor complying environmental and social impacts. The contractor shall have to obtain local authority approval and pay local taxes and royalty as per GoN rules and regulations.

2.6 Environmentally Protected zone / Wildlife Zone

The expressway road area does not pass through any environmentally protected zone.

2.7 Physical Hazard

Medium to low level of physical hazard (flood, earthquake, wind velocity) occurs in contract package-3 zone.

2.8 Disposal of Excavated and /or excess materials

Disposal or tipping sites shall be identified and managed by the contractor during construction period after approval from client considering environmental & social safeguard.

3 Preliminary and General Works

3.1 Scope of Preliminary and General Works

The Contractor during implementation of the contract for the construction of expressway road works, slope protection works, river training works etc. and the design build and construction of the Bridges works (all complete) including slope protection protection shall perform the following works but not limited to:

1. Submission and maintaining of performance security and Advance Payment Security
2. Submission and maintaining of insurance policies
3. Submission of the Contract Management Organization/Organogram
4. Establishment of Contractor's Camp including fencing with all facilities including utility services to all the Contractor's personnel
5. Mobilization of required manpower and equipment
6. Submission of Detailed Work program and schedules
7. Submission of Health and Safety Manual, implementation of H&S system during the contract implementation period
8. Submission of Quality management system (QMS) including Quality Assurance Plan (QAP) and its implementation
9. Submission of Environmental Management Action Plan and its implementation
10. Establishment of Material Testing Laboratory (MTL) including installation of l material testing equipment, accessories and facilities with regular maintenance
11. Fixation of Project Information Board at the project site as per specification
12. Regular maintenance of existing access roads and making of new access roads if required
13. Obtaining necessary statutory approvals from concerned authorities
14. Keeping the workers' camps, lay down area, workshops etc., clean and tidy
15. Pay the workers and provide other facilities as per Country's Laborer Law
16. Making aware the Contractor's workers about the local tax payment requirements
17. Payment of tax and royalties as per prevailing law of the land
18. Submission of Design as required, Shop/working drawing for review and approval before commencement of work
19. Protection of the whole Construction Site during Contract Implementation period
20. Fixing of location of quarry sites and obtaining of approval from the Engineer/the Engineer's representative.
21. Submission of sample of Construction materials as per required frequency for approval before delivery at sites
22. Submission of construction methodologies
23. Conducting test of materials and workmanship as per QMS/QAP
24. Submission of Request for Works for the Engineer's approval before subsequent works are started
25. Obtaining the Engineer's approval for the sub-contractors if any
26. Regular supervision of the Construction works
27. Submission of daily, weekly and monthly progress reports as stipulated in the Contract document
28. Establishment of Communication strategy with all the stakeholders.
29. Participation in progress review meetings with weekly and monthly progress reports
30. Respecting local cultural and social values
31. Proper arrangement of traffic movement and traffic diversion at sites
32. Avoidance of interference with the existing public roads and utility services
33. Submission of training manual prior to start training if applicable
34. Conducting training to the Employer's personnel as per the contract and training manual

35. Submission of as built records for Engineer's review and approval
36. Submission of operation and maintenance (O & M) manual for Engineer's review and approval
37. Submission of Final completion statement and project close-out report
38. Rectification of defects after taking over during Defects Notification Period (DNP)
39. Other as per Employer's requirements and these conditions of Contract

3.2 Specific Requirements for the Preliminary and General Works

The Contractor shall carry out the preliminary and general works for the management and successful completion of the contract works. These works shall confirm to the Specifications, conditions of Contract and the specific requirements provided here below. The details of payable items under the Preliminary and General Works are provided in the Bill of Quantities. Any item not provided in the Bill of Quantities shall be deemed included in the other items of the Bill of Quantities and Schedule of Prices corresponding to the Employer's design works and the Contractor's design works respectively.

3.2.1 Temporary Works

The Contractor's facilities, warehouse, fuel storage area, parking area, access road to construction site, temporary road signs to guide the construction vehicles, and other temporary works required to execute the permanent works is completely the Contractor responsibility. Plan and install enough storage area for material, equipment, utilities and facilities required during construction is the sole responsibility of the Contractor.

Within a reasonable time (and in any case not less than twenty-one (21) calendar days) before he intends to commence construction of any of the Temporary Works the Contractor shall submit full particulars, including drawings, of the same for the approval of the Engineer. The submission to and approval by the Engineer of any such particulars shall not relieve the Contractor of his responsibility for the sufficiency of the Temporary Works or of his other duties and responsibilities under the Contract. The Contractor shall make safe and reinstate all areas affected by Temporary Works when they are removed.

3.2.2 Site Establishment

Site establishment shall be the sole responsibility of the Contractor including providing the water supply, sewage system and Electrification, fire hazard and mitigation measure. The Camp Set out by the contractor shall be spacious for dwelling and parking facilities. The Contractor responsibly shall obtain the related permissions and approval from the Engineer or local bodies to construct the camp.

3.2.2.1 The Contractor's Accommodation

The Contractor shall erect, construct, maintain and subsequently remove all temporary offices, sanitary conveniences, stores, workshops, compounds, parking areas and the like as are necessary to ensure that he is able to execute the Contract efficiently. The sitting and layout of the Contractor's accommodation shall be to the general approval of the Engineer.

No labor camps shall be permitted within the boundaries of the Permanent Works Sites and accordingly the Contractor shall not establish any camp or temporary living accommodation for his staff within or adjacent to the Works Site and shall clear any unauthorized squatters or unofficial camps from the site. All costs of land required for the above Contractor's accommodation, infrastructure & parking area to facilitate construction shall be borne by the Contractor's own costs.

3.2.2.2 Water Supply

The Contractor shall provide at his cost for his own use suitable supplies of potable water for drinking, washing, sanitation and general cleaning in addition to the requirements for the construction, testing and commissioning of the Works and any supplies he may require in

connection with the construction of the Works.

3.2.2.3 Electricity Supply

The Contractor shall install, operate, maintain and pay for electricity at his cost for their use of all offices, stores, laboratories and other temporary buildings used by the Contractor and in addition, he may require electricity for the construction of the Works. If the additional electricity power required for work, the Contractor shall pay all the expenses borne to facilitate more capacity including installation of power, transformer and required accessories etc.

3.2.2.4 Materials Testing Laboratory (MTL) facilities

The Contractor shall have a designated laboratory to carry out testing of all construction materials for quality control and assurance. The Contractor shall have competent technicians in charge of testing required for verifying the compliance of all construction materials as mentioned in Appendix 1: Laboratory Equipments.

3.2.3 Contractor's documents

The Contractor shall prepare and submit for review to the Engineer, the detailed initial/baseline program, methodology of works, inspection and test plan, Quality l Management system, Health and Safety manual and Environment management Plan and other required documents before the commencement of the construction works. The contractor shall submit daily, weekly and monthly progress reports in formats as approved by the Engineer, updated program of work, performance reports etc., during the implementation phase and as built records and drawings, Operation and Maintenance Manual, statement of completion and close out report at the post implementation stage as per the contract.

3.2.3.1 Detailed Program of Works

The initial/baseline program of work shall include necessary investigations, design and construction and the Contractor shall submit the program before commencement of the works. This program shall be in the agreed scheduling method prepared through software and shall include proper logic links between the activities. A soft copy shall be submitted along with other supporting documents for the Engineer's review. Detailed programs shall be submitted during the contract period to macro format versions of the baseline program for review and acceptance by Engineer.

3.2.3.2 Progress Reports and Meetings

The Contractor shall submit to the Engineer within the first week of each month a progress report in a format approved by the Engineer, indicating actual progress at the end of the preceding month, which will form the basis of the Contractor's performance; compared with the Contractor's program for the Works.

At regular intervals as mutually agreed, the Engineer shall arrange meetings in his office or at the Contractor's office or at the Site, as deemed necessary for the purpose of monitoring and appraisal of the Contract performance. Authorized and responsible representatives of the Contractor such as Contractor's Representative / Construction Manager shall attend such meetings.

The Contractor shall arrange monthly for color digital photographs to be taken for showing the progress of the Works as instructed by the Engineer and shall provide the Engineer with one (1) set of prints and a digital copy of each photograph. The prints shall be on matt paper un-mounted and of a size not less than 165mm x 215mm.

The Contractor shall hand-over all prints to the Engineer. The Contractor shall ensure that he will not make any electronic copy or print of the photographs without permission of the Engineer. The Contractor shall also ensure that no unauthorized photography is allowed on site. The Contractor shall allow the Employer and or his personnel to take the photographs on site.

3.2.3.3 Methodology of works

The Contractor shall submit Methodology of works at least seven (07) days prior to commencement of the relevant activity for the Engineer's review and approval. Method statements for temporary and permanent works shall include, but not be limited to:

- Preparatory works if any
- Resources (Manpower and Equipment) required,
- Safety hazards and precautionary measures,
- Quality control measures and critical quality assurance,
- Methodology of works,
- Attachments: Inspection and testing Plan, Task Risk Assessment, Approved Shop Drawing

3.2.3.4 Inspection and Testing Plan (ITP)

Inspection and Testing Plan shall be submitted at least Fourteen (14) days prior to the commencement of the works for the Engineer's review. The ITP includes.

- Schedule of activities,
- Details of Inspection and Tests,
- Inspection or test frequency,
- Inspection or test standards,
- Compliance requirements, etc.

3.2.3.5 Operation and Maintenance Manual

The Contractor shall provide operation and maintenance (O & M) manuals for the operation of bridges if required including structural health monitoring system. The manual shall be reviewed by the Engineer and upon acceptance, shall be the property of the Employer.

The Contractor within 56 (fifty-six) days of commencement date shall submit to the Engineer for review two complete draft sets of Operation and Maintenance Manuals and As-built reports & drawings. The Engineer will assess the suitability of the draft manuals and shall notify within 14 (fourteen) days of receipt of the manuals. The Engineer shall notify the Contractor in writing either on the approval of such manual with or without minor comments or for re-submission of the manual; subject to incorporation of comments and suggestion made by the Employer/the Engineer.

Within fourteen (14) days of receipt of any such comments and/or suggestions, the Contractor shall resubmit the manuals. Submission of the draft manuals and draft as-built drawings shall be a pre-condition to the issue of a Completion Certificate. Following approval to the draft manuals and drawings, the Contractor shall submit five (5) copies with one electronic copy of the final approved manuals to the Engineer.

3.2.3.6 As-Built Records and Drawings

As-built drawings shall cover the works as completed, incorporating all modifications carried out during and after testing at the Contractor's works and all modifications done.

The Contractor shall submit these drawings to the Engineer for review and approval.

The drawings shall be arranged in sets comprising dyeline positive transparencies (on plastic film) and prints bound in albums of approved size. Where drawings have been produced electronically, one (1) original print and a CD copy shall be provided for each drawing in place of transparencies. CD

copies shall be compatible with latest version of AutoCAD.

The record drawings shall be handed over to the Engineer (by delivery to addresses directed) with the following provisions:

- One (1) set to the Engineer comprising two (2) copies of each of the prints
- One (1) set for the Engineer to deliver to the local Operational Staff comprising one (1) transparency and two (2) copies of each of the prints
- One (1) set for retention by the Employer comprising one (1) transparency and one (1) of each of the prints.
- One (1) set to be handed over to NEPALI ARMY, KTFT, fully laminated

The drawings shall be submitted to the Engineer within two (2) months after the issuance of the Contract Completion Certificate. In the event of the Contractor makes any modifications to the Works after submitting the record drawings, the Contractor shall provide amended/modified drawings in the same numbers as stated above.

3.2.4 Contractor's personnel

The Contractor shall employ the minimum key personnel for the design and construction of the proposed works, as outlined as below. The contractor shall be solely responsible for the employment of required number of personnel for timely completion of the contract.

Table 3-1: Contractor's Key Personnel Qualification

S.N.	Position	No.	Minimum Academic Qualification	Total Work Experience [Years]	Experience in Similar Works [years]
For the Contractor's Design (for Design only)					
1.	Bridge Engineer (Design)	3	Master's Degree in Bridge Engineering or Structural Engineering	15	Seven Years of experience in the related field and shall have experience of Design Works of Two Bridges of Minimum 200m Length.
2.	Highway Engineer (Design)	1	Master's Degree in Highway or Transportation Engineering	15	Seven Years of experience in the related field and shall have experience of Design of Highway/Expressway including Inter-change of at least one Highway/Expressway project.
3.	Highway Engineer (Pavement Design)	1	Master's Degree in Highway or Transportation Engineering	15	Seven Years of experience in the related field and shall have experience of Design of Road/Highway/Expressway pavement of at least one Highway/Expressway project.
4.	Geotechnical Engineer	2	Master's Degree in Geotechnical Engineering	15	Five Years of experience in the related field and shall have experience in Geotechnical report of Open and Deep/Pile Foundations for at least one multi span Bridge.
5.	Geologist	1	Master's Degree	15	Five Years of experience in the

S.N.	Position	No.	Minimum Academic Qualification	Total Work Experience [Years]	Experience in Similar Works [years]
			in Geology		related field and shall have experience in geological investigation on slope, highway
6.	Hydrologist	1	Master's Degree in Hydrology/Water Resources	15	Five Years of experience in the related field and shall have experience in Hydrological analysis report of at least one multi span Bridge.
For the Construction of all works					
7.	Project Manger	1	Bachelor's Degree in Civil Engineering	20	Ten years of experience in the related field as a Project Manager or Contract Manager or Equivalent and shall have experience of at least one Road/Highway/Expressway or one bridge with 15m pier Height of 100m length contract.
8.	Deputy Project Manager/Contract Manager	1	Bachelor's Degree in Civil Engineering	15	Seven Years of experience in the related field as a Deputy project Manager or Contract Manager or equivalent and shall have experience of at least one Road/Highway/Expressway or bridge contract.
9.	Quality Manager	1	Bachelor's Degree in Civil Engineering	15	Seven Years of experience in the related field and shall have experience in supervision of at least one Highway/Expressway Project.
10.	Health, Safety and Environment Protection Engineer	1	Bachelor's Degree in Civil Engineering / Environment / Occupational Health and Safety	12	Five Years of experience in the related field and shall have experience in supervision of at least one Highway Project
11.	Highway Engineer (Supervision)	2	Bachelor's Degree in Civil Engineering	12	Five Years of experience in the related field and shall have experience in supervision of at least one Highway/Expressway Project.
12.	Bridge Engineer (Supervision)	1	Master's Degree in Structural Engineering Or Bridge Engineering	15	Seven Years of experience in the related field and shall have experience in Supervision Bridge Works of Highway/Expressway Project.
13.	Geotechnical Engineer	1	Master's Degree in Geotechnical Engineering	15	Five Years of experience in the related field and shall have experience in supervision of

S.N.	Position	No.	Minimum Academic Qualification	Total Work Experience [Years]	Experience in Similar Works [years]
					Slope stability works in at least one Highway/Expressway Project.
14.	Geologist	1	Master's Degree in Geology	15	Five Years of experience in the related field and shall have experience in geological investigation on slope, highway and bridge foundation.

3.2.5 Contractor's equipment

The Contractor shall deploy his/her owned or leased key vehicles/equipment during the construction period as outlined below. The contractor shall be solely responsible for deployment of required equipment for timely completion of the contract. All the equipment provided by the Contractor for the execution of work shall be in working conditions meeting the requirements of Transport Management Law, Nepal and Traffic Rule, Nepal.

Table 3-2: List of Equipment

No.	Equipment (Type and Minimum Capacity)	Quantity Min. (Nos.)	Remarks
1.	Hydraulic Excavator - ≥1.1 cum rock bucket	5	
2.	Loader- ≥3 Cubic Meter	5	
3.	Concrete mixing station (Fully computerized Automatic Batching Plant) Min. production capacity of - ≥60cum/hr	1	
4.	Concrete transit Mixer Truck - >6cum	4	
5.	Mobile Crane - ≥50Ton	2	
6.	Pile Driving/Boring Machine - ≥1.50m diameter with Tremie, Funnel all complete	1	
7.	Dump Trucks/Dumpers - ≥25t capacity	15	
8.	Generator - ≥200KVA	1	
9.	Motor Graders with Blade width≥3.75m	4	
10.	Asphalt Batching Plant≥60Ton/hr Capacity	1	
11.	Asphalt paver Machine with paving width≥3.75m and having Sensor for level control	1	
12.	Pneumatic Roller≥10Ton Capacity	3	
13.	Vibratory Steel Roller≥12Ton Capacity	2	
14.	Water Tanker ≥ 6000liters capacity	2	
15.	Bitumen Distributor≥3000 liters capacity	1	
16.	Concrete Pump Car≥80m^3/hr	1	
17.	Cargo Crane Truck≥80cum/hr capacity	1	
18	Cargo Trolley Truck -≥ 40 Ton-≥ 40 m Long	2	

3.2.6 Environmental Safeguards

The Contractor shall carry out all the construction work satisfying the environmental and social safeguards measures as mentioned in the Table 3-3 for design and preconstruction and construction

stages. The Contractor shall also be responsible to manage and maintain OHS (Occupational Health and Safety) policy and system to safeguard the Environment and Health of the crew working in the project as guided by the OHS manual. The contractor shall also prepare Geohazard Management Plan for Earthquake, Landslide and Ground Deformation, if any.

Table 3-3: Environmental Management Action Plan (EMAP)

Environmental Concern	Objectives	Mitigation Measures Recommended	Timing to Implement Mitigation Measure	Locations to Implement Mitigation Measure	Resp. imp. Mitigation Measure	Resp mon. Mitigation Measure
DESIGN and - PRECONSTRUCTIN STAGE						
1. Social Impacts and Resettlement	To ensure that the adverse impacts due to the property acquisition and resettlement are mitigated according to the RAP.	**To be completed prior to commencement of construction** 1. Social preparation of the APs to be completed prior to commencement of construction. 2. Acquisition of lands completed to minimize the uncertainty of people. 3. Completed implementation of RP and LAS to provide compensation and assistance to the APs. 4. Alternative land is given together with sufficient compensation to enable families to build & move to new houses as preferred. 5. All the payments/entitlements are paid according to the entitlement matrix, which was prepared according to the RP. 6. All the impacts identified by the EIA were incorporated into the RP and relevant entitlements included into the entitlement matrix.	Before the removal of houses and other structures, the APs to be given sufficient time with compensation money and assistance to resettle satisfactorily.	Targeted APs and families according to the CDC. The CDC and The Project Staff will prepare an Inventory of Losses (IOL).	KTFT	KTFT and External Monitors
2. Hydrological Impacts	To minimize hydrological and drainage impacts during construction.	1. Prepare detailed drainage report during DDS. Design of adequate major and minor drainage facilities will be completed and approved by KTFT in the DDS prior to construction. 2. Assess expected hydrologic flow in all areas where it is sensitive, such as for irrigated terraced lands taking into account changes due to climate change as predicted by accredited sources such as OECD. 3. Ensure surface flows are controlled and facilitated through early re-provision of irrigation with appropriate drainage structures in the road base including bridges and culverts. 4. Redistribution of sheet flows to be provided in the design for identified significant impact areas. 5. The main road, bridges and drainage structures over various water bodies in all the river basins (e.g. Bakaiya River) to be designed to maintain pre-project flows and ecological conditions and river water quality. 6. Prepare Drainage Management Plan, to be completed and approved by KTFT in the DDS at least one month	Before the commencement of construction activities/ during detailed designing stage.	Considered locations to be identified in the Detailed Drainage Report.	Contractor	MoDE/KTFT

Environmental Concern	Objectives	Mitigation Measures Recommended	Timing to Implement Mitigation Measure	Locations to Implement Mitigation Measure	Resp. imp. Mitigation Measure	Resp mon. Mitigation Measure
		prior to construction.				
3. Temporary drainage and erosion control	1. Prevent runoff and control erosion.	1. Identify locations for Erosion Control and Temporary Drainage along all earthworks and at all culverts and crossing structures. 2. Agree detailed EC and TD plan with MoD / KTFT cell at least one month prior to construction.	1. During first month after contract is signed but before construction and agree in contract negotiations.	All stream and river crossings and all alignments where slopes indicate erosion will be a problem based on observation.	Contractor	MoD/KTFT
4. Planning construction camps and materials management	To plan to minimize the effect of the work camps on the surrounding environment and residents in the area.	1. Plan sites for worker camps and back up areas for stockpiling materials and equipment in advance. 2. Consult local community and locate to use waste/barren land and nonagricultural plots. 3. Agree use of land before construction commences reconfirmed by the contractor and agreed KTFT at least one month prior to construction.	1. During first month after contract is signed but before construction and agree in contract negotiations.	Locations decided by KTFT in consultation with community and the contractor.	Contractor	MoD/KTFT
5. Planning handling, transportation and storage of construction materials	To minimize contamination of the surroundings (due to implementation of works, asphalt, concrete and aggregates crushing plants)	1. Avoid and or minimize adverse environmental impacts arising out of construction material exploitation in line with MOFE guidelines/ conditions / recommendations. 2. Compile Materials Management Plan one month before commencement of construction and update monthly and include in progress report. 3. Include conditions for selecting borrow sites, timing and use of roads, maintenance of vehicles, selection of sites for material storage, rock blasting and aggregate production, handling hazardous or dangerous materials such as oil, explosives and toxic chemicals.	Update monthly	1. List of borrow areas is to be prepared one month prior to KTFT construction 2. A list of routes of transport of construction material is to be prepared for the contract and agreed one month prior to KTFT construction. 3. A map of locations of storage is prepared by the contractor.	Contractor	MoD /KTFT
6. Spoil disposal	To minimize the environmental impacts arising from generation of spoil waste, reuse where possible and provide adequate disposal options for unsuitable soils.	1. Compile Waste Management Plan. 2. Investigating the environmental conditions of the disposal sites and recommendation of most suitable and safest sites. 3. Investigating whether the waste can be reused in the project or by other interested parties in the vicinity. (landfilling, local road reconstruction, earth berms, amenity planting at intersections – other future public projects. 4. Identify sufficient locations for disposal of best updated estimate.	1. UPDATE Once a month	Spoil Disposal Locations	Contractor	MoD /KTFT
7. Traffic Condition	Plan to minimize disturbance of traffic	1. Avoiding blocking existing roads and other access near the works route during construction. 2. Design provisional Temporary Pedestrian and Traffic	During preconstruction no later than one month after contract award.	Important locations	Contractor	MoD /KTFT

Environmental Concern	Objectives	Mitigation Measures Recommended	Timing to Implement Mitigation Measure	Locations to Implement Mitigation Measure	Resp. imp. Mitigation Measure	Resp mon. Mitigation Measure
		Management Plan for updating by the contractors one month prior to start of works in any given sector.				
8. Protecting wildlife	Avoid impacts on threatened birds and other animals	1. Prevent encroachment into the forests outside the ROW. 2. Do not clear ground vegetation outside the ROW. 3. Enforce a ban poaching in the areas adjacent to the ROW for the duration of construction. 4. Contractor to provide worker canteens with ample alternative supplies of meat and other food sources to avoid the need for poaching in forests. 5. Ban the supply of poached animals to worker canteens for food. 6. Conduct regular spot checks that worker canteens do not serve poached meat	Method statement during contractor selection, prior to contract signing.	Forest Areas	Contractor	MoD /KTFT
CONSTRUCTION STAGE						
1. Orientation for Contractor, and Workers	To ensure that the Contractor, subcontractors and workers understand and have the capacity to ensure that the environmental requirements for mitigation measures are implemented.	1. Conducting special briefing and / or on-site training for the contractors and workers on the environmental requirement of the project. Record attendance and achievement. 2. Conducting special briefing and training for contractor on the environmental requirement of the project. Record attendance and achievement. 3. Agreement on critical areas to be considered and necessary mitigation measures, among all parties who are involved in project activities. 4. Periodic progress review sessions to be conducted every six months	1. Induction for all site agents and above before commencement of work. 2. At early stages of construction for all construction employees as far as reasonably practicable.	All staff members in all categories. Monthly induction until contractors comply / improve	KTFT/Contractor	MoD/KTFT
2. Plans to control environmental and associated impacts	Avoid impacts from unplanned activities by penalizing contractors for not committing to properly planning works.	1. Drainage plan, 2. Temporary pedestrian and traffic management plan, 3. Erosion control and temporary drainage plan, 4. Materials management plan, 5. Waste management plan, 6. Noise and dust control plan, 7. Safety Plan, 8. Agreed Bioengineering and Slope Stabilization plan	Deliverable in final form to KTFT one month before construction commences for any given stretch.	All of KTFT alignment.	Contractor	KTFT/MoD
3. Hydrology Drainage and Irrigation	To ensure the proper hydrology and implementation of drainage for the project and protect irrigation	1. Drainage Management Plan (DMP) to provision proper drainage systems at all construction sites, material exploitation, and storage sites prior to their use. 2. Review the detailed designs for cross-drainage structures provided with the tender and assess and	DMP to be approved by KTFT one month prior to a commencement of construction. Proper timetable prepared in	A list of locations to be provided with the detailed designs.	1. Contractor. (KTFT Cell to actively supervise and enforce. 2. Relevant at all	MoD/KTFT

Environmental Concern	Objectives	Mitigation Measures Recommended	Timing to Implement Mitigation Measure	Locations to Implement Mitigation Measure	Resp. imp. Mitigation Measure	Resp mon. Mitigation Measure
	systems.	agree with KTFT if redesign is required. 3. Review the irrigation systems and irrigation structures potentially affected by construction of the KTFT. 4. Provide and maintain alternative temporary irrigation structures for the construction phase. 5. Re-provision irrigation structures disturbed by construction and agreed with. Appropriate drains will be constructed so that the outfalls of the surface run-off from the carriageway are diverted away from the SRs. 6. Re-provisioned irrigation channels capable to supply all the fields previously supplied with the volume of water supplied before the construction of the KTFT. 7. Measures to ensure that newly installed storm drains and highway drainage systems are periodically cleared to maintain storm water flow.	consideration with the climatic conditions of each area, the different construction activities mentioned here to be guided.		locations in the Drainage Management Plan.	
4. Soil Erosion / Surface Run-off	To prevent adverse water quality impacts due to negligence and ensure unavoidable impacts are managed effectively. To minimize soil and rock erosion due to the construction activities	1. Erosion Control and Temporary Drainage Plan one month before commencement of works. 2. Minimizing the removal of vegetative cover as much as possible and providing for immediate restoration where construction sites have been cleared of such areas. Proper installation of TD and EC before works within 100m of water bodies. 3. Meaningful water quality monitoring up and downstream at all bridges during construction. Rapid reporting and feedback to SC 4. Back-fill should be compacted properly in accordance with design standards and graded to original contours where possible. 5. Cut areas should be treated against flow acceleration while filled areas should be carefully designed to avoid improper drainage. 6. Stockpiles should not be formed within such distances behind excavated or natural slopes that would reduce the stability of the slopes. 7. In the short-term, either temporary or permanent drainage works shall protect all areas susceptible to erosion. 8. Measures shall be taken to prevent ponding of surface water and scouring of slopes. Newly eroded channels shall be backfilled and restored to natural contours. 9. The contractor should arrange to adopt suitable	All times. Dependent on weather forecast monitoring and rainfall because the area can be subject to un-seasonal heavy rain plan before and during construction (cut and fill, land reclamation etc.) while considering the climatic conditions.	1. All locations based on potential problems as advised by authorities review monthly. 2. A List of sensitive areas during construction prepared by the KTFT in consideration with the cut and fill, land reclamation, borrow areas etc. 3. Locations of all culverts, cross structures, and bridges.	1. contractor (KTFT Cell to actively supervise and enforce. 2. Relevant at all locations in the EC and TD Plan.	MoD

Environmental Concern	Objectives	Mitigation Measures Recommended	Timing to Implement Mitigation Measure	Locations to Implement Mitigation Measure	Resp. imp. Mitigation Measure	Resp mon. Mitigation Measure
		measures to minimize soil erosion during the construction period. The contractor should consult the local authorities in the area before deciding on mitigation measures. 10. Surface protection measures such as turf and other bioengineering to be carried out as early as possible. The protection shall be applied in completed portions of surfaces, if such is possible without waiting for the entire section to be completed. 11. Clearing of green surface cover to be minimized during site clearing. 12. Monitor weather and consider of weather conditions when particular construction activities such as cut operations are undertaken. 13. Use of bioengineering / landscaping and slope stabilization early in the construction process as an integrated component of construction activity 14. Erosion Control and Temporary Drainage plan one month before commencement of works.				
5. Water quality	1. To prevent adverse water quality impacts due to negligence and ensure unavoidable impacts are managed effectively. 2. Ensure adverse impacts on water quality caused by construction activities are minimized.	1. Proper construction of TD and EC measures, maintenance and management including training of operators and other workers to avoid pollution of water bodies by the considerate operation of construction machinery and equipment. 2. Storage of lubricants, fuels and other hydrocarbons in self-contained dedicated enclosures >50m away from water bodies. 3. No stockpiles next to water bodies. 4. Proper disposal of solid waste from construction activities & worker camps. 5. Cover construction material and spoil stockpiles with a suitable material to reduce material loss and sedimentation. 6. Stripped surface materials not stored where will disrupt natural drainage. 7. Borrow sites should not be close to sources of drinking water.	Prior to construction, 50m from water bodies Timing will depend on the construction timetable	Relevant locations are construction within 50m of rivers.	Contractor	MoD
6. Water Resources	To minimize impacts on local water supply caused by construction activities are minimized.	1. Availability of water will be assessed to evaluate the impact on community resources. 2. Project water will be obtained without depleting local village supplies. 3. Camps will be located at least 100m away from the	Prior to construction, at all local water supply resources. Timing will depend on the construction	Relevant locations are all local water supply resources and rivers.	Contractor	MoD/KTFT

Environmental Concern	Objectives	Mitigation Measures Recommended	Timing to Implement Mitigation Measure	Locations to Implement Mitigation Measure	Resp. imp. Mitigation Measure	Resp mon. Mitigation Measure
		nearest local settlement. 4. The contractors will be required to maintain close liaison with local communities to ensure that any potential conflicts related to common resource utilization for project purposes are resolved quickly. 5. Guidelines will be established to minimize the wastage of water during construction operations and at campsites.	timetable.			
7. Cut and fill materials management	To reuse cut materials and reduce need for extraction of raw materials.	1. Update and implement Materials Management Plan drafted in preconstruction phase. 2. Contractor to agree in advance storage and disposal sites for surplus with KTFT and the local authorities. 3. Contractor will estimate the construction materials required and make preliminary schedules of works to facilitate the timely production of materials to avoid stockpiling. 4. Suitable cuttings from the project will be crushed and graded and reused to avoid unnecessary extraction of materials in future. 5. Contractor will be informed to produce and update regularly a Materials Management Plan 6. Surplus material should be stockpiled at locations agreed with local authorities for use on other local district or national projects.	Prior to construction. Update monthly.	All KTFT alignment	Contractor	MoD/ KTFT
8. Spoil disposal and construction waste disposal	To minimize the environmental impacts arising from generation of spoil waste, reuse where possible and provide adequate disposal options for unsuitable soils.	1. Implement Waste Management Plan. 2. Confirm conditions and safety of proposed disposal sites. 3. Confirm amounts of surplus rock-based materials that can be reused in the project or by other interested parties for public projects. 4. Confirm sufficient locations in the contract for disposal of best updated estimate. 5. Used oil and lubricants shall be recovered and reused or removed from the site in full compliance with the national and local regulations. 6. Waste oil must not be burned. – Oil and solid waste disposal location to be agreed with KTFT and local authority. 7. Open burning is contrary to good environmental practice and will not be allowed	1. Before construction commences. 2. UPDATE Once a month	Locations approved by KTFT / local authority.	Contractor	MoD/KTFT
9. Noise	To minimize noise level increases and ground	1. Install, maintain and monitor all requisite mitigation as per contract all heavy equipment and machinery shall	Maximum allowable noise levels are 70dB	1. Strong follow up from KTFT Cell required to	Contractor should maintain the	MoD/KTFT

Environmental Concern	Objectives	Mitigation Measures Recommended	Timing to Implement Mitigation Measure	Locations to Implement Mitigation Measure	Resp. imp. Mitigation Measure	Resp mon. Mitigation Measure
	vibrations during construction operations.	be fitted with acoustic insulation. 2. The operation of heavy equipment shall be conducted in daylight hours. 3. Hammer-type pile driving operations shall be avoided during nighttime. 4. Construction equipment, which generates excessive noise, shall be enclosed. Well-maintained haulage trucks will be used with speed controls. 5. Contractor shall take adequate measures to minimize noise nuisance in the vicinity of construction sites by way of adopting available acoustic methods. 6. Contractor may obtain guidelines for noise reduction from ISO/TR11688- 1:1995 (E), which enumerates methods by which air-borne, liquid – borne and structure-borne noise sources may be curtailed with suitable design criteria.	(A) LEQ.	update locations monthly. 2. Potential noise impact locations will be within 100m near all settlements and towns.	accepted standards. KTFT cell will monitor relevant activities.	
10. Air quality	To minimize effectively and avoid complaints due to the airborne particulate matter released to the atmosphere.	1. Control all dusty materials at source. 2. All heavy equipment and machinery shall be fitted to minimize particulate emissions. 3. Stockpiled soil and sand shall be slightly wetted before loading, particularly in windy conditions. 4. Fuel-efficient and well-maintained haulage trucks shall be employed to minimize exhaust emissions. 5. Vehicles transporting soil, sand and other construction materials shall be covered. Limitations to speeds of such vehicles necessary. Transport through densely populated area should be avoided. 6. Spray bare ground areas with water. 7. Concrete and rock crusher activities to be controlled. Plants should be >100m and should be downwind of sensitive receptors such as villages, schools and hospitals) if upwind should be >500m from SRs.	1. Dust control planning will be a line item in the approval of setting up dust producing activities. 2. A schedule of spraying water to be revised monthly	1. A list of locations to be prepared by the Contractor 1 month prior to commencement of construction. 2. Most villages and hamlets are sensitive locations. 3. All concrete plant and any rock crushing plant.	The Contractor should maintain the accepted standards. KTFT will supervise relevant activities.	MoD/KTFT
11. Bitumen usage	Avoid air pollution and traffic obstacles	1. Asphalt hot-mix plants should be >100m and should be downwind of sensitive receptors) if upwind should be >500m from SRs. 2. Bitumen should not be used as fuel. 3. Fuel wood should not be for bitumen heating. 4. Bitumen drums should be stored in a dedicated area, not scattered along the HRRIP road works.	Instruct before works commence and throughout all construction works.	Throughout all KTFT.	Contractor	MoD/KTFT
12. Soil Contamination	Avoid soil contamination	Contractors to instruct and train workforce in the storage and handling of materials and chemicals that can potentially cause soil contamination. Accidentally spills on	Instruct before works commence and throughout all	Throughout all KTFT.	Contractor	MoD/KTFT

Environmental Concern	Objectives	Mitigation Measures Recommended	Timing to Implement Mitigation Measure	Locations to Implement Mitigation Measure	Resp. imp. Mitigation Measure	Resp mon. Mitigation Measure
		open ground including the top 2cm of any contaminated soil shall be disposed of as chemical waste to a disposal site acceptable to the local authority / community.	construction works.			
13. Work Camp Location and Operation	To ensure that the operation of work camps does not adversely affect the surrounding environment and residents in the area.	1. Confirm location of work camps in consultation with KTFT and local authorities. Location subject to approval by the KTFT. If possible, camps shall not be located near settlements or near drinking water supply intakes. 2. Cutting of trees shall be avoided and removal of vegetation shall be minimized. 3. Water and sanitary facilities shall be provided for workers and employees. 4. Solid waste and sewage shall be managed according to the national and local regulations. As a rule, solid waste must not be dumped, buried or burned at or near the project site, but shall be disposed of to the nearest site approved by the local authority. 5. The Contractor shall organize and maintain a waste separation, collection and transport system. Construction camps will be established in areas with adequate natural drainage channels in order to facilitate flow of the treated effluents. 6. Portable lavatories or at least pit latrines will be installed and open defecation shall be discouraged and prevented by keeping lavatory facilities clean at all times. 7. Wastewater effluent from contractors' workshops and equipment washing yards will be passed through gravel/sand beds to remove oil/grease contaminants before discharging it into natural streams. Oil and grease residues shall be stored in drums awaiting disposal in line with the agreed waste management plan. 8. The Contractor shall document that all liquid and solid hazardous and nonhazardous waste are separated, collected and disposed of according to the given requirements and regulations. 9. At the conclusion of the project, all debris and waste shall be removed. All temporary structures, including office buildings, shelters and toilets shall be removed. 10. Exposed areas shall be planted with suitable vegetation. 11. The KTFT Cell shall inspect and report that the camp	UPDATE Once a month	Location Map is prepared by the Contractor in tender/ bid documentation.	Contractor	MoD/KTFT

Environmental Concern	Objectives	Mitigation Measures Recommended	Timing to Implement Mitigation Measure	Locations to Implement Mitigation Measure	Resp. imp. Mitigation Measure	Resp mon. Mitigation Measure
		has been vacated and restored to pre-project conditions as far as is reasonably practicable.				
14. Encroachment, Landscape and Physical Disfiguration	To avoid several negative impacts due to removal of vegetation.	1. Clearing of green surface cover for construction, for borrow or for development, cutting trees and other important vegetation during construction should be minimized. 2. Install bioengineering as soon as practicable after earthworks are completed. 3. Landscaping of intersections and road verges. 4. At conclusion of the project, all debris and waste shall be removed. 5. All temporary structures, including shelters and toilets shall be removed.	During construction of relevant activities	A list of locations for bioengineering will be drawn up by the Contractor 1 month before commencement of work.	Contractor and KTFT	MoD
15. Temporary traffic management.	Avoid community severance and minimize nuisances from works traffic.	1. Contractor should discuss and agree with local bodies and organize temporary means of access to avoid such short-term negative construction impacts on footpaths and tracks from construction works. 2. The Temporary Pedestrian and Traffic Management Plan will be updated as necessary and include 3. Road availability and minimizing interference with pedestrians and traffic. 4. Establishment of acceptable working hours and constraints. 5. Agreement on the time scale and traffic flow/delay requirements. 6. Programming issues including the time of year and available resources. 7. Discussion of the KTFT / inspection/monitoring role. 8. Establishment of complaints management system for duration of the works. 9. Agreement on publicity/public consultation requirements (advance signs and publicity etc.). 10. Installation of traffic warning signs and enforcing traffic regulations during transportation of materials and equipment and machinery. Conditions of roads and bridges to be considered. 11. Conducting awareness programs on safety and proper traffic behavior in densely populated areas near the construction sites. 12. Assigning pedestrian traffic control personnel.	Before commencement of construction activities	TPTMP to cover all roads and paths crossing the KTFT.	Contractor/KTFT	MoD
16. Minimize Impact on Rivers	To ensure that damage to rivers and wet	1. Avoid use of river bed for access roads as far as possible.	During and immediately after construction for 1	The rivers and adjoining tributaries e.g. Bakaiya	Contractor	Independent experienced

Environmental Concern	Objectives	Mitigation Measures Recommended	Timing to Implement Mitigation Measure	Locations to Implement Mitigation Measure	Resp. imp. Mitigation Measure	Resp mon. Mitigation Measure
	ecosystem is minimized during construction.	2. Prevent disposal of wash water, solid waste & discarded packing in rivers. 3. Do not allow washing of vehicles in rivers and tributary streams. 4. Prevent piling up of loose material near rivers. In addition, these materials should not be tipped or stockpiled near rivers or streams or irrigation channels. 5. Remainders from concrete batches should not be dumped but removed with other spoil to avoid seepage to waste bodies. 6. Avoid temporary structures or stockpiling near rivers and irrigation channels. 7. Reestablish condition and water quality after construction.	year.	River) to be restored to pre-project flows and ecological conditions and water quality.		laboratory/KTFT
17. Disease vectors	Minimize health risks due to mosquitoes and other water borne diseases	1. Discourage mosquitoes by reporting and removing any standing water. 2. Temporary and permanent drainage facilities shall be designed to facilitate the rapid removal of surface water from all areas and prevent the accumulation of surface water ponds.	During construction.	All areas of KTFT alignment.	Contractor	KTFT
18. Safety Precautions for Workers	To ensure physical safety of workers	1. Submit Safety Plan one month before commencement of construction. 2. Providing adequate warning signs. 3. Providing every worker with skull guard or hard hat and safety shoes. 4. Establish all relevant safety measures as required by law and good engineering practices. 5. The contractor shall instruct his workers in health and safety matters and require the workers to use the provided safety equipment.	During construction	All areas of KTFT alignment.	Contractor	MoD/KTFT
19. Social Impacts	1. To engage local workforce and community in the KTFT Project. 2. To secure a significantly large proportion of construction labour force locally. 3. To secure a proportion of clerical and service labour	1. Use local labour as far as possible for manual work. 2. Use local educated people for clerical and office work where possible. 3. Encourage monitoring of the project by local village groups. 4. Claims/complaints of the people on construction nuisance/damages close to ROW to be considered and responded to promptly by the Contractor and monitored by KTFT. 5. Quarterly meetings with local bodies for liaison purposes to monitor complaints.	Claims of APs to be solved as soon as possible Necessary evacuations to be done as when necessary	All local bodies. A list of current construction areas to be updated by the Contractor monthly and displayed at local body offices. Special attention to locations of irrigation systems, irrigated terraces and lands damaged due to flood or landslide.	Contractor	MoD/KTFT

Environmental Concern	Objectives	Mitigation Measures Recommended	Timing to Implement Mitigation Measure	Locations to Implement Mitigation Measure	Resp. imp. Mitigation Measure	Resp mon. Mitigation Measure
	force from well-educated local people including women. 4. To encourage local support for the project. 5. To ensure minimum impacts to people living close to the ROW.					

Note: CDC = Compensation Determining Committee. DDS=Detailed Design Stage. MOFE=Ministry of Forestry and Environment, EIA=Environmental Impact Assessment. EMAP= Environmental Management Action Plan = Environmental Management Plan, SPM= Suspended Particulate Matter, KTFT= Kathmandu – Terai/Madhesh (Expressway) Fast Track Road Project. TD = Temporary Drainage. EC = Erosion Control. NGO = non-government organization. AP = Affected Person. RP = Resettlement Plan. LAS = Land Acquisition Survey. IOL = Inventory of Loss. ROW = Right of Way. SR = Sensitive Receiver. SC = Supervision Consultant.

3.2.7 Social Safeguard Measures

The Contractor shall ensure that the following Social Safeguards measures are taken into account and followed; during pricing of Contractor's bid, construction period and during Defect Notification Period; whenever carrying out any rectification works:

3.2.7.1 Public Safety

Undertake other applicable Community and Occupational Health and Safety Measures as per the Environment, Health, Hygiene and Safety guidelines.

When work is to be carried out in public areas such as roads, pedestrian walkways, playgrounds etc., the Contractor shall use barricade tape to prevent entry to such working areas and also erect suitable warning signs for the benefit of public use.

The Contractor's workshops, material storage areas and other working areas shall be fenced off from public. The Contractor should ensure that heavy machinery and material hauling vehicles do not unduly obstruct private accesses, public roads.

If any damages occur to the utility lines / house connections (water supply, electricity, telecom, wastewater lines, etc.) due to the construction works, the Contractor should take immediate actions with relevant service providers to restore such utility lines/house connections.

If any adverse impact occurs to the existing ground water sources (tube wells, shallow wells, etc.) due to project implementation, the Contractor should take immediate necessary actions to rectify the issues.

The Contractor shall make all necessary arrangements to ensure that public in the surrounding areas are not in convenience by dust and noise due to construction work.

The Contractor shall bear the compensation cost of any impact on a structure or land due to negligent movement of machinery during construction or establishment of construction plant, as per standard contract provision.

3.2.7.2 Disturbance to the Livelihood Activities

The Contactor shall make necessary arrangements to provide access for continuing trade/ business or any other livelihood activities. The Contractor shall make necessary alternative arrangements for the vendors (mobile vendors, expressway (highway) vendors, etc.) who will be affected due to the construction works, material storage, construction machinery or equipment mobility. The Contractor shall display proper signboards / directions for the road users such as passengers, vendors and customers.

3.2.7.3 Relevant Labor Laws

The Contractor shall adhere to relevant labor laws of Nepal (meeting minimum wages, equal wages for male and female workers, prevention of child labor, prevention of harassment of women workers etc.), minimize the need for labor camps as far as practically possible by recruiting local labor and maintain health and sanitation within labor camps. The Contractor shall maintain protocol among his work teams and raise awareness on risk taking behaviors for COVID-19 including sexually transmitted diseases.

3.2.7.4 Process of Grievance Redress Mechanism

The Contractor shall follow the process of Grievance Redressing Mechanism. The Contractor shall arrange a proper awareness program to site officers and laborers about the Grievance Redressing Mechanism.

The Contractor shall distribute a Grievance Redressing Mechanism leaflet among the Project Affected Persons (PAPs) and the general public with details of grievance redress procedures.

The Contractor shall establish suggestions boxes in the construction area. The Contractor shall display the relevant contact numbers within the site office: telephone numbers of the Project Management Unit (NEPALI ARMY, KTFT), and other related stakeholders to facilitate contractibility.

3.2.8 Health and Safety

3.2.8.1 Safety Responsibility

The Contractor shall be solely responsible for the safe conduct of the Works. He shall ensure that all operations are carried out safely and that any person he makes responsible for the safe conduct of any part of the operations carries out his duties in a proper manner. The Contractor shall be responsible for "Occupational, Health and Safety Management" with the dedicated team of registered doctor for emergency safety work including 24 hrs at the designated site office with required first aid facilities as well as for further treatment facilities as per prevailing government rules if required.

3.2.8.2 Contractor's Safety Procedures

Before commencing work on any site, the Contractor shall prepare a site safety plan for that site for approval by the Engineer. The Contractor and all persons engaged on work for this Contract shall be required to comply with the safety plan. A copy of the safety plan shall be supplied to the Contractor's Representative at that site, and it shall be the Contractor's Representative's responsibility to ensure that all persons under his control read and follow the safety plan.

The Contractor shall also institute a safety-training program on site upon commencing work to train all the workers in environmental, health and safety matters, including accident prevention, safe equipment handling practices in accordance with labor laws and their maintenance and upkeep.

Detailed procedures and plans of action shall be laid out to combat emergency situations, including the location and proper use of the emergency equipment, procedures for raising alarm and proper response actions for each foreseeable emergency situation. The Contractor shall ensure that all personnel working on the site use PPE, including enclosed footwear, and protective headgear, and where appropriate protective goggles, gloves, steel-capped boots and such other items.

The Contractor shall institute safety procedures for work in confined spaces as follows:

Checking all confined spaces (such as, tanks, sumps, vessels, sewers, excavations) for toxic, flammable or explosive gases, or lack of oxygen, and ventilation of these spaces as required before entry and during occupancy. The Contractor shall ensure of adequate ventilation systems or air-supplied respirators for work in underground and confined work areas. The Contractor shall station of observers or assistants outside of confined spaces to watch over the safety of personnel working inside these areas.

3.2.8.3 Fire Hazard (Naked Lights)

No naked light, wire/cable shall be used by the Contractor on or about the Site and in the open air without the permission of the Engineer. If it requires to do so as per site condition then written instruction should get from client electrical engineer and have to use the naked light, wire/cables and by using this it may cause a fire hazard, and the Contractor shall take such additional precautions and provide such additional fire-fighting equipment (including breathing apparatus) with contractor own cost. The term "naked light" shall be deemed to include electric arcs and oxy-acetylene, or other flames used in welding or cutting metals

3.2.8.4 Work in the Vicinity of Electrical Equipment

Any permanent fencing or other safeguards required to be erected around electrical equipment shall be completed as far as practicable before connection is made to the electricity supply, but where this is not practicable the Engineer may permit the use of temporary fencing or other safeguards.

If work in the vicinity of electrical equipment is to be carried out after connection has been made to the electricity supply the Contractor shall put into operation a "Permit to Work" system to the approval of the Engineer.

3.2.8.5 Portable Electrical Equipment

Any person using portable electric tools or equipment is classified as a "Duty Holder" and must therefore be "Competent" and appointed in writing. All handheld portable tools must operate at a voltage not exceeding 220 volts AC and the source of the voltage must be center tapped to earth. This does not apply to domestic cleaners etc. and to Class 2 domestic appliances, and approved test equipment.

All hand lamps must operate at a voltage not exceeding 220 volts AC between conductors and be fed from a circuit which is isolated from the supply mains and from earth by means such as an isolating transformer. Before any new portable electric tool is put into service, it must be examined, tested and certified safe for use by an authorized person. This includes any equipment that may be hired by the Contractor from a specialized tool hire company.

Where portable electric tools remain on site for an extended period, they must be inspected on each occasion before use, and they must be tested and marked accordingly at no more than three monthly intervals. Prior notice shall be given of the intention to use transportable equipment on supplies exceeding 220 volts and the use of such equipment shall be at the discretion of the Employer.

Only electrically trained personnel shall install temporary generators for supplying fixed or temporary installations. Electrical welding equipment shall not be connected to the site electricity supply and the Contractor shall provide all of the necessary portable generating equipment as may be required to carry out such electrical welding for the Works.

3.2.8.6 Electrical/ Mechanical Test Equipment

All test equipment used by the Contractor at the Contract Works Site to test the electrical and mechanical work shall be such that the use of the equipment shall not endanger the life of those using the equipment, and the test equipment shall be provided with clear instructions for the safe usage of such test equipment on or near to electrical systems, equipment and conductors.

3.2.8.7 Accident Reporting

All accidents shall be notified to the Engineer as soon as possible after their occurrence. The Contractor shall maintain a daily record for the Health and Safety provision for Pan

3.2.8.8 Construction Safety Standards

The Contractor shall carry out all construction installation and commissioning activities in accordance with good safe working practices. In particular, the Contractor shall comply with the requirements of the Specification and the relevant Nepal Standards/ equivalent other standards as per conditions of contract and employer's requirements.

3.2.8.9 COVID-19 Safety Standards

The contractor shall be solely responsible for safety management to avoid COVID-19 as per government protocol. The contractor shall also be responsible for management of safety kits such as PPE, face masks and sanitizer etc.

3.2.9 Quality Management System

The Contractor shall ensure that all actions/activities are taken to build with quality assurance (QA) in the planning, management and execution of works the quality assurance shall cover all stages of work such as setting out, selection of materials, selection of construction methods, selection of equipment and plant, employment of personnel and supervisory staff, quality control testing, etc.

The QA program shall cover not limited to followings:

- Organization and management responsibility
- Document and data control
- Construction program
- Method statement
- Process control
- Working Inspection, Testing and documentary procedures
- Arrangement for smooth safe traffic flow during construction and maintenance
- Control and documentation of purchasing and handling of materials
- Maintenance of records for non- conformity and timely corrective actions
- Internal quality audit
- Training to staff
- Environment Management Action Plan (EMAP)

The Contractor shall submit evidence that the Equipment to be supplied from outside Nepal will be designed, manufactured and delivered to the requirements of ISO 9002 -Quality Systems - Model for Quality Assurance in Production, Installation and Servicing (or ISO 9001), and in accordance with the Employer's Requirements, including Schedules.

This evidence shall be in the form of the following:

A certificate issued by an independent, internationally recognized Third Party Accreditation Agency that the proposed manufacturer of the equipment and materials operates quality assurance systems, which conform to the requirements of ISO 9001 or 9002. The certificate shall clearly show the name of the certifying agency, the certificate number and the products or facilities certified. To be accepted as an internationally recognized independent third-party accreditation agency, the agency must have performed accreditation work of a similar nature in a minimum of two countries. As evidence of this, copies of relevant certificates issued by the agency or a statement from the agency or from an ISO Member Body, showing how the agency meets this criterion shall be provided.

The Quality Plan shall include the following as appropriate:

- Design of equipment necessary for execution of the Contract.
- Procurement of equipment, components and raw material.
- Calibration of test equipment.
- Sampling, destructive/non-destructive testing, frequencies of sampling and testing.
- Inspection procedures; rectification of non-conformities.
- Record systems.
- Inventory control, packing.
- Proposed production, transportation, delivery and installation program.

3.2.9.1 Quality Control

The Contractor shall develop an Inspection and Test Plan for all construction activities and submit to the Engineer for approval before commencement of the construction including material inspection

and re-inspection applied to the subject of engineering, calibration of measuring and testing equipment, storage of materials, identification and traceability of materials, control of construction process, reporting and processing of unqualified products, quality training, etc.

The contractor shall have its own system for quality assurance to demonstrate compliance with the requirements of the Contract. It is up to the Contractor to demonstrate that he has complied with the Specifications – the Engineer is entitled to audit any aspect of the system. Contractor shall submit procedure and compliance documents to the Consultant for information before each section of the work is commenced.

Nevertheless, the Engineer is entitled to audit any part of the Contractor's work. Audit means to witness, oversight or verify whatever the Contractor is doing, and examine any of the Contractor's records. Also, per Specification Section 503, the Engineer's staff can examine, inspect, measure and test the materials and workmanship. The Engineer will use his forms to undertake and record these tasks. The Contractor is required to give notice to the Engineer whenever any work is to be covered up – after which the Engineer may examine, inspect, measure or test without unreasonable delay.

3.2.9.2 Sampling and testing of Materials

The Contractor shall submit to the Engineer as he may require samples of all materials and goods, which he proposes to use or employ in or for the Works. Such samples, if approved, shall be retained by the Engineer and no materials or goods of which samples have been submitted, shall be used in the permanent Works unless and until such samples shall have been approved in writing by the Engineer.

It shall be the Contractor's responsibility to ascertain from the Engineer which materials and articles are required for testing, and to ensure that they are submitted, sufficiently far in advance as to avoid delay in the Works.

The routine monitoring of aggregates, cement, steel, etc., site quality control, and specimen and sample manufacture and curing has to be ensured by contractor. Prior to concreting, slump test should be done and if failing, concrete will be rejected. Sufficient cubes should be cast for testing at 7 days, 28 days; and to be retained for future use as stipulated by The Engineer.

When ready mix concrete is used it has to be from a reputed manufacturer approved by the Engineer. The ready-mix plant should have automation for ensuring the use of designed mixes, recording and printing, and should have the facility for testing aggregates, moisture content cube testing and competence for doing mixed designs. All test certificates and records/ printouts from the plant shall be made available to the Engineer.

All costs for testing and getting items transported to laboratory and for obtaining test certificates shall be borne by the Contractor. In addition, the Contractor shall be responsible for transporting samples for testing from sites to the laboratories. The Contractor shall assign competent technicians to work in the laboratory under the direction of the Engineer.

3.2.10 Other General Requirements

3.2.10.1 Working Hours/Night work

Site working hours shall be 42 hrs within a week. Working apart from these hours shall only be carried out by prior arrangement and consent of the Engineer.

3.2.10.2 Site Land for Construction

The Employer shall give the Contractor possession of the area of the Permanent Works and such other areas shown on the bidding document drawings as being available for the Contractor's use.

Such possession may not be exclusive to the Contractor. The Contractor shall make his own arrangements for any other land required by him. The Contractor shall not use the Site for any purpose other than for carrying out the work required under this Contract.

3.2.10.3 Access to the Site

The Employer shall provide the service track to the Contractor for the implementation at the beginning /of the construction work. But the required maintenance and operation of the service track is the responsibility of the Contractor including the widening of service track as and when required.

The Contractor shall arrange for, construct, maintain and afterwards hand over to the Employer on completion of the Contract (or, if directed by the Engineer remove and reinstate) any temporary access required for and in connection with the execution of the Works. Reinstatement shall include restoring the area of the access route to at least to the degree of safety, stability and drainage that prevailed before the Contractor entered the Site. Where operations are carried out on securely fenced lands/ premises belonging to or under the control of the Employer, the Contractor shall ensure that the Employer's current security regulations are maintained. The Contractor shall ensure that all workers leave the site on conclusion of their duties each day.

3.2.10.4 Site to be Kept Tidy

Throughout the progress of his work, the Contractor shall keep the Site and all working areas in a tidy and worker like condition and free from rubbish and waste materials. Any Temporary Works, Constructional equipment, materials or other things which for the time being are not required for use by the Contractor may with the consent of the Engineer be removed from the site to an approved location, but otherwise shall be properly and securely kept/ parked within the site subject to the consent of the Engineer.

3.2.10.5 Permit to Work System

The Employer may operate a Permit to Work system which the Contractor shall comply with throughout the Contract. Any part of the site that is designated by the Employer as a 'Restricted Working Area' may not be entered without a 'Permit to Work'.

The Contractor shall not allow any of his employees or sub-contractors to enter such an area until a permit has been issued. When the Contractor requires such a permit he shall give seven (7) days' notice to the Engineer, who shall arrange for one to be issued. When the Contractor receives such a permit he shall comply with any precautionary requirements that may be specified in it and shall hold the permit until the end of the period covered and then return it to the Issuing Officer.

Compliance with the requirements of the permit shall not absolve the Contractor from any responsibilities under this Contract. Where the equipment in the restricted area can be put entirely out of use one permit shall usually cover the whole continuous period that the Contractor requires, but otherwise a new permit will be required each day.

Prior to carrying out any excavation work the Contractor shall apprise the Engineer of the proposed location of the excavation and shall confirm that the positions of all known services affecting the proposed excavation have been noted. In addition, the Contractor shall carry out a sweep with an approved detector and shall mark all known services on the ground. Excavation shall not commence without a "Permit to Excavate" issued by the Engineer.

3.2.10.6 Transport, Delivery and Storage of Equipment

The Contractor shall be responsible for making all arrangements necessary for the transportation of equipment to site, including investigation of the route for bridge clearances, loading limitations and the like. The Contractor shall ensure that all assemblies and sub-assemblies delivered to the site are of size and weight suitable for access to the place of installation/usage.

The Contractor shall provide all labor and lifting facilities for off-loading of equipment at site. No delivery shall be made without the prior permission of the Engineer, which must be sought in writing at least seven (7) days before the intended delivery date. Delivery shall normally be to the designated storage area on site, or may be directed to the point of erection with the agreement of the Engineer.

The Contractor shall be responsible for reception at the designated storage area, offloading including all verification that equipment delivered conforms to delivery inventories, ensuring that stored equipment is adequately protected against deterioration from any cause and subsequent removal from the storage area and offloading at the point of erection including all transport.

It is the sole responsibility of the Contractor to maintain protection of the construction equipment until Completion Certificate has been issued. The Contractor shall, at his own expense, provide for storage of all construction equipment brought to the site for the purposes of the Contract and its adequate protection and preservation against loss, deterioration or damage however to be caused, both at his works and on site, where it is required for his approved erection program, his convenience or the requirements of the overall contract program.

3.2.10.7 Redundant Equipment

Redundant equipment removed during the Works shall remain the property of the Employer and shall be moved by the Contractor to a storage area to be allocated on the site.

3.2.10.8 Reinstatement of Roads

Where the Works involve construction in or across public roads, the Contractor shall undertake, at his own cost, the temporary and permanent reinstatement of all such roads affected. The temporary and permanent reinstatement shall be in accordance with the specifications and requirements of the Department of Road (DoR) Nepal or other related authority responsible or concerned.

3.2.10.9 Liaison with Others

The Contractor shall be responsible for liaison with all relevant authorities including but not limited to Nepali Army, other related authorities, local municipalities and ministries and for obtaining all approvals and consents necessary for executing the Works. The Contractor shall, in consultation with the Engineer, arrange his construction program so as to minimize inconvenience to the Employer, other government departments, other contractors and the public.

3.2.10.10 Amenities to be preserved

The Contractor shall cause the least possible interference with existing amenities and facilities, whether natural or manmade. No trees shall be felled except as authorized by the Employer and clearance of the Site shall generally be kept to the minimum necessary for the Works and Temporary Works. Before starting work on any site, the Contractor shall divert around the perimeter of the site any minor watercourses crossing the site which are necessary for the continuation of agriculture outsides the boundaries of the site.

The Contractor shall at all times ensure that he does not cause any damage to or pollution of any existing installations and he shall take positive steps to minimize any inconvenience to the inhabitants of local communities. He shall at all times respect local traditions, religious sites and periods and the life style of the people, and shall deal promptly with any complaints by owners or occupiers.

3.2.10.11 Hoarding Board

The Contractor shall not, except with the written authority of the Employer, exhibit or permit to be exhibited on the site any hoarding board. The content and form of any such advertisement may also be subject to the approval of the Employer before it is put up and it shall be removed if the Employer so instructs.

3.2.10.12 Works to be kept Clear of Water

The Contractor shall keep the works well drained until the Engineer certifies that the whole of the Works is substantially complete and shall ensure that so far as is practicable all work is carried out in the dry. Excavated areas shall be kept well drained and free from standing water.

The Contractor shall construct, operate and maintain all temporary dams/caissons, watercourses and other works of all kinds, including pumping and well-point dewatering plant, which may be necessary to exclude water from the Works while construction is in progress. Such temporary works and plant shall not be removed without the approval of the Engineer.

Notwithstanding any approval by the Engineer of the Contractor's arrangements for the exclusion of water, the Contractor shall be responsible for the sufficiency thereof and for keeping the Works safe at all times particularly during any floods and for making good at his own expense any damage to the Works including any that may be attributable to floods. Any loss of production or additional costs of any kind that may result from flooding shall be at the Contractor's own risk.

3.2.10.13 Disposal of excess materials

Disposal of excavated material shall strictly follow the guidelines mentioned in the document and shall be dumped at designated locations following approved disposal management plan as per specifications and Engineer's instructions/ approval. The Environmental policy measures and guidelines shall be strictly adhered to in the excavated material deposal.

The excavated material from the Construction work (in excess of the used in the site) shall be the property of the Employer. Excess excavated material shall be transported up to the required destinations as per the directions of the Employer and in compliance with the environmental and safety regulations. The Contractor shall pay attention to maintain the sanctity of the historical importance places, with due honor of local traditions, customs, rites, rituals and best practices.

Excess material and waste generated during construction shall be managed and disposed in accordance with relevant local laws and regulations of Government of Nepal.

3.2.10.14 Utility Services for Work

Temporary power supply and other utility services for the construction work shall be the responsibility of the Contractor. The Contractor shall install power transformer and required accessories if required by own cost.

3.2.10.15 Interference with other contractors

The Contractor shall closely liaise with the Engineer to ascertain new construction development activities in the vicinity, which could affect the work carried out under this Contract. The Contractor shall co-operate and shall not interfere unnecessarily the other contractors' work.

3.2.10.16 Public Utility

During execution of temporary and permanent works, the Contractor shall pay attention on existing public utilities such as water sources, electricity power lines, telephone, TV cable, drainages etc. The contractor shall be responsible for the keeping safe and restoration of the public utilities if damaged during the execution of the work.

3.2.10.17 Quarry Materials

The management of local construction material source for the construction shall be the responsibility of the Contractor. The Employer shall not be responsible for facilitation and quarry site management works.

3.2.10.18 Assistance to the Employer and Employer's Personnel

The Contractor shall provide every assistance to the Employer and Employer's Personnel in carrying

out their duties and shall provide a sufficient supply of measuring tapes, hammers, ranging rods, survey books, pegs, poles, paint, lines, tools, instruments, spirit levels and other materials, meters, gauges and small tools for testing and checking and setting out tolerances of the Works and the erection testing, commissioning and maintenance of the Works.

The Contractor shall also provide for the Employer and his staff such waterproof clothing, safety jackets and helmets, rubber boots, torches and the like as may reasonably be required by them. These articles shall remain the property of the Contractor, and they shall be repaired or replaced by him as necessitated by fair wear and tear.

3.2.10.19 Insurance Policies

The Contractor shall effect and maintain Contractor's All Risk (CAR) policy covering all construction related risks.

3.2.10.20 Facilities for Site office & Camp

Site office & Camp shall be established for the contractor's site office & Engineer's staff at the locations in 3000 sq. feet. and approved by the Engineer at the time of mobilization.

The Contractor shall provide, furnish, equip and maintain, for the required period, site offices for the sole use of the Technical staff of both parties and also Engineer's resident site staff. The offices shall be located adjacent to the Contractor's site offices & camp, and the Contractor shall make available to the Engineer all services provided for his own offices including road access, fencing, hard standing, water, power, telephone and sewerage, subject to the provisions of this section of the Specifications. If Contractor requires for his purposes subsidiary offices (which may be moved and re-located during the contract) close to construction activities, he will provide suitable subsidiary offices for the Engineer. 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 / 2 Flat. Each site office shall have an internal area of at least 50 m2, a ceiling height of at least 3 m and shall have at least, 2 office rooms, kitchen, lobby and 2 toilets. The layout of the site office and the sizes of the individual rooms shall be agreed upon between the Engineer and the Contractor. The Contractor shall submit proposals for the site office within 14 days of the issue of the Notice to Commence.

Each office room shall be weather proof, shall have a floor that is at least 150 mm above the ground, and shall be provided with a ceiling and a lining to the walls, or equivalent insulation, with an acceptable type of door with a secure lock, and two opening windows of glazed area at least 15% of the floor area. Each office room shall be well ventilated and shall be so insulated as to provide comfortable working conditions.

The window frames shall be close fitting and protected by fly screens. Sunblind's shall be provided. A continuous supply of cold water under adequate pressure shall be maintained, either from the public supply or from another source of equivalent standard and shall have drinking water quality. If water has to be provided by tankers to the site office, 2 (two) storage tanks (1 ground tank of 2 m3 and 1 roof tank of 1 m3 capacity including booster pump) shall be provided and connected to the piping of the site office. A suitable drainage system with septic tank or otherwise shall be provided.

Each site office shall be provided with electric fans, air conditions, heating facilities and fluorescent lighting and shall have at least 3 no. 13 Amp power sockets in all office rooms. The contractor shall provide and maintain a not less than 5 kVA working conditioned backup generator. The generator shall not make noise more than 85 decibels (dB).

Each site office shall have a telephone connected to the public system and broadband internet. The telephone and internet shall be available for use by the user at all times. The site office shall be fully furnished to the satisfaction and approval by the Engineer.

The Contractor shall provide the office logistic as required and as instructed by engineer i.e. Laptop, computer, printer and photocopy, etc.

Each building shall be ready for occupying and all the equipment provided within 14 days after Commencement of Works.

Each site office and equipment shall become the property of the Contractor upon completion of the Contract and shall be removed from the Site.

The Contractor shall supply and erect, at approved locations, name boards in Nepali and English approved by the Engineer, giving a description of the Project as well as names and titles of the Employer, Engineer and Contractor as ordered or as shown on the Drawings. The Contractor shall keep the name boards in good repair for the duration of the Contract and shall remove them on completion of the Contract.

Services to the Engineer

The Contractor shall be responsible for the proper maintenance of the above listed offices during the Contract period. He shall keep the offices and toilets clean and shall provide cleaning staff for this purpose throughout the Contract period.

The Contractor shall regularly, and when required, clean, repair, and maintain the Contractor's site office & camp, shall carry out emptying of the septic tanks and supply water to the water tanks.

The Contractor shall pay all electricity, water and telephone charges, relating to the Contractor's site office & camp, including connection and disconnection fees and rental charges.

The Facilities for the Contractor's site office & camp shall provide, maintain, operate, use of skill & non-skill workers and all complete work through contractor and the cost has been included in BoQ.

4 The Employer's Design Works

4.1 Scope

The construction of Expressway Road, Service Road, Drain, Cross Drainage, Vehicle Under Pass (VUP), Pedestrian Under Pass (PUP), Slope Protection, River Training, Bio-Engineering, Electrical work including optical fiber and other associated works (designated as the Employer's Design Works) shall be carried out and based on the drawings and specifications. The detailed scope of these Employer's Design Works consists of, but not limited to the following works:

1. Construction of Expressway Road: Approx. 6.295 km asphalt concrete road in between Ch. 49+800 and 57+400 excluding and bridges.
2. Number of carriageway=2, Lane width=2x2x3.75m, Shoulder width 3.0m both side and median width 3-4m;
3. Concrete Road kerbs.
4. Road furniture: Road markings, road signs, Km posts, Metallic guard rails, delineators etc.
5. Drainage works: Masonry or Concrete side drains, spillways and RCC culverts
6. Retaining structures: Masonry or concrete retaining walls
7. Utility works: Street lighting, optical fiber ducts, road crossing future ducts, substations etc.
8. Slope protection works: Rock bolting, rock anchoring, soil nailing, Bio-engineering, etc.
9. Fencing: Chain link fence with gates
10. Vehicle underpass (VUP) and passenger under pass (PUP) etc.
11. Earthwork in excavation for road subgrade, structures, drainage works, box culverts etc.

including disposal of excess material

12. Earthwork in filling for road embankment, median, structural filling etc.
13. Clearing site: removal of trees, bushes, rocks, etc.
14. River Training Works
15. Others as per Bill of Quantities (BOQ) and required as per the Contractual provisions.

Detailed quantities of above works are provided in Bill of Quantities.

4.2 Specific Requirements of The Employer's Design Works

The Contractor shall carry out the Employer's Design works, such as Expressway Road, Slope Protection, River Training, and associated Works in accordance with design, drawings and specification provided by the Employer. The detailed quantities of these works are provided in the Bill of Quantities (BOQ).

The requirement specified in Preliminary and General Works shall be applicable to these works in addition to the following specific requirements.

4.2.1 Construction Drawings

The Employer shall supply the construction drawings to the contractor within reasonable time before the commencement of the works. The Contractor shall prepare and submit working drawings/shop drawing for the Engineer's review and approval. The working drawings shall be prepared based on the Construction Drawings provided by the Employer. No works shall commence without the approved working drawings.

4.2.2 Contract Price

The Contract Price shall be agreed or determined by Evaluation and subject to adjustment as per the Contract.

4.2.3 Measurement and payment

The Employer shall make payment to the Contractor in accordance with the measured quantities of work done and their respective unit rate as per the Contract Agreement.

5 The Contractor's Design works

5.1 Scope

The design & Build/Construct consists of Bridges and associated works (designated as the Contractor's Design Works) including of planning, topographical surveying, geological, geophysical & geotechnical investigation, hydrological study, preliminary and detail design and approval, construction and 5 years defects liabilities period for specified works. The scope also covers the works associated with the slope stabilization, bioengineering, pier and abutment protection etc. The detailed scope of the Contractor's Design Works is shall be listed as below but not limited to.

5.1.1 Bridge Works

The design and build work for the Bridges comprises, but not limited the following:

1. Desk study, detail survey, site pre-investigation, inventory survey etc.
2. Site preparation / surface preparation i.e. levelling, trimming removal of boulders and other structure if any all complete.
3. Geotechnical investigation as per IRC Code of each foundation and detailed design of bridges, and associated works including hydrological analysis and modelling.
4. Earthwork in excavation for Bridges foundations, etc. including disposal of excess material.
5. Earthwork in filling for bridge embankment, structural filling.
6. Construction of 23 Nos. of Bridges comprising at least as per the following design:

a. PSC Girder deck, rigid frame, rahmen, side rails etc.

b. RC Piers, abutments with 8 meter long(minimum) return walls, wing walls etc. with deep foundations and foundation protection.

c. 6m long 500mm thick Approach slabs at both approaches of the bridges and including crash barriers at both sides of the bridges.

d. Bearings, Expansion joints etc.

7. Painting of exposed concrete surfaces using two coats of suitable epoxy painting over suitable primer and waterproofing
8. Traffic signs, road marking, cat eyes and informative signs
9. Utility works: Street lighting work & cabling, optical fiber ducts etc.
10. Slope protection works for bridge approaches and abutments, turfing, stone riprap, etc. up to the approach slab end point.

Table 5-1: Details of bridge location and size, excluding Approach Slabs

S.N.	Bridge Number	Chainage	Length (m)	Description
1	BR. CP3-01-a	49+880 to 50+120 (Kathmandu)	240; 6@40	PSC girder bridge
2	BR. CP3-01-b	49+890 to 50+130 (Terai)	240; 6@40	PSC girder bridge
3	BR. CP3-02-a	50+205 to 50+285 (Kathmandu)	80; 2@40	PSC girder bridge
4	BR. CP3-02-b	50+215 to 50+295 (Terai)	80; 2@40	PSC girder bridge
5	BR. CP3-03-a	50+440 to 50+560 (Kathmandu)	120; 3@40	PSC girder bridge
6	BR. CP3-03-b	50+450 to 50+570 (Terai)	120; 3@40	PSC girder bridge
7	BR. CP3-04-a	50+684to 50+789 (Kathmandu)	105; 3@35	PSC girder bridge
8	BR. CP3-04-b	50+695 to 50+800 (Terai)	105; 3@35	PSC girder bridge
9	BR. CP3-05-a	50+879 to 50+939 (Kathmandu)	60;2@30	PSC girder bridge
10	BR. CP3-05-b	50+890 to 50+950 (Terai)	60;2@30	PSC girder bridge
11	BR. CP3-06	51+425 to 51+440	15	Rigid frame bridge
12	BR. CP3-07	51+980 to 52+00	20	Rigid frame bridge
13	BR. CP3-08	52+464 to 52+484	20	Rigid frame bridge
14	BR. CP3-09	52+658 to 52+678	20	Rigid frame bridge
15	BR. CP3-10	53+250 to 53+270	20	Rigid frame bridge
16	BR. CP3-11-a	54+799 to 55+039 (Kathmandu)	240; 6@40	PSC girder bridge
17	BR. CP3-11-b	54+813 to 55+013 (Terai)	240; 6@40	PSC girder bridge
18	BR. CP3-12-a	55+476 to 55+536 (Kathmandu)	60; 2@30	PSC girder bridge
19	BR. CP3-12-b	55+476 to 55+536 (Terai)	60; 2@30	PSC girder bridge

20	BR. CP3-13-a	56+666 to 56+716 (Kathmandu)	50; 2@25	PSC girder bridge
21	BR. CP3-13-b	56+664 to 56+714 (Terai)	50; 2@25	PSC girder bridge
22	BR. CP3-14-a	57+119 to 57+294 (Kathmandu)	175;5@35	PSC girder bridge
23	BR. CP3-14-b	57+111 to 57+286 (Terai)	175;5@35	PSC girder bridge

Note: 1. If the length of the bridges decreases from the proposed length, the price of the bridges shall be reduced in the proportion to the reducedquoted price, but no extra payment shall be made for the increased bridge length to any extent during the design and construction
2. The conceptual drawing and plan arrangement is included in Volume IV: Reference Drawings.

5.2 Specific Requirements for the Contractor's Design Works

The Contractor shall design the Bridges Works and prepare the respective drawings as per the Employer's Requirements. The Contractor shall conduct necessary survey, detailed investigation and Hydrological survey, study, and design in addition to the information provided by the Employer. The Contractor shall scrutinize the Employer's Requirement for these works, set out the works as per the site data and items of reference provided by the Employer. The contractor shall prepare the conceptual design drawings and get Employer's approval on the Contractor's conceptual design. The contractor shall carry out detailed survey & design and prepare drawings and get approval from the Employer. The Contractor shall carry out the construction works as per the approved design drawings.

The requirement specified in Preliminary and General Works shall be applicable to these works in addition to the following specific requirements;

5.2.1 Design Obligation

The Contractor shall design, execute and maintain the Works in accordance with this Employer's Requirements. The Contractor's design process shall include topographical survey, geotechnical investigations, water quality survey, hydrological study and analysis of flood level as per the specified codal provision for the conceptual designs, schematics, detailed designs, preparation of the working drawings and all other studies, investigations, analysis, calculations necessary to achieve compliance with the Employer's Requirements. In this process, the Contractor has to take into consideration of the existing data, amenities utilities on ground and to plan and shift as per the requirement for the shifting of these utilities and amenities (if necessary).

The Contractor shall submit to the Employer the documents comprising the Contractor's design of the Works, drawings including a comprehensive design report, in electronic as well as hard copy ten (10) format for the Engineer's review and approval. The software contracts used in the designs shall be compatible with available software (the software should be to international standard) with the authority and/ or accepted by the Employer. One copy of each software used during design shall be provided to the Engineer for the design check. The Contractor in carrying out the construction works shall use only Construction Documents including drawings as approved by the Engineer. The Contractor shall neither use for other than this contract nor publish the design details/data without written permission of the Engineer.

5.2.2 Design Personnel

The Contractor shall engage suitably qualified and experienced design personnel/expert/consultant acceptable to the Employer for the design works. The design/expert/consultant personnel shall be available during the design approval and execution of the works for clarification, if any. The design personnel/expert/consultant specified in the Employer's Personnel Section above are minimum

required and the Contractor shall deploy sufficient number of qualified design professionals to complete the design works in time.

5.2.3 Design Procedure and Program

The Contractor shall submit the Design Procedure with program to the Engineer and shall clearly indicate the submission date of design documents providing appropriate review period. The program shall allow for at least ten (10) business days for Engineer's review of the submissions by the Contractor. The program also shall include reasonable period that the Contractor shall prepare re-submissions of items after reviewing comments from the Engineer and transmit documents to be re-submitted. The design program shall be compatible with overall construction program and milestones if any.

5.2.4 Detailed Design and Documents

The design shall be based on the Employer's requirements performance and standard specification requirement (Functional Requirement). No variations to the approved design shall be permitted, except with the specific written consent of the Employer.

The Contractor shall submit the following information for review and approval:

General Design Information - this shall incorporate an augmentation of information provided in the preliminary design as appropriate, with design report.

Civil and Structural Works Drawings - Civil and Structural works drawings shall include but not be limited to:

- Setting out drawings with reference coordinates.
- Layout drawings and sectional views.
- Civil works and structural drawings.
- Ancillary and temporary works (shafts etc.) drawings.
- Architectural and builder's work drawings.
- Drainage and other disposal systems drawings.
- Co-ordination drawings.
- Reinforcement and bar bending schedules.
- Any other drawings required to cover work included under bridge works.

5.2.4.1 Document Format

Designs and Construction drawings submitted by the Contractor for review shall include but not limited to:

- Contents List and Summary.
- References including specification requirements, design codes of practice, manuals and supporting documents used, numbers and titles of drawings which are based on the design.
- Criteria, parameters, software and methods used. Test procedures, analysis and results.
- Calculations and Schedules.
- Qualitative description and comments on results.
- Any other relevant information required by the Engineer.

Design calculations and documents shall be presented on A4 size paper with every page numbered

and bound in order between a transparent front cover and stiff back using undeletable ink. The title of the submission shall be given on the front sheet beneath the title of Contract, Contractor's name, title of works location, author's reference, date, Contractor's signature, and any other relevant information.

Drawings submitted as part of the design or document shall be presented on A3 size paper (unless otherwise requested by the Engineer to submit on A1 size paper) folded into pockets at the back using undeletable ink. The Contractor shall bind in as appendices to the designs and documents English language copies or photocopies of any standard, code of practice, manual or other reference referred to in the designs and documents which have not otherwise been submitted.

5.2.4.2 Drawing Format

Drawings submitted by the Contractor for review shall be based on previously submitted designs or documents. Interrelated drawings shall be submitted at the same time in a complete and self-sufficient set. Copies shall be collated into ordered bundles each with a list of contents. All drawings provided by the Contractor shall be in the form of good quality reproductions and shall conform to the requirements of the relevant British Standard, or equivalent, in respect of drawing size, presentation and use of symbols.

Drawings shall be no smaller than A4 and no larger than A1. All dimensions used on drawings shall be in metric units and all drawings shall be to scale acceptable by both parties, and shall include a graphical scale to aid the use of photographic reproductions.

Drawings shall be complete with:

- Title block approved by the Engineer.
- Drawing codification with revision number & related details. Legends with all details.
- Comprehensive notes describing all aspects, including revision, modifications made.
- Separate descriptive information for sub-assemblies, major components, foundation, fixing details etc.
- Sections, elevations, plan layout information.

5.2.4.3 Numbering and Titling

The Contractor shall use a reference numbering system for designs notes, report, drawings and documents so that each number used is unique. The numbering and title information on design notes, reports, drawings and documents shall be designed so that management, transmittal and communication of drawings can be carried out expeditiously using a computer aided data base system.

All drawings shall bear the following information in a standard title block:

Employer's name, address and logo. Contractor's name, address and logo. Contract Title.

- Contract Number.
- Drawing Title, including names of facility and site. A unique Drawing Number.
- Revision Schedule.
- Name and signature of Originator, Reviewer and Approver of the drawing. Scale.
- Date.

The Contractor shall maintain a document/ drawing register listing all documents/ drawings prepared as part of the Contract. The document / drawing register shall incorporate a revision number. Wherever a change is made to the document / drawing the revision number, the date of

the change, full details of the change and person responsible for the change shall be recorded on the register.

The revised document / drawing shall be submitted with complete details after rectifying all the discrepancies observed in the initial document, together with the revised reference number and brief description.

5.2.4.4 Number of Copies

The Contractor shall submit to the Engineer for review ten (10) hard copies as well as electronic copies of all submissions along with each the software used. Only one (1) hard-copy will be returned to the Contractor. Following acceptance of the documents by the Engineer, the Contractor shall submit to the Employer five (5) copies of all accepted documents and drawings with the date of the Employer's acceptance marked on the original.

5.2.4.5 Review of Submissions

Acceptance by the Employer of any drawing or revision, structural design, method of work or any information regarding materials and equipment the Contractor proposes to supply, shall not relieve the Contractor of his responsibility for any errors or omissions therein, and shall not be regarded as an assumption of risks or liability by the Employer.

The Contractor shall have no claim under the Contract on account of the failure or partial failure or inefficiency of any design, plan or method of work or material and equipment so accepted. Such acceptance shall be considered to mean that the Employer has no objection to the Contractor using, upon his own full responsibility, the design, plan or method of work proposed or furnishing the materials and equipment proposed.

5.2.4.6 Quality assurance plan for Design and Build and Unit Rate works

The QA/QC Manual established by this project includes quality assurance plan and quality control plan, covering organization and responsibilities, quality inspection plan, quality control procedures, design quality control, construction quality control, quality document control, training, etc.

It defines the policies and objectives and its quality commitment during the execution of Kathmandu Terai Fast Track Road Project. The QA/QC also defines the quality assurance and control procedures used by all functional areas from consultant to fulfil the quality objectives and its contractual obligations towards the Client. The QA/QC applies to all activities affecting the project quality including engineering and construction of the project

QAQC manual shall apply to all quality-related activities for the execution of the Contract with Client/engineer to engineering, procurement and construction, warranty of Kathmandu Terai Fast Track Road Project.

The purpose of this manual is to establish the necessary standards for construction supervision methods and procedures to carry out on-site construction work and supervision service effectively. Standard Specifications for Road and Bridge works, published by the Department of Roads shall be one of the documents for quality control and quality assurance.

5.2.5 Final Design Report

The Contractor shall submit detail design report with step-by-step design calculations (both Hard & Soft copy) incorporating all suggestions and including all necessary topographic, hydraulic, structural, geotechnical, and calculations early in the design stage. The Contractor shall submit a final design report prior to the commencement of works. The final report shall be based on the preliminary design, conceptual design report and contain any necessary updated or augmented information.

5.2.6 Errors in Documents

The Contractor shall scrutinize the Employer's Requirement, site data and item of reference and give notice to the Employer if found any error, fault or defects in the Employer's Requirements, site data or the item of reference.

5.2.7 Contract Price

The Contract Price shall be the accepted lump sum contract amount as per the Contract Agreement shall not be adjusted for the change in cost.

5.2.8 Measurement and payment

The Contractor shall be paid based on the Payment Schedule provided in this contract to the proportion of work completed by the Contractor.

5.3 Design Criteria and Design Restrictions

The design criteria and restrictions are applicable for the Design and Build (contractor design) works only.

5.3.1 Bridge Design Criteria

All permanent road bridges in Nepal shall be designed as per IRC loadings and relevant IRC Codes. All design shall be carried out in accordance with IRC standards for bridges unless otherwise specified in this document. In line with this, PSC Girder Bridge, Balanced cantilever, Extrados Cable stayed bridge are preferred one for Major Bridges and for Rigid Frame Bridge (for minor Bridge) PSC/ RCC types would be preferred type under Design and Build. No Steel Bridge is preferred.

5.3.1.1 Scope of Design

The Scope of Design Covers planning, Survey, Design, Construction and maintenance of the Bridge system mentioned in Bill of Quantities. The Scope of design shall be preferably equivalent or better than the Employer's Conceptual Engineering Design (CED). Within the Design criteria and preferred type of bridge the Contractor can opt suitable type of bridge and span arrangement which is subject to approval from the Engineer. The Detail Design at least should comply all criteria of IRC code; in absence or the topics that are not covered reference of AASTHO or Euro code would be acceptable. It is to comply the minimum configuration /survey, detail investigation of sub soil and hydrological conditions, loading, site specific Seismic design of bridge and testing, performance standard etc. Design life of bridgeworks and ancillary retaining walls, except for the sub-elements (Minor non-structure), shall be designed and detailed to ensure an operational design life of 100 years, without major repair requirements.

5.3.1.2 Design Criteria and Standard

The Employer Standard and Required / Compliance Specification document provides guidance and requirements for the design / construction of bridges and associated civil engineering work throughout the Expressway. It defines design principles and best practice to be applied to construction of the bridges in accordance with IRC loading. The design approach defined here embraces the IRC vision and reflects the project's commitment to secure design, construction and operation as per minimum requirement. The scope of design and construction work considered here encompasses the majority of civil engineering structures within the contract. The following codes provides the basic requirement to be meet with:

BRIDGE DESIGN CODES: The code shall be followed generally by IRC whenever IRC not available, the contractors should follow international codes (i.e. AASTHO, EURO codes etc.)

i. IRC: 5-2015 Standard Specification and Code of Practice for Road Bridges
ii. IRC: 6-2017 Standard Specification and Code of Practice for Road Bridges
iii. IRC: 112-2011 Code of Practice for Concrete Road Bridges
iv. IRC: 22-2015 Standard Specifications and Code of Practice for Road Bridges

v. IRC: 24-2010 Standard Specifications and Code of Practice for Road Bridges, Steel Road Bridges (Limit States Method).
vi. IRC: 78-2014 Standard Specifications and Code of Practice for Road Bridges
vii. IRC: 83-2015 Standard Specifications and Code of Practice for Road Bridges (Part – I)
IRC: 83-2018 Standard Specifications and Code of Practice for Road Bridges (Part – II)
viii. IRC: 83-2018 Standard Specifications and Code of Practice for Road Bridges (Part – III)
ix. IRC: 83-2014 Standard Specifications and Code of Practice for Road Bridges (Part – IV)
x. IRC: 45-1972 Recommendation for estimating the resistance of soil below the maximum scour level in the design of well foundation of bridges
xi. IRC: 87-2011 Guidelines for Formwork, Falsework and Temporary Structures
xii. IRC: 89-1997 Guidelines for Design and Construction of River Training & Control Works for Road Bridges
xiii. IRC: SP 33-1989 Guidelines on supplemental measures for design, detailing and durability of important bridge structures
xiv. IRC: SP 65-2018 Guidelines for Design and Construction of Segmental Bridges
xv. IRC: SP 66-2016 Guidelines for Design of Continuous Bridges
xvi. IRC: SP 67-2005 Guidelines for Use of External and Unbonded. Prestressing Tendons in Bridge Structures
xvii. IRC: SP 70-2016 Guidelines for Use of High-Performance Concrete in Bridges (Including Self Compacting Concrete in Bridges)
xviii. IRC: SP 71-2018 Guidelines for Design and Construction of Precast Pretensioned Girder for Bridges
xix. IRC: SP 23-1983 Vertical Curves for Highways
xx. IRC: SP 64-2016 Guidelines for analysis and design of cast in place voided slab structure
xxi. IRC: SP:114-2018 Guidelines for Seismic Design of Road Bridges
xxii. IRC: SP: 115-2018 Guidelines for Design of Integral Bridges
xxiii. IS: 2911-2010 Code of Practice for Design and Construction of Pile Foundations
xxiv. IS: 13920-2016 Ductile detailing of Reinforced Concrete Structures subjected Seismic Forces – Code of Practice
xxv. IS: 13920-2016 Ductile detailing of Reinforced Concrete Structures subjected Seismic Forces – Code of Practice

5.3.1.3 Design Life of Bridge Structures.

The minimum design life of the Project shall be as follows:

Table 5-2: Design life of Expressway components

Design Parameter		Minimum Value
A	Bridge	100 years
B	Bearings / Movement Joint	50 years
C	Drainage system	20 years
D	Road Pavement:	
	- Cement concrete pavement	20 years
	- Asphalt concrete pavement	10 years
E	Wearing surface/Overlay	10 years

5.3.1.4 Technical Requirement

It is to meet the Minimum Performance Standards and Specifications (MPSS), which is at least:
Establish and meet the minimum requirements that the Contractor must comply since from survey, geotechnical/ sub surface investigation, detail engineering design Construction and maintenance of the bridges upto the defect liability period as specified in contract data. The attached conceptual drawings in route to Kathmandu Terai Fast Track (KTFT) is to refer for generic conceptual

requirement.

Scope of Construction: The Contractor shall undertake the construction of the Project in accordance with the certified/approved DED by Employer. While doing so, it is the sole Contractor responsibility to complying with the Standard Specifications of Road and Bridges of Nepal, it is to create certainty of the physical construction of the designed bridges as per General Requirements/MPSS up to the specified duration. The contractor shall meet the requirements which are the outcome of integrated effort of Detail Engineering Survey, geological, geo-physical, geotechnical investigation, Preliminary and Detail design, clearances, environmental protection, aesthetics, economical, durable, constructible, maintainable for vehicular movement as well as for utility service passage too. It is to ensure Minimum requirements for traffic safety as referenced. Minimum requirements for drainage facilities and self- protecting measures against erosion, sliding water, ice, and water-borne salts (if any) in worst possible cases or combination of cases that the structure subjects in its life span.

5.3.1.5 Survey and Investigation Work

The Contractor shall carry out the following detailed survey and investigations suitable for bridge under the MPSS requirement. This does not limit the necessary survey and investigation that warrants for the particular type of bridge.

Topographic Survey

The Engineer shall provide reference basic topographic survey data/ thereof drawing which was carried out just in 2021. The Contractor shall carry out detail survey work to update and validate plan, profile and cross section @10m intervals cross section for at least up to 500 m upstream and 500 m downstream of the main crossing and auxiliary crossing as instructed by the Engineer. The acquired coordinates shall be converted into coordinates of Modified Universal Transverse Mercator (MUTM) projection system. These converted coordinates shall be used for the survey and mapping of road/ bridge alignment.

Geological & Geotechnical Investigation

The existing geological and geotechnical investigation report is provided as reference materials in the supplementary information chapter. However, the contractor shall conduct geological, geophysical and geotechnical investigation works as per IS, IRC and international standard codes and prepare and submit the report separately. It is the Contractor's responsibility to determine to undertake adequate investigations and studies to justify the proposed design and verify site conditions.

Bridge Geometry, Super Elevation, Radius of Curve and Bridge Ancillary Structure ie Approach Slab and return wall/wing wall

The Bridge Geometry including extra widening in curve bridge super elevation, skewness and radius of Curve shall satisfy the design speed of 120 km/ hr. In addition, it is to provide at least 6m length RCC approach slab on either side of bridge and sufficient length/height of RCC wing and return walls, Bio-engineering work on slopped portion including proper drainage management.

5.3.1.6 Requirements of Bridge Design

Structural design shall conform to a high level of technical competence and shall be based on proven methods, materials and technology. The structures shall be designed in accordance with accepted engineering practice, relevant codes and incorporate safety in design principles. The structures shall be designed collaboratively and integrate the various inputs of all involved disciplines including:

- Detailed topographic survey
- Geotechnical/Geological/ Geophysical investigations tailored to fit proposed type of bridge as per relevant IS code or AASHTO.

- Geotechnical investigation reports
- Geological/ Geotechnical and geophysical Investigations to match bridge design requirement for bridge located in nearby active fault zone/Seismic zone V
- Hydraulic survey and study reports, and
- Environmental protection works and bio engineering works.
- Slope protection (up to the Design and Built portion)
- Abutment and pier protection works
- Specifications
- Quantity estimate
- Drawings

Plan of land acquisition

The Employer has already acquired land for 50m from center line to right and left side. The Contractor shall verify land acquisition and have to submit the plan of land acquisition in case of changing alignment or to build additional bridge structure and its components.

Hydrological Investigation

A comprehensive outline of hydrological investigations for collecting the necessary field data and hydrological analysis can be collected from Department of Hydrology and Meteorology (DHM), Nepal for 100 years return period using the flood frequency analysis.

Hydraulic Analysis

The Contractor shall perform hydrology, hydraulic survey for bridge and river training plan for high quality design.

Design Flood Frequency

A frequency of 1/100 years is adopted for bridges; For special bridges a frequency of 1/200 years is recommended

Hydraulic Analysis of the River is to clearly mark:

- design High Flood Level (HFL),
- hydraulic gradient,
- free board,
- side slopes,
- top width etc.

Hydraulic analysis shall be performed to compute the hydraulic parameters in the geometrical shape of cross section from survey data and design flood discharge.

Design HFL

- The design HFL obtained from gauge stage discharge curve.
- The design HFL so obtained should be verified on the basis of observed cross-sections, slopes and velocity of the river

- The design HFL also be obtained from flood frequency analysis for corresponding return period

Free board

- The top of the embankment fixed that no danger of overtopping,
- Unexpected rise in water level, sudden change in river course, aggradations or degradation of riverbed.

$FB=0.1*Q^{0.3}+0.008v^2$

Where,

Q= Design discharge, m^3/s

V= approach velocity, m/s

FB= Free board, m

- Free Board adopted in design shall also comply Nepal Bridge Standard – 2067

Pier Abutment Protection:

Protection of abutment and piers are integral part of Design and Build part of the bridges and the contractor shall ensure the design of these protection works

5.3.1.7 Bridge Structure design:

For structural verifications, by means of a proper static cum dynamic model the following shall be verified for the all major structural elements according to IS code: ULS (Ultimate limit states) - Bending moments (interaction domain MN); - Shear load. SLS (Serviceability limit states) - deformations; - cracking. Structural and geotechnical verifications (STR/GEO) must be provided for the foundation of all structures.

Computer Calculations:

The Contractor shall use industry standard software for the modelling, analysis and drawing of the design. Calculations prepared with appropriate Computer Programs shall have the following information attached, without limitations: - name of the program and the version number; - description of the program with general assumptions and limitations; basis of calculation and a description of the calculation process with any approximations or simplification being used; - rules for notation; - details of input loads, their method of derivation and quantity and load combinations used.

The results from any computer calculations shall include the following information, without limitations - name of the structure and computer program with version number; - list of contents; - page number; - data input; - graphic representation of the calculation model Output data shall be provided under Engineer's request. Calculations prepared with computer programs if necessary be supplemented with checks done by manual calculation.

Detailed Design Drawings:

The Contractor shall prepare all detailed design drawings and submit to the Engineer for review and approval.

5.3.1.8 Materials

All materials, workmanship to be used in the project shall conform to the Nepal standard specifications for road and bridges works-2073, relevant IRC specification to the extent not covered by specification for road and bridges works-2073. Despite, the generic and minimum strength would be as following:

a) Concrete

Minimum cube strength of all concrete grades shall be as follows:

Table 5-3: Required strength of Concrete

Location	Minimum Grade for concrete (MPa)
Concrete for bored piles	40
Pile caps	40
Abutments	35
Piers	40
RC Slab	35
PC Beam Girder	40
PC Box Girder	50
Pylon/Tower	50
Barrier	35

b) Reinforcement Steel

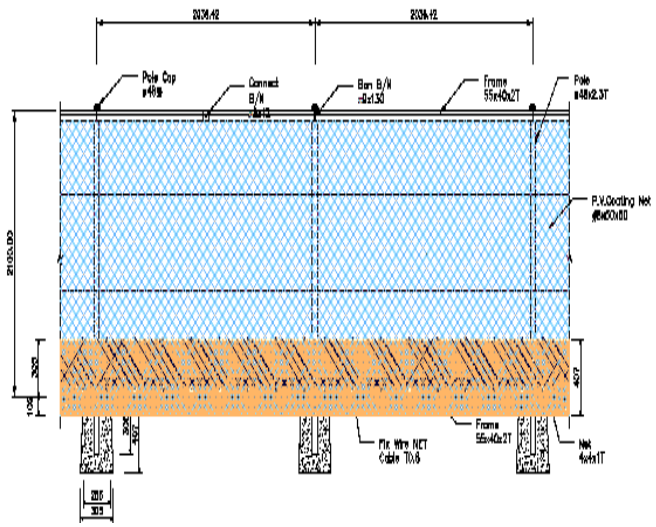
All reinforcing steel bars shall be High Yield Strength Deformed type and Cold Twisted Deformed Bar/ Thermo Mechanically Treated, having specified minimum 0.2 per cent proof stress of 500 MPa conforming to IS:1786.

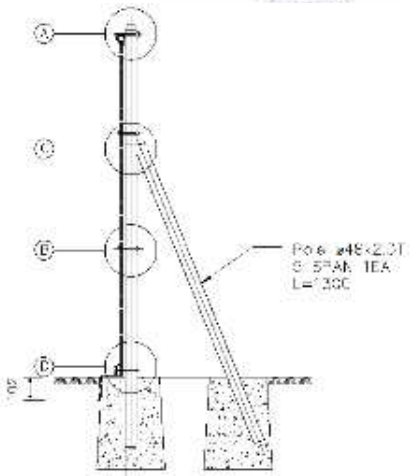
5.3.1.9 Requirement of Design reports and list of drawings:

The Design report shall include
1. Location plan/vicinity map
2. General Notes on Design Parameters and construction Procedures
3. General plan and elevation
4. Details of superstructure
5. Detail of bearing and Expansion joints
6. Details of piers and abutments
7. Details of foundations
8. Details of abutment and pier protection works
9. Detail of temporary structure such as: crane way, cofferdam etc.
10. Summary of quantities
11. Detail lighting facilities
12. Utility provision

5.3.2 Fencing and Gate

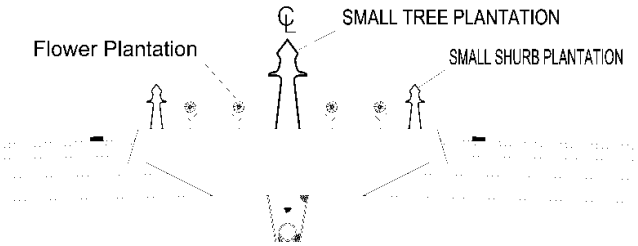
It shall be planned to construct the expressway access control for people and animal with heavily galvanized netting mild steel wire with hexagonal mesh. The fencing works shall be also planned throughout both side of bridge construction works.





5.3.3 Median Barrier

4 m wide central median barrier shall be designed with plantation for bridge approach. The median shall have kerb guard at both sides and best aesthetic green plants having maximum height of 4m at centre with good quality grass turf within kerb at top of median. The median shall have proper drainage system.



5.3.4 Design Criteria for Light and Electrical Utilities

The major objective of the road safety traffic engineering measures is to provide safe and efficient movement along the expressway including bridge sections. The road safety measures shall be provided for the convenient and comfortable driving and selection of safer speed as well as the carriageway. The road and traffic safety measures shall be matched with the major elements of the cross-section of roads and bridges and driver's perception.

The Design of expressway and bridges including the approach road-sections shall contain road safety measures including the traffic control devices as per the appropriate design standards, guidelines and best practices in the country as well as in the region. The application of these standard documents shall be of latest version. The Contractor shall incorporate the entire safety deficiencies pointed out by Engineer. The traffic management plan during the construction period and the proper operation plan shall be prepared as the part of the completion report.

Proper illumination shall be designed and provided at the bridges and roads approaches.

In conclusion, the safety and efficiency of traffic operations shall be taken as the prime concern for the entire stages of the project.

5.3.4.1 Bridge and Expressway

Supplying and laying of underground electrical cables 4" HDP pipe of 10 kg pressure by making inspection chamber at interval of 30 meter and in every bend in bridge and road section have to lay the cable on hot dip galvanized GI perforated tray of suitable size.

The LT cables shall be PVC armoured cables with copper conductor, confirming to IS 1554 (part 1)1988 & IS7098 Part-II amended up to date of make CCI / universal / Polycot / uncial or equivalent as per universal standard specification.

The contractor shall be set up light & electrical utilities in Road and bridges.

5.3.4.2 Description

This works shall include the following:

- Supplying, construction and installation of the High Lighting System (HLS)
- Ancillary Works and Testing

The expressway (highway) light system consists of the specified electrical hardware, mast arm poles, and jointing in bridge components or at any other hard surface such Railings, concreting, erecting poles to lines and levels and curing the concrete and re-instatement of the surface to its original condition and disposal of excess spoil materials if any: on an all complete net basis.

The works shall include furnishing all materials, construction or installation of the above referred items, and all ancillary works and any other incidental necessary to complete the Works in conformity with the Drawings and these Specifications, or as directed by the Engineer.

This work shall also include the Design Review and Updating of the Expressway (highway) Lighting System (HLS) by the Contractor based on the Conceptual Design provided by the Employer. The report shall also include all detailed drawings, applicable technical specifications and requirements for construction and materials.

The Contractor shall be responsible for providing all design, fabrication, and installation details necessary to provide work and operations as intended under and required by the Drawings and Specifications.

When local regulatory bodies, have jurisdiction over installation, the following Nepalese standards shall be applied:

- Nepal Electricity Authority
- Nepal National Building Code NBC207: 2003 – Electrical Design Requirements
- The following basic requirements shall be satisfied for the Expressway (highway) Lighting System (non-solar system):
- Type of the Expressway (highway) Lighting is 120-Watt LED IP 65 light. Power of the lamp is 250W. Luminous flux of the road lighting shall be 28,000 lumen minimum, and shall be the product of Phillips Wipro, Nichia Japan or equivalent as approved by the Engineer
- The lighting poles shall be made from octagonal steel plate with the thickness of 3.2mm minimum and also protected by hot dip galvanize.
- Lamp Power: 120 Watt
- Reliability / MTBF: 5 years (product life cycle) / 50,000 Hrs
- Gear SGR (SON gear)
- Ingress Protection IP 65

- Housing material Aluminium
- Voltage/Hz 220V / 50 Hz

5.3.4.3 Design codes and standards adopted for electric pole, Cable and transformer layout

1. Electric pole placement is adopted at 30 m interval in both side with octagonal steel plate with 11m height
2. Transformer position is adopted at every 2 to 3 km interval
3. Underground cable layout in both side of expressway
4. Color coding, as per internationally accepted rule, shall be followed for phases (Red/Yellow/Blue), neutral (Black) and earth wire (Green) everywhere, even including inside the main panel board, distribution board, main switch.

5.3.5 Design Criteria Slope Protection works

Bridge approach Slope protection report and back filling/ cutting works adjacent to the bridge pier and abutment shall comply the following:

1. Design Criteria
2. Geological Condition
3. Standard gradients of Slope
4. Slope Stability Analysis
5. Proposed Slope Protection Method
6. Analysis of Slope Protection Section
7. Landslide Monitoring System
8. New technology method

5.3.5.1 Cut and fill section slope design criteria

i) Gradient for fill and cut slope

The final gradient of the fill and cut slope is to be maintained according to the existing slope. The slope gradient must be redesigned if there are no similarities between design parameters and actual field conditions. The standard slope gradient for different material types and the necessary height proposed for the KTFT fill and cut slopes are presented below.

Table 5-4: Slope gradient standard for fill slope

Material	Height to track formation (m)	Fill slope gradient standards *(vertical: horizontal)*	
		Standard (DoR, 2003)	Proposed
Fill Materials	H < 5.0m	1:1.5 ~ 1:2.0	1:1.5
	5.0m ≤ H < 10.0m	1:1.5 ~ 1:2.0	1:1.8
	10.0m ≤ H < 15.0m	1:1.5 ~ 1:2.0	1:2.0
	H ≥ 15.0m	1:1.5 ~ 1:2.0	1:2.3

For the construction of the embankment, the benching terrace should be 1.5 m wide in every 5 m height.

Table 5-5: Slope gradient standard for cut slope

Material	Berm height (m)	Cut slope gradient standards *(vertical: horizontal)*	
		Standard *(DoR, 2003)*	**Proposed**
Soil	5	1:0.8 ~ 1:1.5	1:1.5
Weathered rock	5	1:1.0 ~ 1:1.5	1:1.0
Soft rock	5	1:0.5 ~ 1:1.2	1:0.7
Hard rock	20	1:0.3 ~ 1:0.8	1:0.5

ii) Factor of safety

The factor of safety required for stable slope is reviewed and selected, comparing with the standards used internationally as it is not clearly mentioned in the Nepalese standard. For cutting sections the DPR applied Factor of Safety (FoS) 1.5 for the dry condition, 1.2 for the rainfall condition and 1.1 for the seismic condition. Similarly, for the filling area, FoS 1.5 for the dry condition, 1.3 for the rainy condition and 1.1 for the seismic condition to evaluate the slope stability. In the case of temporary slope for the short-term (construction period of less than 1 year), FoS of 1.1 for both the fill slope area and cut slope shall be considered. The groundwater level has used the result of seepage with rainfall record during 50 years. It is assumed that groundwater is the actual measurement or normal level during the earthquake as there are fewer chances of occurring the same. It is necessary to monitor the groundwater before and during construction and need to review the slope as per field condition. The minimum factor of safety required for the fill and the cut slope is presented below.

Table 5-6: Minimum factor of safety required for fill slope

Case		Groundwater Conditions	FoS
Permanent	Dry condition	No presence of groundwater in the embankment	1.5
	Rainfall condition	Determine the groundwater depth by comprehensively considering the site conditions and the most unfavourable conditions for stability that occur	1.3
	Seismic condition	Actual measurement or normal groundwater level	1.1
Temporary (< 1 year)		Actual measurement or normal groundwater level	1.1

Table 5-7: Minimum factor of safety required for cut slope

Case		Groundwater Conditions	FoS
Permanent	Dry condition	No presence of groundwater	1.5
	Rainfall condition	• Rock slope: The half depth of saturated groundwater within the tension crack or half depth of the slope saturated with groundwater along the active plane. • Soil slope: Determine the groundwater depth by comprehensively considering the site conditions, or performance of a seepage analysis considering the rainfall intensity & duration of the target basin, etc.	1.2

Case		Groundwater Conditions	FoS
	Seismic condition	Actual measurement or normal groundwater level	1.1
Temporary (< 1 year)		Actual measurement or normal groundwater level	1.1

5.3.6 Design Criteria for River Training Works

5.3.6.1 Hydraulic Analysis

Hydraulic Analysis of the River for determination of hydraulic Parameters

- High flood level of design return period
- River morphology, bed forms and channel geometry
- River behavior and river channel pattern
- Sediment load and instability of rivers

Hydraulic analysis shall be performed to compute the hydraulic parameters in the geometrical shape of cross section from survey data and design flood discharge to choose the type of protection work.

5.3.6.2 Design HFL

- Provided after contract awarded from design report for reference. Contractor shall responsible for the analyzing the HFL.

5.3.6.3 Free board

- Provided after contract awarded from design report for reference. Contractor shall responsible for the analyzing the free board.

5.3.6.4 Design of Slope Pitching

- Design flood for pitching/revetment for 100 years return period using the flood frequency analysis.
- For special cases, where damage potential justifies, observed flood may also be considered for fixing the crest level.
- The design HFL should be obtained from gauge discharge relationship /hydraulic computational techniques
- Stable riprap rock size is desired

5.3.6.5 Size of Stone

- Isbash equation,

$$D = \frac{V^2}{2gC^2(s-1)}$$

Where,

V = Water velocity approaching the riprap (m/s)

C = Isbash constant. C=0.86 for highly turbulent conditions or C=1.2 for low turbulence

D = Median diameter of spherical stone or rock. Also known as D50 (m)

g = Acceleration due to gravity, 9.81 m/s^2

S = Specific gravity of stone or rock

5.3.6.6 Weight of Stone

- Stabilizing forces for hydrodynamic drag and lift forces.

The weight of stones on slopes (W in kg) may be worked using the formula given below

$$W = 0.02323 * S_s * V^6 / K * (Ss-1)^3 \text{ in kg}$$

Where,

K (correction factor for slope) $=[1-\text{Sin}2\theta/\text{Sin}2\Phi\ ]^{1/2}$

Ss=specific gravity of boulders (may be adopted as 2.65)

Φ = Angle of repose of material of protection works (adopted as 300 for boulders)

θ= Angle of sloping bank 2 (H) :1 (V) (Normally 26.560 for Boulders)

V= Velocity in m/s

5.3.6.7 Launching Apron Design

- Width of the launching apron depends upon the scour depth below HFL.
- Depth of scour below HFL (D) may be worked out using the following formula:

$$D = 0.473\ (Q/f)^{1/3}$$

Where,

Q = design discharge in cumecs

f = silt factor.

Silt factor (f) may be calculated using the following formula

$$f = 1.76\ (d)^{1/2}$$

Maximum scour depth (D_{max}) below HFL= 1.5* Scour depth (D below HFL).

Maximum Scour depth (D_{max}) below LWL = (D_{max}) below HFL – (HFL-LWL)

Width of launching apron= projection of expected stable slope up to the scour level, 1.5 to 3 * (D_{max}) below LWL

Thickness of launching apron (T) = 1.5* thickness of pitching (t).

5.3.6.8 Factor of Safety

$$FS = \Sigma S/\Sigma V$$

$$\Sigma C + (N-U)\tan\boldsymbol{\Phi}/\Sigma W \sin\alpha$$

Where,

FS = Factor of safety

S = Resisting or stabilizing Force

T = Driving or actuating force

C = C1x (b/ Cos α)

N = Force normal to the arc or slice

U = Pore water pressure.

α = Angle of shearing resistance

W = Weight of the slice

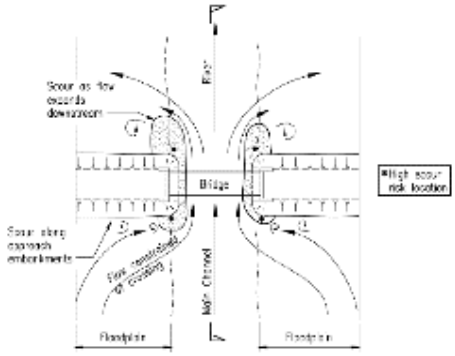
A = Angle made by the radius of the failure surface with the vertical at the centre of slice.

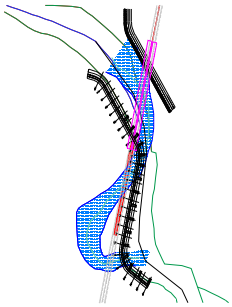
C1 = Unit cohesion, and b = Width of the slice

5.3.6.9 Bridge Scour Protection

Contraction Scour

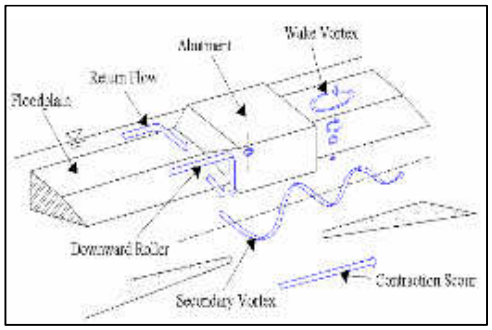
- caused by a constriction of flow in the floodplain
- increases erosive forces >> more material removed from bed and banks
- velocity and shear stress decrease until equilibrium is reached

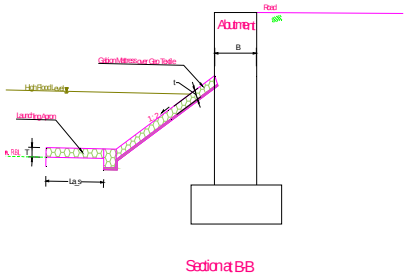




Bridge Abutment Scour

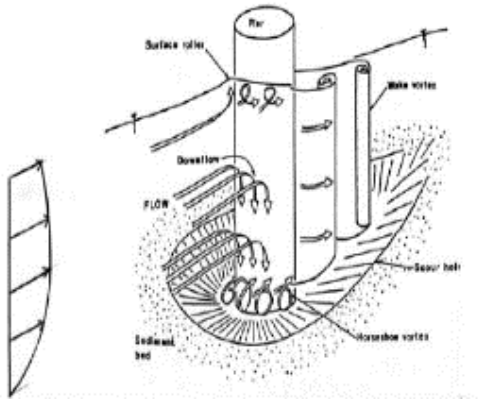
- Determining the magnitude of scour is complicated by the cyclic nature
- Scour can be deepest near the peak of a flood
- Designed (guide bank, revetment wall, spur and launching apron) for at least 2.5 times the adopted linear waterway in upstream and 1.25 times the linear waterway in downstream.





Bridge Pier Scour

- Scour can be deepest near the peak of a flood



5.3.7 Design Criteria for Bioengineering Works

5.3.7.1 Scope

Local species of vegetation are adopted for plantation on slopes as and where required.

Some major species are listed for bioengineering purposes;

broom grass (Thysanolaena maxima), Napier grass (Pennisetum purpureum), vetiver grass (Vetiver zinzaniodes), durva grass (Cynodon dactylon), turf grass (such as, Festuca arundinacea, Poa pratensis), kans grass (Saccharum spontaneum), different types of bamboo, giant cane (Arundo donax), Malabar nut (Adhatoda vasica), male fern (Dryopteris filixmas), artemesia (Artemisia spp.), weeping willow (Salix babylonica), mulberry (Morus alba), five-leaved chaste tree (Vitex negundo), ghogar tree (Garuga pinnata), coral tree (Erythrina variegata), tiger's milk spruce (Sapium insigne), and eastern cottonwood (Populus deltoides).

5.3.7.2 Details of Bio engineering Techniques

Construction details of bio engineering systems are presented in tabular form below:

A. Comparison table for grass planting systems

Configuration	Description/ critical slope	Normal spacings	Main advantages	Main limitations
Grass lines: Contour/ Horizontal	Planting of grass slips (or springs) in geometric lines across the slope or along the contour Slopes ≤ 65°	Plants at 100 mm centres within rows Row spacings: Slope < 30°: 1000 mm; Slope 30-45°: 500 mm; Slope > 45°: 250 mm;	Traps material moving downslope Retards runoff on highly impermeable materials	Can increase the infiltration rate to the point of liquefaction on porous materials
Grass lines: downslope/ vertical	Planting of grass slips (or sprigs) in geometric lines down the slope or towards drainage lines. Slopes ≤ 65°	Plants at 100 mm centres within rows Rows spaced at 500 mm centres.	Maximizes while protecting against erosion. Minimizes infiltration	On very impermeable materials, runoff can become damaging Grass plants can suffer from drought.
Grass lines: diagonal	Planting of grass slips (or	Plants at 100 mm centres within rows	Appears to combine the best	Where the specific

Configuration	Description/ critical slope	Normal spacings	Main advantages	Main limitations
	sprigs) geometric lines diagonally across the slope, usually at 45° to the contour. Slopes ≤ 65°	Rows spaced at 500 mm centres.	features of both horizontal and vertical planting in the majority of sites.	advantages of horizontal and vertical planting patterns are critical, diagonal planting should not be used.
	Grass seeds are spread evenly over the surface, and are usually covered with mulch. Slopes≤ 50°	Most species require a seeding rate of 25 grammes/m^2. Mulch, if applied, should be at a rate of 0.05 m^3 mulch/m^2.	Can be used to create an even cover overall surfaces.	None of the structural advantages of grass slip planting. Plants take longer to develop from seeds than from slips
Turfing	Turf cut from elsewhere is placed on the surface and pegged if necessary. Slopes ≤ 35°	Requires equal area of turf cut for the surface to be treated. Pegging should be at 250 mm centres on slopes > 15°.	Complete instant surface cover.	Relatively costly. Creates equal bare areas at the source of the turf. There is a discontinuity between the turf and the under-lying material
Recommended species	Amliso Babiyo Dubo Dhonde Kans Katara khar Khar Khus Narkat Padang bans Phurke Sito Tite nigalo bans	Thysanolaena maxima Eulaliopsis binate Cynodon dactylon Neyraudia reynaudiana Saccharum spontaneum Themeda species Cybopogon microtheca Vetiver zizanoides Arundo clonax Himalayacamus hookeranus Arunduella nepalensis Neyraudia arundinacea Drepanostachyum intermedium		Terai - 2000 m Terai - 1800 m Terai - 1500 m Terai - 1500 m Terai - 2000 m Terai - 2000 m Terai - 2000 m Terai - 1500 m Terai - 1500 m 1500 - 2500 m 700 - 2000 m Terai - 1500 m 1000 - 2500 m

B. Larger plant system

Configuration	Description/ Critical slope	Normal spacings	Main advantages	Main limitations
Shrub and tree	Seedings of	Plants spaced at 1000	Establishes a	Seedings take about

Configuration	Description/ Critical slope	Normal spacings	Main advantages	Main limitations
planting	shrubs or trees are planted on a geometric pattern. Slope ≤ 35° 35-45° with care	mm centres in off-set rows. Rows 1000 mm apart	plantation of larger plants effectively. These contribute to the reinforcement and anchoring of the slope.	5 years to contribute significantly to slope strengthening. Care protection required in first three years.
Recommended species	Areri Bhujetro Dhanycro Dhusun Kanda phul Keraukose Tilka Bakeno Chilaune Gobre salla Kalo siris Khanyu (Khosro) Khayer Lankuri Painyu Rani (Khote) salla Rato siris Seto siris Sisau Utis	Acacia pennata Butea minor Woodfordia fruticose Colebrookea oppositifolia Lantana camara Indigofera atroturpurea Wendlandia puberula Melia azedarach Pinus wallichii Albizia lebbeck Ficus semicordata Acacia catechu Fraxinus floribunda Prunus cerasoides Pinus roxburghii Albizia julibrissin Albizia Procera Dalbergia sissoo Alnus nepalensis	500 - 1500 m 500 - 1500 m Terai - 1500 m Terai - 1000 m Terai - 1750 m Terai - 2000 m Terai - 1500 m Terai-1800 m 900 - 2000 m 1800 - 3000 m Terai - 1200 m Terai - 2000 m Teari - 1000 m 1200 - 2700 m 500 - 2400 m 500 - 1950 m 800 - 3000 m Terai - 1350 m Terai - 1400 m 900 - 2700 m	Shrubs Trees
Shrub and tree seeding	Direct sowing of shrub and tree seeds on any slopes. Direct seeding: slopes 35-80° Broadcasting: Slopes ≤ 50°	Direct sow at 50 to 100 mm centres, as conditions dictate. Broadcasting rate depends on seed weight: (e.g. utis @ 1 g/m^2).	Establishes a cover of larger plants on any slope, however rocky. These provide good reinforcement and anchorage.	Plants take about 5 years to contribute significantly to slope strengthening. Protection required in early years.
	Large clumping bamboos (bans) are planted, usually near the base of a slope. Slopes ≤35°	Individual plants spaced at 2000-3000 mm intervals in a single row or in off-set rows. Rows 200 mm apart	Establishes a very strong line of plants which provide the best reinforcement, trapping and support at the	Bamboos take about 5 years to contribute significantly to slope strengthening. Protection required in early years. Not in hot, dry sites.

Configuration	Description/ Critical slope	Normal spacings	Main advantages	Main limitations
			2base of a slope.	
Recommended Species	Choya/tama bans Dhanu bans Mal bans Nibha/ghopi/lyas bans Tharu bans	Dendrocalamus hamiltonii Bambusa balcooa Dendrocalamus hookeri Bambusa nutans Ampelocalamus patallaris Bambusa nutans	300 - 2000 m Terai - 1600 m 1200 - 2500 m Terai - 1500 m 1200 - 2000 m Terai - 1500 m	

C. Vegetation structures

Configuration	Description/ Critical slope	Normal Spacings	Main advantages	Main Limitations
Bush layering	Lines of woody cuttings laid in trenches. The tops protrude above the surface. Slopes ≤ 45°	Cuttings laid in double rows at 50 mm centres (i.e. 40 cuttings/ running m). Layers Spacings: slope < 30°: 4000 mm; slope 30-45°: 2000 mm.	A very strong and low-cost barrier to trap material and reinforce useful on debris slopes, however loose.	Construction gives rise to a considerable level of disturbance to the slope.
Palisades	Lines of woody cuttings inserted in the ground. The tops protrude above slopes ≤ 60°	Cuttings Planted in double rows at 50 mm centres (40 cuttings/ running m). Row spacings: slope < 30°: 4000 mm; Slope 30-45°: 2000 mm	Provides a strong and low cost barrier to trap material and reinforce the soil, with minimum disturbance to the slope.	Not as strong as brush layering.
Line check dams	Flexible check dams made from a variety of woody cuttings Gully slopes≤ 45°	Spacing depends on gully conditions but they should normally be at 3000 to 5000 mm centres.	Affective low cost structure to reduce erosion in smaller gullies. Can also be used in between masonry check dams.	Large and very active gullies require stronger measures than can be provided by vegetation alone.
Fascines construction	Bundles of live woody cuttings are laid in trenches just below the surface. Slopes ≤ 45°	Cuttings planted @ 4 or 8 cuttings/running metre). Fascine spacings: Slopes< 30°: 4000 mm; Slope 30-	A very strong and low cost barrier to trap material and reinforce on a wide variety of sites.	Fascines do not form a barrier Immediately like brush layers Construction gives rise to disturbance to

Configuration	Description/ Critical slope	Normal Spacings	Main advantages	Main Limitations
		45°: 2000 mm		the slope.

Recommended Species

Assuro	Adhatoda vasica	Terai - 1000 m
Bainsh	Salix tetrasperma	Terai - 2700 m
Kanda phul	Lantana camara	Terai - 1750 m
Namdi phul	Colquhounia coccinea	1000 - 2000 m
Saruwa/bihaya	Ipomoea fistulosa	Terai - 1500 m
Simali	Vitex negundao	Terai - 1750 m
Dabdabe	Garuga Pinnata	Terai - 1300 m
Phaledo	Erythrina Species	900 - 3000 m

D. Small scale physical measures

Configuration	Description/ critical slope	Normal spacing	Main advantages	Main limitations
Wire bolster cylinders	A 300 mm diameter gabion tube laid in a trench, with the top flush with the surface Slopes ≤ 50°	Spacing depends on site condition. Normal spacing: Slopes<35°: 4000 m Slopes35-50°: 2000 m	The strongest and longest-lasting method of reinforcing a slope surface and preventing gully development.	Relatively expensive in comparison within comparison with bio-engineering measures such as brush layers.
Jute netting	A temporary surface cover to aid grass establishment on very steep slopes Slopes ≥ 50°	Complete cover of standard netting with 40×40 mm mesh of 5 to 8 mm yarn. Anchoring pegs at 5200 to 1000 mm centers.	A very effective aid to the establishment of a permanent grass cover on hard, dry materials on steep cut slopes.	As it forms a mulch, it raises the moisture content of the soil: if the material has poor internal drainage, this can lead to liquefaction.

5.4 Reference Specification and Codes for Design

5.4.1 Bridge Design Standard

The Employer Standard and Required/Compliance Specification document provides guidance and requirements for the design /construction of bridges and associated civil engineering throughout the Expressway. It defines design principles and best practice to be applied to construction of the bridges in accordance with IRC loading. The design approach defined here embraces the IRC vision and reflects the project's commitment to secure design, construction and operation as per minimum requirement. The scope of design and construction work considered here encompasses the majority of civil engineering structures within the contract.

It is to meet at least Bridge design standard mentioned in Heading 5.2.2

The bridges shall be designed as per IRC loadings. The Load combination shall be based on IRC: 06 latest edition.

The preferred type of Bridge is PSC Box Girder (FCM of construction), Extradosed, Cable Stayed Bridge, PSC Girder Bridge for Major Bridge and no Steel Bridge is permitted. The preferred type of foundation is bored cast in situ/driven pile foundation and no open foundation shall be permitted. However, the Engineer in rare cased can accept open foundation for abutment with strong foundation strata is meet sufficiently at shallow depth.

i. All the bridges are located in seismic terrain of V category. The method of analysis shall be Elastic Seismic Acceleration method, Elastic Response Spectrum Method, Elastic Response Spectrum Method and Time history method or Elastic Response Spectrum and Time History Method with site specific studies based on IRC: SP-114-2018.
ii. The span arrangement and pile cross section are conceptual only. The limited geotechnical and geological information to the available extend for each bridge is attached as separate report for reference. The contractor is to carryout confirmatory survey and site investigation report to substantiate the detail design as per employer's requirement. i.e. 5-4 Requirement of Bridge Design.
iii. The bridge superstructure carriageway may > 11.80m to match with highway geometric; super elevation requirement parameters etc. but 11.80m is the minimum required superstructure width including safety barrier. The deck is to overlay by 75mm thick asphalt concrete.
iv. The pier and abutment protection is to propose by the contractor based on site specific hydrological characteristics but river channeling; river protection etc. are separate item of work and is allocated in item rate basis.
v. The utilities facilities optical fiber, bridge lighting, marking; approach RCC slab, RCC return wing wall and back filling, slope work for the additional 10m on either side is the responsibilities of the Design and Build Contractor.
vi. The proposed length is the minimum required length. No reduction in length is permitted unless and until unavoidable site condition has arisen and got approved by the Engineer. Despite if it is to increase the bridge length, no cost variation shall be applicable thereof.
vii. The design shall be based upon a useful economic life of 100 years for all elements structural facilities assuming the employer will perform normal routine maintenance.

5.4.2 Expressway (Road) Design Standard

The following codes shall be used as references to be consulted for more specialized aspects of design not covered in the ruling design code:

1. Asian Highway Classifications and Design Standards,
2. Nepal Road Standards, 2070
3. Indian Road Congress (IRC)
4. Standard Specifications for Highway Bridges, the American Association of State Highway and Transportation Officials (AASHTO), latest edition, including interim revisions.
5. A policy on Geometric Design of Highways and Expressway (highway)s, AASHTO
6. Standard Specification Road and Bridge Works -2073 (with amendment 2075), Ministry of Physical Planning and Works, Department of Roads, Government of Nepal
7. CEB-FIP Model code for Concrete Structures, 1990 (CEB-FIP MC90)
8. Traffic Sign Manual, 1997 by Department of Roads
9. Manual for Uniform Traffic Control Devices, Federal Highway Administration, USA
10. Road Safety Notes
11. Roadside Design Guidelines, Federal Highway Administration, USA

12. Rigid Pavement Design: IRC 58-2011 "Guidelines for the Design of Plain Jointed Rigid Pavements for Highways
13. LRFD Bridge Seismic Design Specifications DPWH Guide Specifications-1st Edition, 2013.

5.4.3 Slope Protection Design Standard

Standard Specification for Road and Bridge Works, Department of Roads, Nepal 2073 (with amendment 2075) under section 2400, sub section with ***additional sub section new clauses 2417.*** In *Section 2400 River Training and Protection works* ***"Ground Anchors, Soil Nails, Rock Bolts and Rock Dowels"; 2418 "Pull out Testing of Test Anchors" 2419 "Micro Pile"; 2420 "Horizontal Drains"; 2421 "HDP Drainages Pipes" and the "Rock Nets"*** *for the slope protection works as follow*:

Ground Anchors, Soil Nails, Rock Bolts and Rock Dowels:

The soil nails or rock bolts shall comply with the DIN 4125 standards and bar tendons shall be DYWIDAG Y 1050H Prestressing Steel or approved equivalent type with yield strength of at least 950 MPa and tensile strength of at least 1050 MPa. The following Standards or, where not covered by these Standards, to their equivalent International Standards, subject to the approval by Client with quality conformations.

Rock Bolts:

The rock bolts/rock anchor shall conform to the latest editions of the following Standards or, where not covered by these Standards, to their equivalent International Standards, subject to the approval by Client (Geotechnical Engineer/Geologist).

- Standard Specification for Road and Bridge Works, DoR, 2073 (with amendment 2075) under section 2400, sub section 2413
- IS: 1786 Specifications for high strength deformed-steel bars and wires for concrete reinforcement
- IS: 2062 Steel for general structural purposes
- IS: 10270 Guidelines for design and construction of pre-stressed rock anchors
- IS: 11309 Method of conducting pull out test on anchor bars and rock bolts
- ASTM D4435 Standard Test Method for Rock Bolt Anchor Pull Test
- IS: 13219 Rock bolts for mines (cement grouted) - general requirements

Anchor (PC Strand Type)

This specification applies to the manufacture and construction of permanent anchors. The anchor (PC Strand Type) shall conform to the latest editions of the following Standards or, where not covered by these Standards, to their equivalent International Standards, subject to the approval by Client (Geotechnical Engineer/Geologist).

- IS: 1786 Specifications for high strength deformed-steel bars and wires for concrete reinforcement
- IS: 2062 Steel for general structural purposes
- IS: 10270 Guidelines for design and construction of pre-stressed rock anchors
- IS: 11309 Method of conducting pull out test on anchor bars and rock bolts
- ASTM D4435 Standard Test Method for Rock Bolt Anchor Pull Test
- IS: 13219 Rock bolts for mines (cement grouted) - general requirements
- KS D 7002 SWPC 7B

Soil Nailing

- Standard Specification for Road and Bridge Works, DoR, 2073 (with amendment 2075) under section 300, sub section 302

- AASTHO/American standard

5.4.4 Reference Codes and Specification for River Training Design

The following codes shall be used as references to be consulted for more specialized aspects of design not covered in the ruling design code:

1. Flood Control and Management Manual, WECS (2019), Singhadurbar, Kathmandu
2. IS Code 8404 (1994), Planning and design of groynes in alluvial river - Guidelines [WRD 22: River Training and Diversion Works]
3. Handbook for Flood Protection, anti-erosion and river training works, CWC (2012) New Delhi
4. EM 1110-2-1418, CHANNEL STABILITY ASSESSMENT FOR FLOOD CONTROL PROJECTS, U.S. Army Corps of Engineers
5. Nepal Bridge Standards 2067, DOR, Kathmandu
6. IRC 5-2015, Standard Specification and code of practices for Road Bridges, Section I, General Feature and Design
7. IRC 5-2014, Standard Specification and code of practices for Road Bridges, Section VII, Foundations and Sub Structures

5.4.5 Electrical Design and Installation

5.4.5.1 Standards and codes

The reference code for electrical works is presented in table below:

Table 5-8: Reference code for electrical works

Description of works	Code reference
Low Voltage Molded Case Circuit Breaker	IS 2516-1977
Transformer installation	IS 2026-1962
Earthing works	IS 3043-1966
Wiring installation	IS 732-1963
PVC Cable	IS 1554-1964
Three pin plugs and socket outlets	IS 1293 - 1967
PVC insulated (Heavy Duty) electric cables for working voltages upto and including 1100 volts (revised).	IS 1554 - 1976 (Part - I)
Air break switches and fuse combination units for voltage not exceeding 1000 V	IS 4064 - 1978
Polythene insulated and PVC sheathed cable	IS 1596 - 1977
Conductors for insulated electric cables and flexible cords	IS 8130 - 1984
General and safety requirements for electric light fittings	IS 1913 - 1978
Flood lights	IS 1947 - 1980
Rigid non-metallic conduits for electrical installation	IS 9537 - 1983
Switches for domestic and similar purposes.	IS 3854 - 1966
Switch socket outlets	IS 4615 - 1968
Guide for electrical layout in residential buildings	IS 4648 - 1968
switches for domestic and similar purposes	IS 4949 - 1968
Decorative lighting outlet	IS 5077 - 1968
Selection of switches (voltage not exceeding 1000 volts).	IS 10118 - 1982

Description of works	Code reference
Wiring Installation	IS 732 - 1963
Distribution Board	IS 2675 - 1966
HDPE Pipes	NS 40
Distribution Transformer	IS 2675 - 1977
Bush bar	IS 375
PVC Insulated cables for working voltages up to and including 1100 V	IS 694
Code of Practice for installation and maintenance of Power Cables up to and including 11 KV rating (Second Revision)	IS 1255
Bayonet lamp holders (Third revision)	IS 1258
Code of practice for fire safety of buildings (general): Electrical installations.	IS 1646
Glossary of items for electrical cables and conductors	IS 1885
High voltage test techniques: Part 1 General definitions and test requirements	IS 2071
Protection of building and allied structures against lightning	IS 2309
Danger notice plates.	IS 2551
AC Metal enclosed switch gear and control gear for rated voltages above 1 KV and up to and including 11 KV.	IS 3427
Flexible steel conduits for electrical wiring.	IS 3480
Accessories for rigid steel conduit for electrical wiring.	IS 3837
Application guide for voltage transformers	IS 4146
Boxes for the enclosure of electrical accessories.	IS 5133 (Part - I)
Recommendations on Safety Procedures and Practices in Electrical Work - Part I: General	IS 5216 (Part-I)
Brass glands for PVC cables	IS 12943
Marking and arrangement of bus bars	IS 5578 & 11353
Cross linked polyethylene insulated PVC sheathed cables. For working voltages from 3.3 KV up to and including 33 KV	IS 7098 - (Part - II)
Factory built assemblies of switchgear and control gear for voltages up to and including 1000 V AC and 1200 V D C.	IS 8623 - (Part -I)
Bus Bar trunking system	IS 8623 - (Part -II)
Miniature Circuit Breakers	IS 8828
Methods of test for cables.	IS 10810
Earth Leakage Circuit Breakers	IS 12640
Air Circuit Breakers	IS 13947- (Part- I)
Molded Case Circuit Breakers	IS 13947 (Part- II)
Degree of protection provided by enclosures for LV switchgear and control gear.	IS 13947
General requirement for switchgear and control gear for voltage not exceeding 1000 Volts.	IS 13947
Stationary cells and batteries lead acid type.	IS 1651 & 1652

6 Tests during construction stage and/or Completion and Governing Codes/References

All the tests specified in the Employer's Requirements to be conducted during construction stage and/or completion shall comply with Standard Specification for Road and Bridge (SSFRB) Works, DoR, 2073 (with amendment 2075). The test conducted during design and construction phase are solely responsibility of the contractor. The relevant tests not covered by aforesaid SSFRB, the IRC/AASHTO standard test specification shall prevail in order.

6.1 Reference manual for the tests of slope protection works

1. ASTM D4435 or method of conducting pull out test on anchor bars and rock bolts according to IS 11309
2. IS 12269- 2013: Specification for ordinary and low heat Portland cement

6.2 Testing of Optical fiber works

Testing of laid duct shall be carried out as per the DIT (Duct integrity test) procedure to blowing of optical fiber cable. Section wise test shall be done with foam mandrill prior to blowing of optical fiber cable. However, in case any defect is found, the duct-laying contractor shall be responsible for removing of the defect at the earliest. Testing of the complete section (between two stations) to the satisfaction of the Engineer as per test schedule submitted by the Contractor according to his work schedule. Testing and Handover of the network along with test report and as-built documentation.

7 Tests after Completion and Governing Codes/References

All the tests after completion if applicable shall comply Standard Specification for Road and Bridge Works, DoR, 2073 (with amendment 2075) and it should have better than the Nepal Standard to suit the relevant codes i.e. IS., AASHTO, The British code as per priority order.

8 Warranties

The warranties for the goods/materials/item of works shall be as per the specifications and the catalog of the goods/materials supplied by the Manufacturer, if applicable.

The works designed by the Contractor shall be fit for the Purposes specified in the Employer's Requirement. The Contractor shall affect and maintain insurance policy for the breach of professional duty including the liability against the fit for purposes.

9 Drawings

The Tender/Bid Drawings for Expressway Road, Slope Protection, River Training Works etc. and the Reference/indicative Drawings for the Bridge works are provided in separately bound volume.

10 Technical Specifications

10.1 General Specification

The General Specification shall be the followings:

a. Standard Specification for Road and Bridge Works, DoR, 2073 (with amendment 2075), Ministry of Physical Planning and Works, Department of Roads, Government of Nepal.

10.2 Particular Specifications

10.2.1 Specification for Optical Fiber

Technical Specification of Laying of Optical Fiber

Optical Fiber cable -96F Armoured type Ribbon Fiber shall be used as per Nepal Telecom Standard.

Overall Scope of Work

The following works shall be carried out:

- Survey and Design
- Installation, Testing and Handover of Underground Optical Fiber Network
- The Contractor shall carry out, survey, site layout, installation and testing for the construction, acceptance testing.
- Facilitating access to all locations in performing all the works as and when required
- Necessary right of way permissions from relevant authorities like road department, Municipality, Bridge division, local authorities, Nepal telecom etc. for trenching and construction works with close coordination and instruction of the Engineer.

The Contractor shall submit the Quality Assurance Plan (QAP). The Quality Assurance Plan should clearly set out working procedures, equipment, materials, workmanship, tests requirements, testing frequency the Contractor will adopt in carrying out the works so that the material and works are in compliance to the requirements of contract and as per the Technical Specifications.

PLHDPE Duct

The contractor shall be responsible for laying of 2 Way ducts in the trenches, cleaning, testing and jointing of laid ducts, carry out the integrity test of laid ducts and placement of manholes. The contractor shall physically inspect each and every material such as PLHDPE duct and accessories, jointing kit etc.

Trench

The trench excavation shall be carried out by the contractor on the prescribed route as per the Conceptual Detailed Project Report of Kathmandu-Terai-Fast-Track (Expressway) Road project.

The minimum depth at which the duct is to be laid through trenching is as follows:

Ordinary Soft/Silty Soil	1.3 meter
Boulder mixed soil	1.0 meter
Soft Rock	1.0 meter
Hard Rock	0.7 meter
Mixed soil of different strata	1.3 meter

Bridges/Culverts, Drain, pipelines, Highway crossing, Densely Built- up area etc. shall be carry out through the mechanized/ mechanical/ augur boring/ moiling/ tunneling/ trench-less technology, unless & until it is not technically possible. The duct shall be constructed accordingly with the international standard and requirements as specified in best code of practices.

10.2.2 Specifications for Electrical works

Power Supply System
Application

This Chapter describes the provision to be made for the supply and distribution of electrical power for the electrical equipment and services installed to provide safe conditions for the full range of operational requirements, including emergencies. Requirements for earthling and circuit breakers are important in reducing the risk of electrical fire.

Power is normally received at high voltage 11kV from the NEA 11 kV power supply and it is transformed down to 400 volts for final distribution to plant and equipment throughout the road lighting systems, via allow voltage main switchboard, which contains control and protection equipment for the numerous circuits. An emergency generator facility, DC power supply, and uninterruptible power supply are also included to secure safe operation of electrical facilities during times of NEA power outages.

Incoming supplies and key items of equipment such as transformers and main distribution cables are frequently duplicated, and appropriately sized so that if one is out of service, either because of a fault or for maintenance, service can be maintained via the other for as long as necessary.

To maintain supplies to essential equipment in the event of failure of the incoming supplies, standby power shall be provided. This may take the form of uninterruptible power supply (UPS) equipment, which uses battery power to maintain supplies without a break to connected equipment for a limited period of time, and diesel powered standby generators which will start automatically when a mains failure is detected and run for as long as fuel is available or until mains power is restored. In the latter case, a limited amount of UPS provision is needed to cover the short period required for the standby generator to start and run up to speed, and also for the possibility of a failure to start. A stand-by generator will be necessary such as where there are essential loads, such as pumping, which exceed the practical capacity of the UPS.

The main equipment comprises 11kV and 400V switchgear, transformers, distribution boards, luminaires and associated equipment supported by stand-by supplies.

Facility Structure

The power distribution equipment comprises the following facilities:

- Substation Building at service area and electrical room facilities (including DC power supply uninterruptible power supply), generator room
- Substation Building stand-by generator room (including underground fuel tank)

Applicable Standards

These facilities abide by the laws and standards below:

- Electricity Business Act
- International Electro Technical Commission (IEC)
- Institute of Electrical and Electronics Engineers (IEEE)
- Illuminating Engineering Society (IES)
- Emergency Generator Facility Earthquake Resistance Design Guidelines (NEGA)

These facilities must be manufactured, installed, tested, and commissioned under a quality guarantee and quality management system meeting ISO 9001 standards. The manufacturer must be an organization which possesses ISO 9001 certification from an independent public body.

Basic Requirements

a. Basic Design

The power distribution equipment will receive 11kV, 50Hz power from NEA and these lines will run into the high voltage electrical room in the substation building and total O&M building. The boundary of responsibility for NEA jurisdiction will be installed at the switchgear panels and the interior sector switchgear (DS) will be the primary NEA cable bed. The high voltage electrical room will comprise 11kV switchgear and a transformer board for step-down conversion of 11kV to 400V. The 400V electricity will be supplied to the electrical room, where it will be converted to either 220V or 110V as needed to supply power for each piece of equipment. The status of each device can be monitored from the front of the switchgear and cubicle, and the necessary signals will connect to a

control system device through the relay terminal board, to enable monitoring control.

Backup power for use during NEA power outages is provided according to facility importance level. Circuits are classified into general circuits (AC), emergency generator circuits (GC) and important circuits (INV).

Requirement for electricity shall be assessed for each main area of demand, to determine the total connected load in kVA and the likely maximum demand. This will enable the supply capacity and the ratings of the plant (transformers, switchgear, and cabling) to be established. Electricity supply organizations shall be consulted at the design stage about the estimated installed load for all electrical equipment (lighting, pumps, fans etc.). Information for discussion shall include sufficient predicted load profiles, plotted against time over typical 24-hour periods and any seasonal variations as well as peak demands during an emergency.

Maintaining a high-power factor is necessary to minimize tariff penalties from the supply authority and to reduce electrical losses. Power factor correction equipment shall be installed, where necessary, to achieve a minimum overall power factor of 0.92.

One high voltage (HV) supplies, at 11kV and derived from near NEA substation, and duplicated two HV/LV transformers shall be installed ensure maximum security of the power supplies. The cables associated with these services are separately routed for maximum security of supply. The HV is transformed to 400V and distributed via the low voltage (LV) switchboards to distribution panels mounted at road level

For security of essential loads an uninterruptible power supply (UPS) is provided, and a standby generator shall also be provided.

b. Reliability

This system will run 24 hours a day, 365 days a year. Devices which can bear up to sustained use will be employed.

Security of supply is paramount. Primary supplies shall ideally be derived from two independent sections of the 11kV network which, in turn, should preferably be derived from different points on the National Grid system. Careful consideration shall be given to establish if faults on one section of the system feeding one side can affect the second supply.

It can be difficult to obtain two truly independent separate supplies. They may be independent up to a point but still be derived from a common 11kV grid substation. Failure of the supply at the 11kV level, such as by damage to overhead lines, could lead to loss of both incoming supplies and this possibility shall be taken into account when assessing standby supply requirements.

A UPS with a 2-hour back up capacity will normally be provided for essential loads (as discussed under UPS).

c. Extensibility

Extensibility will be made possible, to promote ease of future expansions and repairs. It will be made easy to add basic facilities, etc.

d. General requirement of Design and Maintenance

Electrical equipment to supply and control electrical services shall be designed to have a minimum 25-year service life. Its design requires special care and attention to detail to ensure continuity of supply, safe working conditions, performance, proper operating sequences and physical measures to combat a hostile environment.

The maintenance philosophy to be adopted shall be taken fully into account in the initial design of the whole of the electrical system. The system shall be capable of being safely maintained. Onerous maintenance requirements may be reduced by specifying the most appropriate plant.

The cable layout and circuitry shall be designed with maintenance in mind and particular attention paid as to how future electrical testing will be carried out and at what frequency. Ease of fault finding in the system shall also be taken into consideration together with provision for removing and replacement of the installation at the end of its useful life.

Minimum standards for the design and installation shall be those given in BS 7671: Requirements for Electrical Installations or IEC 60364 Low Voltage Electrical Installations. If the minimum standards included in the Standard are not acceptable and higher standards, or particular alternatives, are required, these shall be defined under the relevant section of the project specification, with reference to other appropriate standards. The requirements of relevant legislation such as EEC Directives and the Electricity at Work Regulations1989 must be met.

Power Distribution Equipment

This item will be applied to devices installed as part of power supply control facilities (here in after, "the facilities.")

Equipment Outline:

a. Use Locations

The equipment will be installed in the electrical room and the devices shall be supplied indoor devices.

b. Surrounding Conditions

Temperature:

Indoor 0°Cto+40°C

Outdoor -10°Cto+40°C

Humidity

Indoor 10% to 85% RH.

However, this assumes no condensation.

Specification of Substation equipment

a. Device List:

The device list for the power distribution equipment shall be prepared as per actual requirements as shown in drawing and design.

b. Device Design:

The designs for the devices and equipment are detailed below:

(a) All devices are "indoor use" except when specified otherwise.

(b) The shape of the housing for high-voltage devices must be IEC 62271-1 HV switchgear conforming to the standards.

(c) The shape of the housing for low-voltage devices must be IEC 60059 LV Switchgear conforming to the standards:

(d) All sides of the high voltage power distribution panel must have doors, and the back side must have a hooking cover or door.

(e) Materials for the high-voltage and low-voltage panels must have capacities exceeding those of a steel sheet (hot rolled steel sheet) or equivalent item.

c. Temperature Increase

Temperature increase inside the panels and within each device must meet the compliance standards mentioned in the previous item detailing ambient conditions and must be within a range that does not interfere with any of the components.

Detail Specification for power supply system

a. Transformers

The power supply shall be equipped with a transformer. The transformer shall be a 11000/400V Dy11 type, with sufficient kVA rating to enable one transformer to carry the whole of the required load without excessive temperature rise, although load shedding may be implemented to disconnect nonessential loads. Restricted Earth Fault protection shall be provided for the transformers.

Vector groups other than Dy11 may be more appropriate where large inductive loads are connected to the transformer.

Depending on earthling configuration and resistance, the neutral point of each transformer shall be earthed through an adequate link within the LV switchboard. Low Voltage (LV) System

b. LV Switchboards

The design of the low voltage system shall be based on the following.

LV switchboards shall be suitable for operating on a 400V, three phase, 4 wire, 50 Hz supply with ingress protection to IEC IP31. They shall be fault rated for 50KA for 1 second.

Switchboard enclosures shall be of cubicle construction, with units mounted in tiers within each cubicle, assembled to form a flush fronted, floor mounted, free standing, dust protected metal enclosure having 1 to 1.25m minimum access from the front, with bottom cable entries whenever possible. To allow for future requirements, a minimum of 25% spare ways shall be included. The maximum overall height of the switchboards shall be 2.2 m to aid access and operation, with the operating switches and dial reading instruments at a maximum height of 2.0m, minimum height 0.45m, from the finished floor level. Switchboards shall be arranged with 2.5m free space at the front and back and 2m at each end.

c. Protection systems

All protection systems for the LV distribution shall be compatible. Certain HV protection circuits or circuit breaker operations may require a response from the related LV protection system.

When specifying any form of protection system, it is necessary to ensure that discrimination is maintained throughout each circuit and sub-circuit, to prevent tripping of higher-level circuits.

d. LV Distribution for Lighting, Electrical Distribution Panels

The LV switchboards shall provide separate circuits for the various stages of lighting, (emergency lighting shall also be connected to the UPS equipment).

Electrical distribution panels (EDPs) are required throughout a road.

Equipment within the EDPs shall be rated for the temperature rise within the enclosures.

Particular care shall be taken in the design of the EDPs to ensure that adequate space is available for all equipment and connections. EDPs shall incorporate other electrical equipment such as connections for CCTV, communications, traffic loop detectors, control outstations etc. Suitable socket outlets (220V AC) for the TOA and special socket outlets for the use of the Fire Brigade may be required.

Care shall be taken to provide adequate terminations and space to allow reasonable bending radii of tails and outgoing cables.

Conduits for the final circuits from the EDPs to luminaires shall comply with IP65 and the use of

stainless-steel conduits and accessories is required. Final circuits shall be arranged to suit the characteristics of the lamps served (including starting currents).

IEC 60364 requires that the earthling bonding system from the services buildings shall be extended to each EDP to ensure the integrity of the earthling system (TN-S system) by the provision of a separate circuit protective conductor (PE) other than using the armoring of the sub-main cables. The PE shall also be bonded to extraneous conductive parts.

e. LV Distribution in Services Buildings, etc.

In addition to the LV supplies for lighting, LV distribution is needed for the various services. A "clean" supply may be needed for computer systems.

Earthling systems to provide equipotential bonding, frame earthling, neutral point earthling, computer system "clean" earths and general protection shall be considered when designing Services Buildings. High quality copper systems shall be installed, and allowance made for the testing facilities to be provided. The laying of earth electrode mats may be required before building superstructure work commences. The bonding system may require to be extended to connect equipment outside the Service building.

Stand-by Generator Facility

a) General

Where it is likely that drainage pumps will need to be operated under mains failure conditions to maintain the security and administration facility, such loads will be beyond the capacity of a UPS. For such cases, automatic start standby generating equipment shall be considered.

Separate accommodation, with 4 hours' fire protected enclosure, shall be provided for the standby generating equipment, fuel tanks etc.

As an alternative to permanently installed standby generating plant, consideration may be given to the provision of suitable connecting points for the use of mobile generators. The availability of a suitable generator shall be carefully assessed, particularly taking into account competing demands that may be made for use of such plant.

b) Standby Generator Design Considerations

A standby generator, where required, may be specified to accept load in two stages, the first not exceeding 60%, and the system design shall allow for this.

Fuel storage tanks, shall store sufficient fuel for two days running at full load. A dump tank shall be provided external to the diesel set room to take the contents of the day service fuel tank which will empty automatically should a fire occur in the diesel room. The dump tank shall be provided with pumps to empty it.

Separate accommodation shall be provided for the standby generating equipment, fuel tanks etc.

c) Equipment Outline

i) Location

The usage location shall be the east-side generator room, and an indoor model shall be used.

ii) Ambient Conditions

Temperature:

Indoor 0°Cto+40°C

Outdoor-10°Cto+40°C

Humidity

Indoor 10% to 85% RH.

However, this assumes no condensation.

d) Facility Structure

The emergency generator facility will consist of the following items:

Item	Unit	Qty	Comments
AC Generator	Unit	1	***** KVA, 3P3W, 11kV, 50Hz, 4P**
Diesel Engine	Unit	1	TBD KW, radiator cooling, light oil or electric start-up
Generator Panel	Panel	1	VCB, EVT, CT
Automatic Start-Up Panel	Panel	1	EXTR, AVR, auxiliary circuit
Start-Up DC Power	Set	1	DC24V200Ah
Supply			
Exhaust Muffler	Unit	1	85 dB (A) attached to generator
Fuel Transfer Pump	Unit	1	0.75kW
Fuel Tank	Unit	1	*** liters
Fuel Supply Box	Panel	1	SUS-made outdoor, wall-mounted
Vent Fan	Unit	2	85dB(A), fan5.5kW, damper, anti-vibration
Exhaust Duct	Unit	1	With damper and hood

Device Structure and Specification

Device designs are stipulated as follows:

(a) All devices shall be "indoor type" unless specified otherwise.

(b) The shape of the housing for high-voltage devices must be IEC 62271-1 HV switchgear conforming to the standards in the table below.

Panel Type	Format	Standard
Generator Panel	CW	IEC 62271-1

First format letter: C: Cubicle-Type Switchgear

Second format letter: W: Pull-Out-Type Device X: Fixed-Type Device

Y: Carry-Out Type

The panel material must have capacities exceeding steel sheet (hot rolled steel sheet) or the equivalent.

(c) Devices and power distribution wires must be heat-resistant so as not to be affected by heat generated by the motor and must be firmly affixed. The motor and generator must include anti-vibration rubber or similar measures to absorb vibration.

(d) The engine must include a device exceeding the capacities of the lubricating oil pump, and the sliding portion and moving parts of the lubricating oil supply nozzle must not cause a breakage in the oil film when switched off.

(e) The devices must be coated or painted to prevent rust. Pipes must be painted the same color as the

generator. Once the pipes are painted, a color stripe shall be painted at the entrance/exit of the pipe, along with an arrow indicating the direction of the flow through the pipe. Furthermore, the surface of pipes to be buried in the outdoor pit must be painted to prevent rust.

(f) All components of devices, etc. must meet or exceed JIS or IEC or IEEE standards, and effort should be made to increase reliability of all devices by using a standard for components that exceeds actual usage conditions by as much as possible. In addition, anti-explosive designs must also be compatible with these standards

(g) These devices must provide a stable supply of electricity to each type of load system.

(h) To prevent movement and falls during earthquakes, items equipped with anchor bolts and anti-shake devices selected based on earthquake engineering calculations must include anti-quake stoppers.

(i) Radiator shutters must automatically open during diesel engine operation and close when operation is stopped.

(j) Dimensions must fit the radiator-equipped Stand-by generator facility structure, and not impede exhaust.

(k) Meters must be included to measure the following operational conditions.

(l) Rotation or frequency of the internal combustion engine.

(m) Lubricating oil pressure on the internal combustion engine. (However, for items which supply lubricating oil through a forced circulation system, it must be possible to change to measuring lubricating oil amount or lubricating oil surface.)

(n) Lubricating oil temperature in the internal combustion engine (however, for items which operate based on the temperature of the water used to cool the lubricating oil, it must be possible to change to measuring the temperature of the cooling water.)

(o) Cooling water temperature in the internal combustion

(p) Silencers must satisfy area noise regulations and must be designed so as not interfere with the performance of the motor.

Monitoring Control Format

a) Power Reception Control

Control is achieved through the power receiving (automatic/manual) toggle switch mounted on the power receiving panel and the remote-direct toggle switch.

b) Power Recovery Control

i. When power restoration is detected at the voltage relay at the power receiving point, after being confirmed by the timer and tripping the bus-tie circuit breaker, the power receiving circuit breaker is thrown.

ii. When the power receiving circuit breaker (52) is thrown, a stop order is sent to the generator simultaneously.

c) Lighting Control

Lighting control is achieved using remote manual toggle switch mounted on the lighting control panel, and the power receiving remote-direct share toggle switch mounted on the power receiving panel.

d) Lighting Control Details

i) Individual Control

- Switch the toggle switches to "manual" and "direct," then press the push-button switch on the

front of the control center unit to achieve individual control.

- If the switches are set to "manual" and "direct," the interlocking display light on the front of the lighting control panel will go out, and display signals will be sent as-is to the remote monitoring control facility.

ii) Manual Interlocking Control

- Switch the toggle switches to "manual" and "remote" to achieve interlocking control, with each applicable circuit controlled by the remote monitoring control facility operations switches.
- The signal from the main electrical room lighting control panel automatic light modulation device automatically controls the entrance lights on the main electrical room side, while the signal from the auxiliary electrical room lighting control panel automatic light modulation device automatically controls the entrance lights on the auxiliary electrical room side.

Cabling

a) General requirement

Cable fire protection shall be in accordance with the requirements of Fire Fighting section. Design of cabling shall also be based on the following.

b) Services Below Ground

Where cables are to be buried in the ground, the depths of cable trenches shall be defined so that there is no ambiguity regarding the depth required. For example, it may be specified that an LV cable shall be laid at a minimum depth of 500mm on a bed of sand 150mm deep (i.e. a trench depth of 650mm). Cable tiles or marker tape shall be provided over the installed cables.

Where cables are housed in glazed or plastic duct pipes, it shall be arranged, where economically practical, for only one cable to be installed in each pipe. At least 25% spare ducts shall be provided, above the initial assessment, to allow for future requirements.

c) Services in Switch rooms and Services Buildings

The design of switch rooms and service buildings shall allow for adequate space for known and possible future cable routes beneath floors. In switch rooms, floors shall be of the suspended type with approximately 1m of space below them and shall conform with the Building Regulations and Local Authority requirements. Fire partitioning and barriers to aid system segregation shall be incorporated.

In switch rooms or similar locations, cable trays shall be designed and erected so that they do not say when the cable installation is completed. All fixings and accessories shall be of stainless steel or hot dipped galvanized materials may be used. Wall or ceiling mounted support systems to the cabling may be required. Such systems need to be purpose designed for each project.

Entries to equipment shall be arranged to give access to cables approaching from below. In the case of major short interconnections (such as between the LV terminals of a transformer and a main LV switchboard) consideration may be given to the use of bus duct connections rather than cable, but care needs to be taken in the physical layout of the equipment to ensure maximum economy.

Cables shall not be run beneath the floor in battery rooms.

d) Cable Design Requirements

Cables shall have copper cores. Cable cores shall be stranded (except for MICC cables) where used on any part of the lighting, power distribution, final circuit and control systems. Care is required in the selection of cable entry gladding materials suitable for a road environment.

All LV cables shall be manufactured to suitable standards and shall be XLPE insulated, steel wire armored and red LSOH (Low Smoke Zero Halogen) sheathed.

e) LV Cable Sizing

Long route lengths may require the use of cables having large core sections to meet the voltage drop, disconnection time requirements and the power correction factors for groups of cables. Cable terminations shall be sized to suit these requirements.

As the distance between the low voltage switchboard and the furthest fan or luminaire increases, cable sizes may need to be increased to compensate for the drop in voltage along the cables. Voltage drop in the LV cable system may be reduced by the provision of more frequent sources of supply, through the extension of the HV system to additional substations.

A cost benefit analysis shall be undertaken to assess the benefits of providing such additional substations compared to the provision of larger cross-section LV power cables.

f) Cable and Termination Identification

A system of identification for cables, and cable cores in terminations, shall be established and recorded.

Except where buried in the ground or in enclosed ducts, all cables shall be identified externally by standard cable markers, fixed over the external sheath, at intervals not exceeding 25 meters. All cables shall have the same identification provided at each cable termination, at each change of direction and where passing through barriers.

Cable cores and terminations shall be identified, with a previously agreed code of alphabetic and numerical symbols, by means of pre-engraved indented circular markers closely fitted to the core insulation of each constituent core. Cores not utilized shall be identified as 'spare' and shall be terminated in a spare terminal arrangement of the same pattern as that used for the 'in use' cores.

Cable voltage ranges shall be indicated by the color of the outer sheath, such as red sheath for HV, black sheath for LV and the sheath for control cables to be of some other distinguishing color.

g) Cable Segregation

Throughout an installation, strict segregation shall be maintained between services derived from different sources, or operating at different voltages, or whose operating characteristics may interfere with the satisfactory operation of other cables or services.

Tests and Inspections

a) Independent Inspection

The devices used in the facilities must be subject to an independent inspection including all the tests below at the factories where they are manufactured, and the results of the inspections must be submitted for review.

b) On-Site Inspection

Once construction on the site is complete, the following on-site inspections shall be performed, and the results shall be submitted for review.

c) General Operation Tests

When on-site inspections are finished, all facilities must be subject to commissioning as a whole and adjusted if necessary.

- Power Distribution Equipment Internal General Operation Tests
- Counter Test with Monitoring Control Facilities

Road Lighting equipment

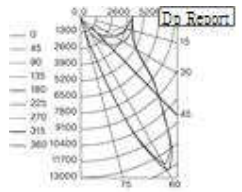
General Requirement

1) Design overview

- Reduction of human and property damage caused by traffic accidents and prevention of night crimes
- Considering energy saving, install the most appropriate and economical road lighting.

2) **Design focus**

- At night, if there is no light across the road, it is difficult for the approaching motorist to grasp the width and alignment of the road.

Design criteria and review	⇨	lighting calculation and design	⇨	actual measurement data collection	⇨	simulation verification
· KS A 3701 (Road lighting) · Light source: LED · Installation interval: By section		· Standard illumination: · Calculation illuminance · Separate receiving from NEA		 · Light distribution curve, lighting rate table, etc		 TI value verification

Review Results	· Provides a comfortable viewing environment and secures safety for drivers operating IC etc. · KS A 3701 verified the uniformity system and threshold increment (within 10%) according to the road lighting standard

3) Lighting installation standards

A) Lighting installation target

- From the user's point of view on traffic roads, the more lighting facilities are better, but the facility costs and maintenance costs are required, so it is necessary to select the facility location.
- Criteria for lighting installation places of general national highways specified in the application standards (Road Safety Facility Installation and Management Guidelines, Road Design Manual)

Continuous lighting installation location	· Sections where light from buildings adjacent to the road affects road traffic · The section between intersections and places where lighting facilities such as rest facilities are installed, with an extension of less than 1km · Sections with special circumstances that require continuous lighting in cases other than the above
Special area lighting	· Intersection · Where the road width alignment changes rapidly

	· Places that require local lighting in cases other than the above

B) Road lighting equipment Standards

i) Korea Expressway Corporation illumination standard

Category	Pavement	Road surface luminance (cd/m^2)	Road surface illumination (lx)
I/C, Main Line	concrete	1	10
	asphalt	1	15
Accident vulnerable section	concrete	2	20
	asphalt	2	30
Rest area, T/G area	-	-	15~30

ii) **Standard of Korea Expressway Corporation**

Category	Area	No of Lane	concrete(asphalt)		Pole (m)	Arr.
			1cd/m^2			
			Distance (m)	LED(W)		
Continuous lighting	Main Line	4 Lanes	75(55)	250	12-2.8	zigzag (Facing)
Special area lighting	I / C Access to rest area Etc.	one-way 1	35(35)	100	10-2.0	One Side
		one-way 2	30(25)	100	〃	One Side
		one-way 3	25(20)	100	〃	zigzag
		4 Lanes	55(45)	150	12-2.8	Facing

iii) A 3701 - IC, JCT Ramp Design Standard

1) KS A 3701(2007)

The road lighting class is adopted based on Korean lighting standard which is based on the traffic type and road grade. Condition 1of following table is adopted for expressway illumination level .

<Table 1> Road lighting grade by road and traffic type

Type of road		Type of traffic and vehicle traffic volume	Road lighting class
1.Expressways and automobile-only roads.	High-speed roads with separate upper and lower lines and all intersections are multi-level intersections, and access is completely restricted.	In case of heavy traffic 1) and complex road alignment2).	M1
		Heavy traffic or complex road alignment.	M2
		Low traffic and simple road alignment, or dark surroundings.	M3
2.Main road and auxiliary arterial road	High-speed roads and roads where the up and down lines are separated	Lack of separation 5) from other types of road users 4) and insufficient traffic control 3)	M1
		Separation of different types of road users, traffic control is well established	M2
	Major urban traffic routes and national highways	Lack of separation from other types of road users and insufficient traffic control	M2
		Separation of different types of road users, traffic control is well established	M3
3.Collective and local roads	Connection roads of low importance, local connection roads, main access roads in residential areas, access roads and connecting roads to private lands	Lack of separation from other types of road users and insufficient traffic control	M4
		Separation of different types of road users, traffic control is well established	M5

Notes:

1) Higher and lower traffic is based on the annual average daily traffic volume (AADT) of 25,000 vehicles, and if it is higher than that, it is considered to be high, and if it is less, it is considered to be less.

2) The complexity of the road linearity means the basic structure of the road, the movement of the vehicle, and the visual environment. The factors to be considered at this time are as follows.

-Number of lanes, number of slopes

-Traffic lights and signs

-The presence of entry and exit ramps, entry vehicles and exit vehicles must also be considered.

3) Traffic control refers to the existence of traffic lights and signs and laws. The means of control include traffic lights, rules of right-of-way, rules and signs of priority, traffic signs,

direction signs and road signs. In the absence or inadequate of these means, traffic control is considered insufficient.

4) Other types of road users are, for example, cars, trucks, low-speed vehicles, buses, bicycles, and pedestrians.

5) Separation may consist of imposing restrictions on the method of dedicated lanes or one or more types of traffic. With this separation, low-grade lighting can be achieved.

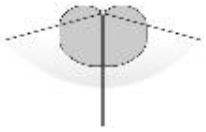
2) KS A 3701(2007) Road surface brightness standards for drivers

Road lighting grade	Average road surface luminance (Minimum allowable value) L_{avg} (cd/㎡)	Brightness equalization system (minimum allowable value)		TI (%) (Maximum allowable value)
		Overall uniformity system (Uo) L_{min}/L_{avg}	Lane Accumulation System L_{min}/L_{max}	
M1	2.0	0.4	0.7	10
M2	1.5	0.4	0.7	10
M3	1.0	0.4	0.6	10
M4	0.75	0.4	0.6	15
M5	0,5	0.35	0.4	15

Note: 1) The horizontal plane illumination is the average illuminance on the sidewalk.

2) The vertical surface illumination is the minimum illumination on the vertical surface perpendicular to the road axis 1.5m high from the road surface on the sidewalk centerline.

3) Lighting fixture and light distribution

Category	Cut-off type	Semi-cut-off type	Non-cut-off type
Light distribution			
Characteristics and Applicable target	· A device that gives little glare · Increased number of luminaires installed · Especially important high-speed road	· Apparatus with limited glare · General national highway by normal road	· Devices that do not limit glare · Low speed road with normal road
Review result	· As road lighting equipment needs to control light distribution according to the structure and characteristics of the road, select the cut-off type, which is a light distribution type suitable for the characteristics of the road.		

4) Selection of light source

a) Light source condition

Item	Condition	Reason	Item	Condition	Reason
efficiency	High Efficiencies	Reduce Power cost	Instant re-lighting	possible	Easy lighting control pattern
life span	Long Life Using	Reduce maintenance cost	Life cycle cost	low price	Reduce maintenance cost
Luminance	Low luminance	Anti-glare	Product	Local market	Easy procurement
Color rendering	Good	Easy obstacle identification	Size	Point light source	Easy light distribution control
Permeability	Good	Identification of obstacles in fog	Step of Standard capacity	proper	Need to adapt without segmentation

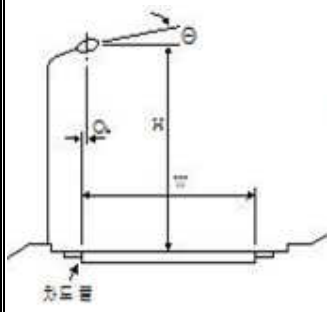
b) Required characteristic of lamps

Item \ Type of light		LED lamp
Average usage		50,000 h
Efficiency		110(lm/W)
Light color		white
Color rendering		Good
Ambient temperature Influence	Efficiency	No
	Start	No
Where to use		Fog area, smoke area, etc. City area
Apply		All sections

5) Selection of streetlight

6) Installation of streetlight poles

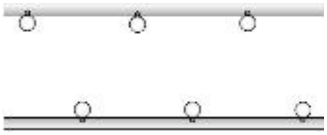
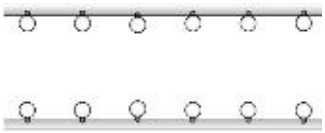
A) Installation height, overhang and inclination angle of lighting equipment

Schematic diagram	 W : Road width(m) H : Installation height of lighting fixture(m) O_H : Overhang(m) Θ : Angle of inclination (°)
Installation height of lighting fixture	· In principle, more than 10m. However, except when it is necessary to change the height due to restrictions such as prevention of glare on adjacent roads and roadways · Maintain a constant installation height of lighting fixtures with the same road width
Overhang	· It is desirable to keep the overhang as short as possible. · Constantly applied overhang in continuous road lighting facilities
Angle of inclination	· In principle, the angle of inclination is set within 5°

B) Arrangement of streetlights

· The relationship between the height (H) and spacing (S) of the roadway to the width (W) determines the light distribution of the luminaire.

· Streetlight poles are arranged in one side, zigzag, and face to face, and are selected according to the width and height of the streetlight

One side placement	Zig zag placement	Face to face placement
		

C) Mounting height (H) and spacing (S) of lighting equipment

Type of equip. **Array H and S**	**Cut-off type**		**Semi-cut-off**		**Non-cut-off**	
	H	**S**	**H**	**S**	**H**	**S**
One side	1.0W or more	3H or less	1.2W or more	3.5H or less	1.4W or more	4H or less
Zig zag	0.7W or more	3H or less	0.8W or more	3.5H or less	0.9W or more	4H or less
Face to face & Center	0.5W or more	3H or less	0.6W or more	3.5H or less	0.7W or more	4H or less

Review result	· If the uniformity system is satisfied after the road lighting simulation is conducted, the above arrangement interval is applied.

D) Calculation of the placement interval of the light pole

· The maximum distance of lighting equipment is arranged in consideration of the distribution and induction of road surface luminance by the height of the light source and the effective width of the roadway according to KS A 3701.

$$S = \frac{N.F.U.M}{E.W}$$

· S: Installation interval (m) · N: Number of arrays · U: Illumination rate

· E: Average illuminance (lx) · F: Luminous flux of light source (lm)

· M: Maintenance rate (0.6~0.75)

· W: Width of roadway (m)

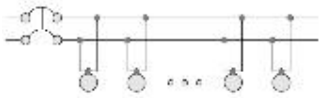
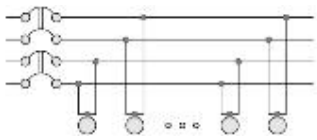
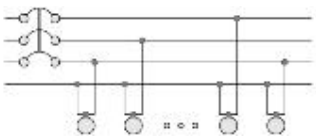
7) Piping and wiring

A) Voltage drop rate

· Sufficient wiring capacity is adopted to supply less than 6% of the total from the NEA power receiving point to the extreme end to extend the life of the luminaire and prevent deterioration of the mark by supplying a stable voltage.

(Main line: 1% or less, branch line: 5%)

B) Wiring method

Item	1P2W 1line	1P2W 2 lines	3P4W 2 lines
Circuit			
Advantage	· Most economical for short distance wiring · Uneconomical for long distances · All turn off in case of circuit failure	· Increased wiring cost · Even when cut in one circuit Lighting possible	· Economical for long distance wiring · Not economical for short-distance wiring · All turn off in case of circuit failure
Review the results	· 1 P2W 2 line, 3P 4W 2-line method makes it easy to establish safety measures, and it is possible to light up even when power failure in 1 circuit, so reliability is good. · 3P4W 2-line method applied		

C) piping

Road crossing	Earthwork section	Bridge section
· Conduit direct burial method · Buried more than 1.2m underground · Use of polyethylene conduit · Handhole installed on the cross section	· Direct conduit burial method · Buried more than 0.6m underground · Use of polyethylene conduit	· Burial method in the barrier · Use of polyethylene conduit

9) Streetlight distribution board

A) Control box basics

- Material that has not been damaged or corroded for a long time
- Structure that can withstand even minor impacts
- Maintenance of electrical facilities function as rain-proof type
- Structure that does not intrude dust inside
- Breakers and relays are parts that do not deteriorate their function even after long-term use
- Prohibit manipulation by the person concerned by locking device
- Facilities in a place that is in harmony with the surrounding landscape and does not interfere with traffic and traffic
- Enclosure made of stainless steel 2.0t or more

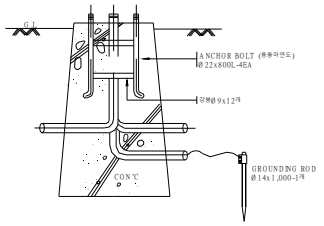
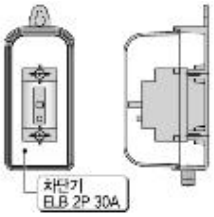
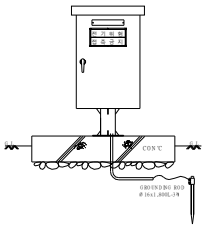
B) Circuit breaker

Main switch	Branch switch
· Type: Circuit breaker · Rated current: 200AT or less · Rated breaking capacity: 10kA or more · Protection function: Overload, short circuit protection function	· Type: Earth leakage circuit breaker 2P · Rated current: 30AT or less, 1.5kA or more · Rated sensitivity current: 50㎃, within 0.1 seconds · Protection function: both short circuit, overload, short circuit protection

C) Streetlight control

Circuit classification	Load classification	Application time	Remark
Continuous light	1/2 of street light	Lights up from sunset time to sunrise time	Control using GPS
Intermittent street light	1/2 of street light	Lights up from sunset to midnight	

10) Security equipment

Street light pole ground	Earth leakage circuit breaker	Control panel grounding
		
· Independent of earthworks, connecting ground of bridge · Ground rod Ø14×1,000mm	· Independent ground · Connect three Ø16×1,800mm ground rods	· Electrical safety management and prevention of electric shock accidents · Adoption of an appropriate capacity earth leakage circuit breaker

A) Review of KS C 8324 (distribution board for street lighting) standards

- Branch switch should use an earth leakage breaker in principle.
- The earth leakage circuit breaker is a current-operated type for medium-sensitivity electric shock protection (rated sensitivity current 30mA, operation time within 0.03 seconds).
- If the connection ground resistance value is maintained below 10Ω, it is possible to install an earth leakage circuit breaker within a rated sensitivity current of 50mA and an operating period of 0.1 seconds → (Prevent traffic accidents caused by lights off by slowing the sensitivity current)

B) Mine damage reduction plan

Classification	Improvement Plan	
Energy saving	· Streetlight lighting control (50% dimming at night) · 50% incremental control possible in case of emergency	
Light pollution measures	· Reduce light pollution damage by controlling light distribution (Use Cut Off luminaire)	
Review result	· Plan to control 50% of late-night lighting and control by season and time by program · Review of backlight control lighting method taking into account the inhibition of growth of agricultural land or animals and plants in the road lighting section (additional shading screen is installed if necessary)	

Choice of Light Source

1) Luminaires will be aligned with their long axis parallel to the road. Their light is predominantly directed transversely across the expressway giving a longitudinally

symmetrical light distribution.

2) The following characteristics shall be considered when determining the most appropriate types of lamp:

   i. Lamp Circuit Luminous Efficacy: A measure of the energy efficiency of a lamp, presented in terms of lumens of light output per watt of power consumed by the lamp and its associated control gear.

   ii. Lumen Maintenance: The average number of operating hours from new when light output will have dropped to 80% of the initial value.

   iii. Lamp Survival: The number of operating hours from new when 20% of lamps in an installation will have failed.

   iv. Restrike time: The time taken to restore full light output after restoration from interruption of the normal electricity supply.

   v. Colour Rendering Index: A measure of the ease with which different colours can be distinguished under the light from the lamp. This is particularly important if compatibility with colour CCTV is required.

   vi. Shape: Linear sources emit light over the full length of the lamp and therefore differ in beam appearance and apparent brightness from more concentrated point sources.

   vii. Dimmable: Dimmable luminaires offer greater flexibility of control for energy saving but with higher capital and possibly higher maintenance costs.

3) The design of luminaires shall be related to expressway profile, systems of support, ease of access and vulnerability from traffic. Luminaires shall be of robust construction, sealed to IP65 requirements to prevent the in grass of moisture, and adequately protected against the harsh conditions of the expressway environment.

Led Modules for road Lighting

1. General

This section covers technical requirements for LED luminaires used on roads areas. This includes road lighting, lighting under bridges, decorative lighting.

2. Applied Standard

The following standards, in whole or in part, are applied for this project. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

CIE 017:2016 ILV International Lighting Vocabulary

IEC 62717:2015 LED modules for general lighting - Performance requirements

IEC 62722-1:2014 Luminaire performance - Part 1: General requirements

IEC 62722-2-1:2014 Luminaire performance - Part 2-1: Particular requirements for LED luminaires

3. Ingress protection IP class used to define levels of sealing effectiveness of enclosures against intrusion from foreign matter (tools, dirt etc.) and moisture. Ratings are defined in the standard IEC 60529.

4. Constant light output functionality to constantly adjust the luminous flux of the light source based on the known or predicted depreciation behavior of the light source to enable a constant luminous flux over time

5. The technical specifications and the performance of a luminaire shall be presented in accordance with the standards IEC 62722-1:2014, IEC 62722-2-1:2014 and IEC 62717:2015, taking the specifications of this document into account.
6. The rated useful lifetime of a luminaire shall be submitted by the contractor for approval.
7. The maintenance factor fM shall be employed in lighting designs to ensure that the target requirements are met throughout the rated useful lifetime of a luminaire when the luminaire is maintained according to the defined maintenance schedule.
8. The luminous flux factor f is defined as the ratio of depreciated luminous flux to the initial luminous flux. For outdoor lighting the luminous flux factor f shall be determined at luminaire level.
9. A constant light output (CLO) control of a luminaire shall always be used, if available, for the selected luminaire type. The CLO lifetime shall be the same as the rated useful lifetime of a luminaire Luminaires utilizing a constant light output control adjust the luminous flux based on the known or predicted depreciation behavior of the light source to enable a constant luminous flux over time.

This is realized by initially dimming the light source to the predicted end-of-life flux and increasing the current (and as such the power consumption) over time to compensate for the depreciation in luminous flux due to ageing of the light source.

10. General structural requirements

All electronics of a luminaire shall be protected against moisture, condensation and corrosion.

The ingress protection class of a luminaire shall be IP65 in accordance with the standards IEC 60598-1:2015 and IEC 60529:1992.

The ingress protection class for spaces in a luminaire not containing electronics or optics shall be at least IP4X. The ingress protection class of a luminaire shall remain the same for the whole rated useful lifetime of the luminaire, including appropriate maintenance.

Cable entries shall provide the degree of protection against dust or moisture in accordance with the ingress protection class of the luminaire, when an appropriate external cable is installed.

Cable entries shall have rounded edges with a minimum radius of 0.5 mm.

A luminaire housing (not including flat glass, seals, vents, nuts, screws, latches and so on) shall be made from die cast aluminium, extruded aluminium or stainless steel. The service life of the luminaire housing shall be at least the same as the rated useful lifetime of the luminaire.

The hot dip galvanised coating of a luminaire housing and exterior luminaire components shall be performed in accordance with the standard EN ISO 1461:2009.

The corrosion resistance of a luminaire and exterior luminaire components shall fulfill the requirements of the standard IEC 60598-1:2015

Metal parts of a luminaire shall be galvanically separated when different metals are in interaction.

The exterior nuts, screws, latches and other fasteners of a luminaire shall be made from stainless steel A4-80 according to the standard IEC ISO 3506:2009.

The cord anchorage of a luminaire shall fulfill the requirements of the standard IEC 60598-1:2015 so that the external cable and wires are relieved from strain, including twisting, when they are connected to the wiring block of the luminaire.

11. Lighting control requirements for road luminaires

A road luminaire shall enable the luminaire luminous flux to be controlled using one or several of the following lighting control methods:

- preprogrammed stand-alone dimming,
- outdoor luminaire controller and external control, mains voltage amplitude modulation (additional requirement).

Remote Monitoring and Control System

General

The Traffic Management System shall consist of basically the following facilities and devices

- Monitoring control equipment
- CCTV camera equipment

Applicable Standards

IEC 60870 Tele control equipment & System or unless otherwise specified, items in this list of specifications shall apply the following standards:

SN	Application Standards
1	Part 5 CCTV Facilities in "Standard Design Specifications Vol. 8 Communications Facilities" (NEXCO RI, July 2014)
2	"Standard Specifications, etc. for CCTV Facilities", Specification No. 17219 (NEXCO RI, July 2017)
3	"Standard Specifications, etc. for Intelligent Remote-Control Monitoring Equipment Vol. 2", Specification No. 17210 (NEXCO RI, July 2017)
4	"(Draft) Specifications for CCTV Facilities" (Ministry of Land, Infrastructure, Transport and Tourism, January 2017)
5	"Standard Specifications for Digital Land Mobile Communication Systems (K-X)", MLIT Specification for Communication Facilities No. 55 (Ministry of Land, Infrastructure, Transport and Tourism, October 2015)
6	"Degrees of Protection Provided by Enclosures" (IP Code), IEC 60529
7	"Degrees of Protection Provided by Enclosures for Electrical Equipment" (JIS C 0920), Japanese Industrial Standards
8	IEC 60870 Tele control equipment & System

For any maters referred to multiple documents, these Specifications shall prevail

The System shall be manufactured, installed, tested, and test-operated under the quality assurance and quality control system in compliance with ISO 9001. The manufacturers are required to have a copy of ISO 9001 issued by International Organization for Standardization.

Basic Requirements

- The Traffic Management System is a system that shall be installed in the Control Office of the administration building and monitor and control disaster prevention facilities in the road (such as emergency, lighting and other facilities).

- The System shall enable operators to monitor the real-time states of facilities and alerts from the operation terminal and large screen display in the Control Office. It shall also provide road users with appropriate information through appropriate road boards and radio broadcasting.
- The system shall be operated 24 hours a day, 365 days a year; the hardware must be durable for continuous operation.
- The integrated management server shall represent the core of the System, and secure redundancy so that defect of any component shall not adversely affect the entire System. In case of any trouble with the operation system hardware of the integrated management server or application programs to be created, the backup system hardware shall automatically take over the operations for continuous operations of the entire System.
- The system shall be easily linked to other system and have additional functions for possible system extensions.
- The Telecommunication each device and equipment in the Control Office shall be powered at 220V AC via the uninterruptible power system. Other equipment shall be compatible with 220V AC, single phase 50Hz.

11 Supplementary Information replace by package -3

The summary of Geotechnical Investigation Report for Bridges is provided here below.

11.1 Geotechnical Investigation Summary Report for Bridges

11.1.1 Project Description

The proposed bridges of the contract package-3 (Ch: 49+800 to 57+400) along the alignment belong to the rocks of the Siwalik Group. In general, the proposed alignment between CH 43+136 to CH 53+700 (Figure 11-1) comprised of sandstone and mudstone of the Siwaliks.

Figure 11-1: KTFT Alignment with the Proposed Bridges

This report has been prepared with the objective to summarize the findings from the Geotechnical Investigation for reference.

11.1.2 Regional Geology

The Sub-Himalaya (Siwaliks or Churia Group) is developed in the southern part of the country (Figure 11-2) which is represented by low hills of the Churia Range. ~5-6 km thick fluvial sediments of Siwalik Group of Nepal are mainly composed of mudstone, sandstone and conglomerate that are deposited in the middle Miocene to early Pleistocene age. Based on lithology and in increasing grain size, Siwalik Group is further divided into the Lower, Middle and Upper Siwalik in ascending order. The Lower Siwalik is comprised of mudstone and sandstone, whereas the Middle Siwalik represented by thick-bedded, coarse-grained, "pepper and salt" appearance sandstone. The Upper Siwalik is identified with the presence of conglomerate with lenses of mud and sands.

Lithostratigraphic division of the Bakiya Khola section of central Nepal, Ulak (2002), Siwalik section further divided into Northern and Southern belt as shown in Table 11-1.

Table 11-1: Lithostratigraphy of Siwalik, Central Nepal

Group	Formation	Member	Thickness (m)	Lithology
Lesser Himalaya				

Main Boundary Thrust (MBT)				
Northern Belt				
Siwaliks	Upper Siwaliks		500	Cobble-pebble bearing conglomerates with lenses of muds and sands
	Middle Siwaliks	*Upper Middle Siwaliks (MS20*	1200	Thick bedded pebbly sandstone and mudstone
		Lower Middle Siwaliks (MS1)	1000	Thick bedded sandstone and mudstone. Proportion of sandstone is greater than mudstone
	Lower Siwaliks		1000	Interbedding of mudstone and sandstone. Ratio of mudstone gradually decrease and sandstone increases
Marin Khola Thrust (MKT) or Main Dun Thrust (MDT)				
Southern Belt				
Siwaliks	Upper Siwaliks		1000	Cobble-pebble bearing conglomerates with lenses of muds and sands
	Middle Siwaliks	*Upper Middle Siwaliks (MS2)*	1500	Thick bedded pebbly sandstone and mudstone
		Lower Middle Siwaliks (MS1)	1000	Thick bedded sandstone and mudstone. Proportion of sandstone is greater than mudstone
	Lower Siwaliks		1800	Interbedding of mudstone and sandstone. Ratio of mudstone gradually decrease and sandstone increases
Main Frontal Thrust (MFT)				
Indo-Gangetic Plain				
Indo-Gangetic Plain	Bhabar zone		500	Boulders, cobble and pebbles
	Middle Terai zone		500	Sands, cobble and pebbles
	Southern Terai zone		500	Silt, clay and sands

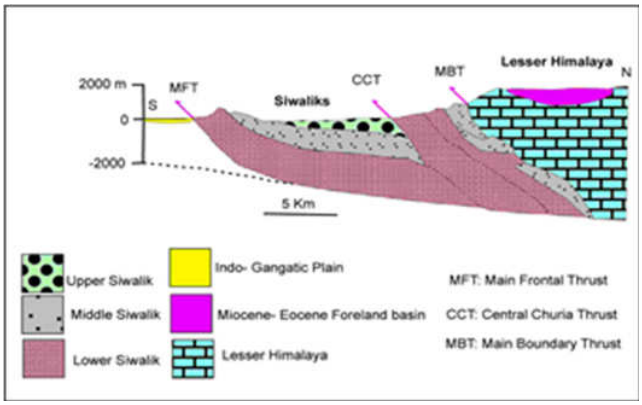


Figure 11-2: Cross-sectional view of Indo-Gangatic Plain, Siwalik and Lesser Himalaya central Nepal (modified from Mugnier et al., 1999)

The proposed package-3 is mainly composed of mudstone and sandstone. The section for the package-3 falls in between the Main Boundary Thrust (MBT) and Marin Khola Thrust (MKT).

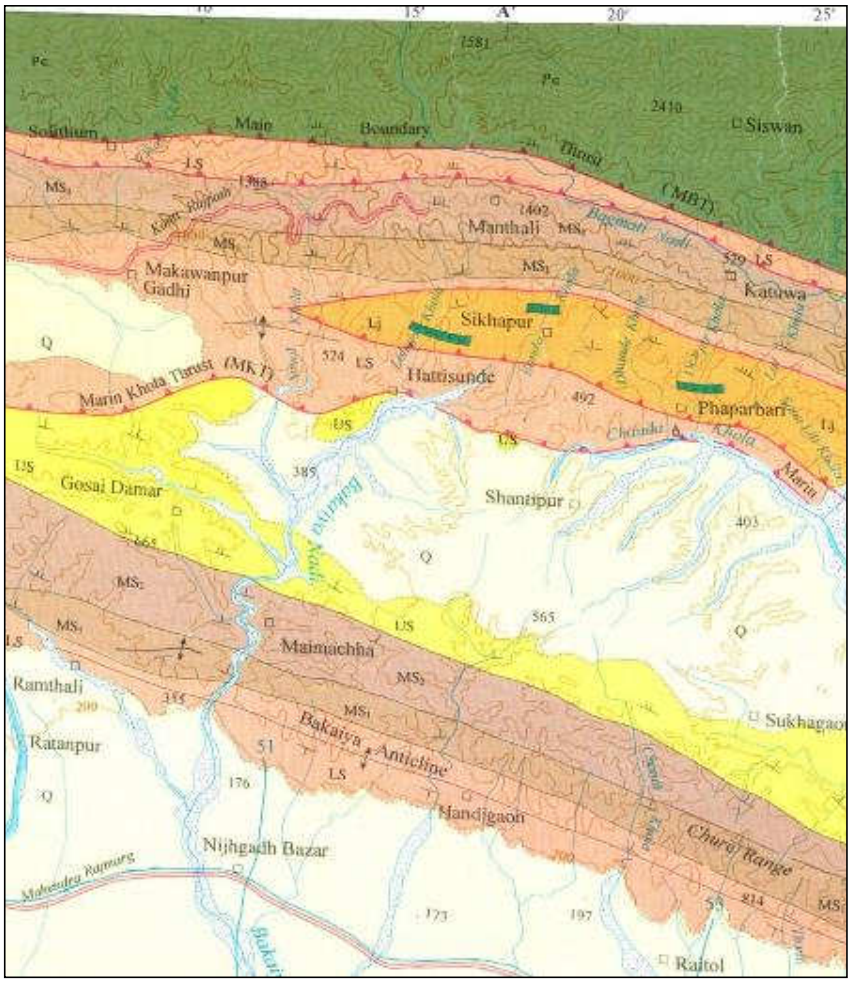


Figure 11-3: Regional geological maps of Bakiya Khola section (DMG 2002)

11.2 Ground Characterization and Baseline Information

11.2.1 Stratigraphy

The detail description of proposed bridge site, drilling depth additional point of drillings have been shown in **Table 11-2** below;

Table 11-2: Location of borehole on the bridge sites

S. N	Bridge No.	Borehole No.	Chainage of Proposed Bridges	Borehole Depth (m)	Latitude	Longitude
1	CP 3-01	RD16BP59	49+880 ~ 50+120	40	3025066.93	616064.35
2	CP 3-03	RD17BP60	50+440 ~ 50+560	40	3024978.69	616679.69
3	CP 3-04	RD18BP61	50+684 ~ 50+789	35	3024960.59	616842.42
4	CP 3-05	RD19BP62	50+879 ~ 50+939	25	3024957.31	617038.33
5	CP 3-06	RD20BP63	51+425 ~ 51+440	20	3024914.75	617556.54
6	CP 3-11	D1B65	54+799 ~ 55+039	40	3022287.26	619531.41
7	CP 3-12	D2B66	55+478 ~ 55+538	25	3021900.22	619951.87
8	CP 3-13	D3B67	56+666 ~ 56+716	25	3020729.31	620061.35
9	CP 3-14	D4B68	57+119 ~ 57+294	50	3020329.73	619997.6

The general stratigraphy indicated by boreholes in terms of strata encountered and their distribution across the Bridges are summarized in **Table 11-3** below;

Table 11-3:General lithology of Package No.: 5 area

S.N.	Bridge No.	Borehole No.	Stratum	Min./ Max. Levels below existing ground level (m)	Min. / Max RQD (%)	Min. / Max UCS (MPa)	SPT (N-Field value)
1	CP 3-01	RD16BP59	Overburden (Very dense pebbles and cobbles of quartzite along with coarse to very coarse grain with fines, silty-sand)	23			> 50
			Mod. Hard to hard grey color, fresh, fine grained with coarse grain sand, silty-clayey mudstone	23 ~ 40	0 ~ 95	46 ~ 158	
2	*CP 3-02*						
3	CP 3-03	RD17BP60	Overburden (Mod. dense to very dense brownish yellow color, fine to med. grained, silty sand)	15			22 ~ 81
			Weathered sandstone	15 ~ 40	0	-	

S.N.	Bridge No.	Borehole No.	Stratum	Min./ Max. Levels below existing ground level (m)	Min. / Max RQD (%)	Min. / Max UCS (MPa)	SPT (N-Field value)
4	CP 3-04	RD18BP61	Overburden (Mod. dense to very dense brown color, fine grained with granular, weathered, clayey-silty sand)	6			28 ~ > 50
			Mod. hard to hard silty-clayey mudstone with weathered Sandstone layers	6 ~ 35	9 ~ 100	33 ~ 168	
5	CP 3-05	RD19BP62	Overburden (Mod. dense to very dense grey colored, medium grained, clayey-silty sand with pebbles of grained Sandstone and Quartzite)	17			16 ~ 71
			Weathered layers of Sandstone and Mudstone	17 ~ 25	0 ~ 20	-	
6	CP 3-06	RD20BP63	Overburden (Mod. dense to very dense greyish white color, boulder of quartzite with blackish brown color, fine to coarse grained silty sand)	20			12 ~ 74
7	*CP 3-07*						
8	*CP 3-08*						
9	*CP 3-09*						
10	*CP 3-10*						
11	CP 3-11	D1B65	Overburden (Very dense, dark grey, white to rosy colored sand mixed with pebbles and cobbles)	40			> 50
12	CP 3-12	D2B66	Overburden (Mod. Dense to very dense, yellow colored clayey sand mixed with pebbles and cobbles)	25			25 ~ > 50
13	CP 3-13	D3B67	Overburden (Dense to very dense, yellow colored clayey sand occassionally mixed with pebbles and cobbles)	25			36 ~ > 50
14	CP 3-14	D4B68	Overburden (Very dense, grey,yellow colored silty sand and silty clay occassionally mixed with pebbles and cobbles)	50			> 50

11.3 Field Investigation and Laboratory Testing

The investigation and tests carried out are summarized below for reference.

11.3.1 Core Drilling

A total of 340.0 m of linear core drilling has been carried out during the investigation within this alignment area as given in Table 11-2 above.

11.3.2 IN-SITU Testing

Two different in-situ tests were carried out as below:

- SPT
- DCPT

SPT/DCPT test were carried as per IS 2131-1981 (Reaffirmed 2002).

11.3.3 Ground Hydrology

The water table observed during borehole drilling is given in table below,

Table 11-4: Ground water condition in boreholes

S.N.	Bridge No.	Borehole No.	Water level below ground level	Observed water loss level
1	CP 3-01	RD16BP59	N/A	None
2	CP 3-03	RD17BP60	N/A	None
3	CP 3-04	RD18BP61	N/A	None
4	CP 3-05	RD19BP62	N/A	None
5	CP 3-06	RD20BP63	N/A	None
6	CP 3-11	D1B65	3.0	None
7	CP 3-12	D2B66	5.0	None
8	CP 3-13	D3B67	4.5	None
9	CP 3-14	D4B68	N/A	None

11.3.4 Landslide Near Vicinity of Bridge Site

The overview of the landslide within the vicinity of the bridge location is given below as per the Geotechnical Investigation Report;

S. N.	Bridge No.	Landslide overview	Remarks
1	CP 3-01	Rock slide are shown major type of instability due to the road constriction.	It is required to take care of the hill slopes while excavating the foundation pits for all the bridges during construction phase and needs to address the scouring impacts by the river discharge.
3	CP 3-03	The slope stability condition is fair due to the gully action which is possibility of soil erosion and bank undercutting due to the nature of the soil.	
4	CP 3-04	The slope stability condition is fair due to the colluvium loose materials along proposed site. There is possibility of soil erosion and bank undercutting due to the nature of the soil.	
5	CP 3-05	The slope stability condition of the foundation is in stable in within 10 m upstream the small khola. The soil erosion will occur during monsoon season and bank undercutting due to the nature of the soil.	
6	CP 3-06	The gentle slope of the area indicates the stability condition is good even there are loose materials along the proposed site.	

11.3.5 SPT and DCPT Test VALUES

The SPT and DCPT values observed at bridge borehole sites are provided below;

S. N.	Depth	DCPT		DCPT to SPT	SPT (N)	Combined SPT
	(m)	No. of blows	penetration (cm)			
1	1.5	50	13			0
2	3.0	50	12			0
3	4.5	50	13			>50
4	6.0	50	8			>50
5	7.5	50	3			>50
6	9.0	50	12			>50
7	10.5	50	7			>50
8	12.0	50	13			>50
9	13.5	50	13			>50
10	15.0	50	5			>50
11	16.5	50	3			>50
12	18.0	50	6			>50
13	19.5	50	12			>50
14	21.0	50	12			>50
15	22.5	50	10			>50
16	24.0	50	13			>50
17	25.5	50	14			>50
18	27.0	50	12			>50
19	28.5	50	10			>50
20	30.0	50	7			>50
21	31.5	50	5			>50
22	33.0	50	8			>50
23	34.5	50	13			>50
24	36.0	50	12			>50
25	37.5	50	8			>50
26	39.0	50	7			>50
27	40.0	50	10			>50

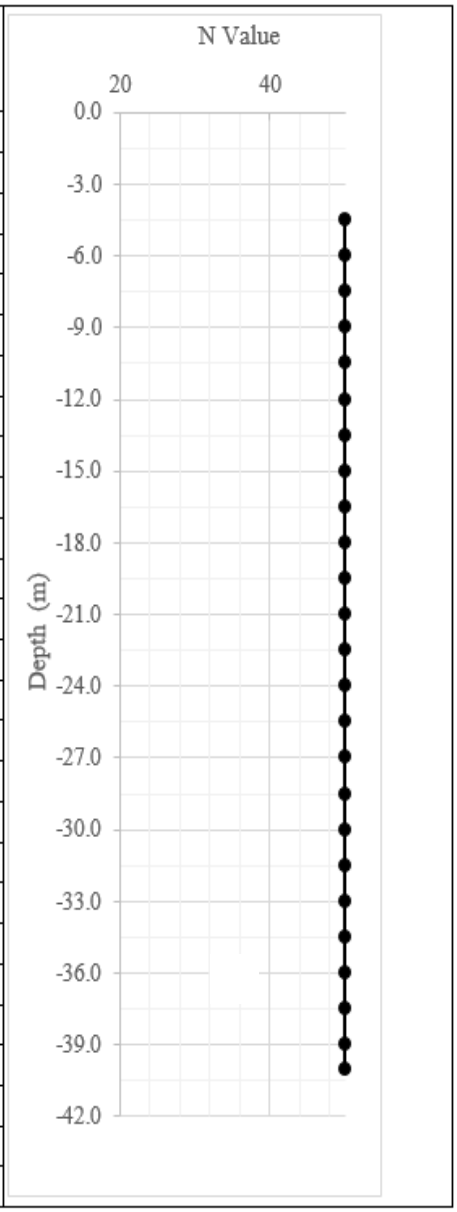


Figure 11-4: ***SPT value observed at RD16BP59***

S.N.	Depth	DCPT		DCPT to SPT	SPT (N)	Combined SPT
	(m)	No. of blows	penetration (cm)			
1	1.5				42	42
2	3.0				46	46
3	4.5				26	26
4	6.0				22	22
5	7.5				30	30
6	9.0				30	30
7	10.5				81	81
8	12.0	50	12			>50
9	13.5					
10	15.0					
11	16.5					
12	18.0					
13	19.5					
14	21.0					
15	22.5	50	13			>50
16	24.0				11	11
17	25.5				56	56
18	27.0				86	86
19	28.5	50	3			>50
20	30.0	50	4			>50
21	31.5				63	63
22	33.0	50	13			>50
23	34.5	50	6			>50
24	36.0	50	6			>50
25	37.5	50	8			>50
26	39.0	50	2			>50
27	40.0	50	7			>50

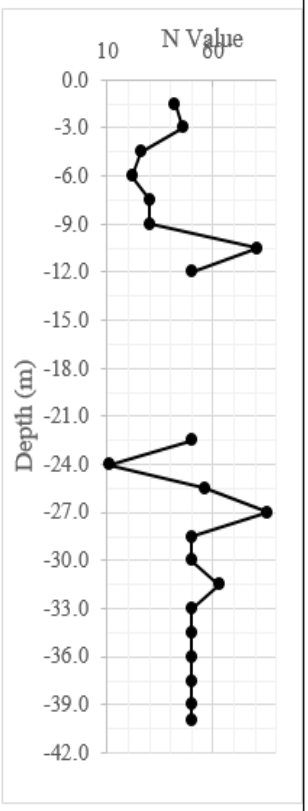


Figure 11-5: ***SPT value observed at RD17BP60***

S.N.	Depth	DCPT		DCPT to SPT	SPT (N)	Combined SPT
	(m)	No. of blows	penetration (cm)			
1	1.0				28	28
2	2.0	50	3			>50
3	3.0	50	6			>50
4	4.0	50	13.3			>50
5	5.0	50	8			>50
6	6.0	50	10			>50
7	7.0	50	10			>50
8	8.0	50	4			>50
9	9.0	50	7			>50
10	10.0	50	7			>50
11	11.0	50	10			>50
12	12.0	50	7			>50
13	13.0	50	5			>50
14	14.0	50	6			>50
15	15.0	50	6.5			>50
16	16.0	50	7			>50
17	17.0	50	13			>50
18	18.0	50	8			>50
19	19.0	50	5			>50
20	20.0	50	4			>50
21	21.0	50	6			>50
22	23.0	50	9			>50
23	24.0	50	6			>50
24	25.0	50	6			>50
25	26.0	50	5			>50
26	27.0	50	7			>50
27	28.0	50	9			>50
28	29.0	50	7			>50
29	30.0	50	6			>50
30	31.0	50	6			>50
31	32.0	50	5			>50
32	33.0	50	9			>50
33	34.0	50	6			>50
34	35	50	6			>50

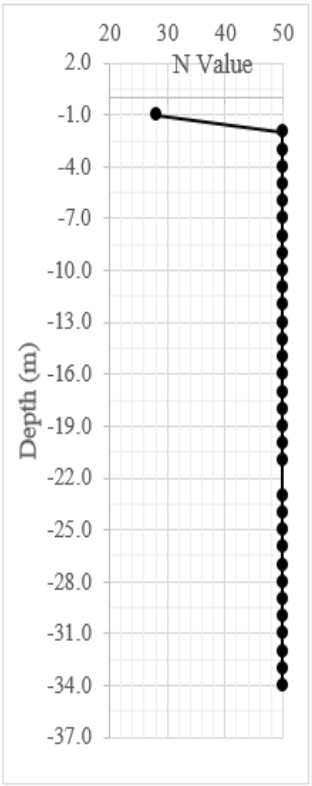


Figure 11-6: ***SPT value observed at RD18BP61***

S.N.	Depth	DCPT		DCPT to SPT	SPT (N)	Combined SPT
	(m)	No. of blows	penetration (cm)			
1	1.5				16	16
2	3.0				25	25
3	4.5				63	63
4	6.0				63	63
5	7.5				41	41
6	9.0				63	63
7	10.5				55	55
8	12.0				71	71
9	13.5				71	71
10	15.0				67	67

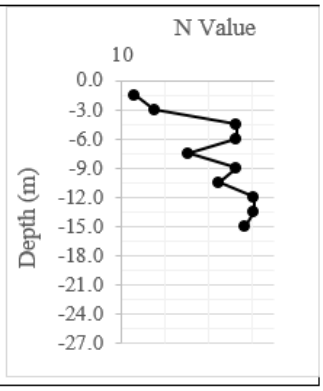


Figure 11-7: SPT value observed at RD19BP62

S.N.	Depth	DCPT		DCPT to SPT	SPT (N)	Combined SPT
	(m)	No. of blows	penetration (cm)			
1	1.0				33	33
2	2.0				74	74
3	3.0	50	2.5			>50
4	4.0	50	6			>50
5	5.0	50	5			>50
6	6.0	50	7			>50
7	7.0	50	6			>50
8	8.0	50	8			>50
9	9.0	50	7			>50
10	10.0	50	9			>50
11	11.0				47	47
12	12.0				51	51
13	13.0				50	50
14	14.0				12	12
15	15.0				45	45
16	16.0	50	6			
17	17.0	50	3			
18	18.0				45	45
19	19.0	50	8			
20	20.0				70	70

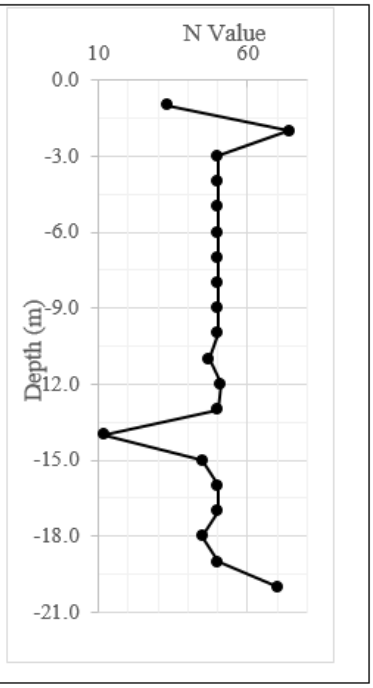


Figure 11-8: SPT value observed at RD20BP63

S. No	Depth	DCPT		DCPT to SPT	SPT (N)	Combined SPT
	(m)	no. of blows	penetration (cm)			
1	1.5	50	9	**111**		>50
2	3.0	50	13	**77**		>50
3	4.5	50	5	**171**		>50
4	6.0	50	10	**86**		>50
5	7.5	50	13	**58**		>50
6	9.0	50	6	**125**		>50
7	10.5	50	12	**63**		>50
8	12.0	50	8	**94**		>50
9	13.5	50	13	**58**		>50
10	15.0	50	5	**150**		>50
11	16.5	50	11	**68**		>50
12	18.0	50	7	**107**		>50
13	19.5	50	10	**75**		>50
14	21.0	50	13	**58**		>50
15	22.5	50	7	**107**		>50
16	24.0	50	4	**188**		>50
17	25.5	50	6	**125**		>50
18	27.0	50	11	**68**		>50
19	28.5	50	13	**58**		>50
20	30.0	50	9	**83**		>50
21	31.5	50	7	**107**		>50
22	33.0	50	4	**188**		>50
23	34.5	50	9	**83**		>50
24	36.0	50	13	**58**		>50
25	37.5	50	8	**94**		>50
26	39.0	50	14	**54**		>50

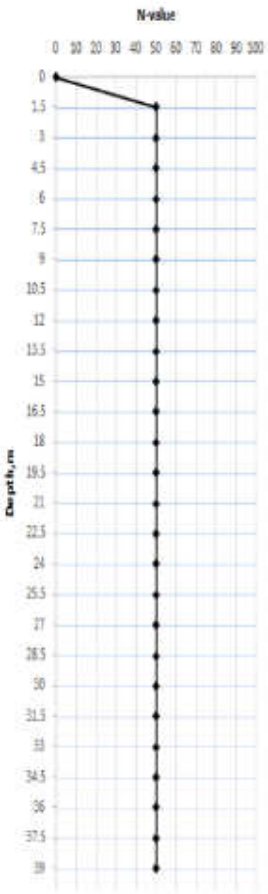


Figure 11-9: SPT value observed at D1B65

S. No	Depth (m)	SPT (N)	Combined SPT
1	1.5	51	51
2	3.0	90	90
3	4.5	62	62
4	6.0	45	45
5	7.5	52	52
6	9.0	35	35
7	10.5	58	58
8	12.0	40	40
9	13.5	35	35
10	15.0	36	36
11	16.5	32	32
12	18.0	25	25
13	19.5	34	34
14	21.0	38	38
15	22.5	32	32
16	24.0	28	28

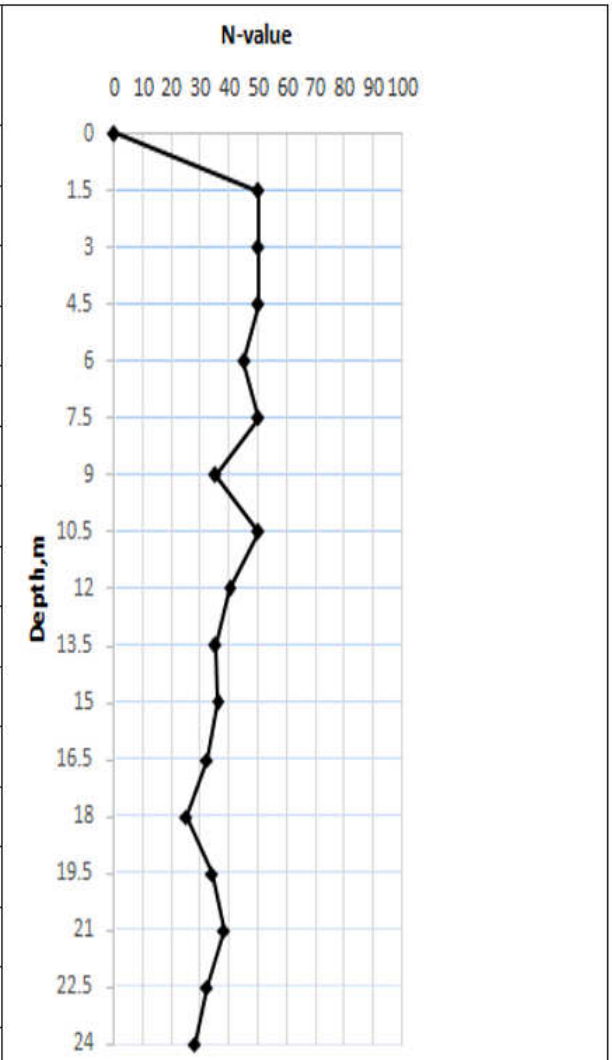


Figure11-10: SPT value observed at D2B66

S. No	Depth	DCPT		DCPT to SPT	SPT (N)	Combined SPT
	(m)	No. of blows	Penetration (cm)			
1	1.5				58	58
2	3.0				59	59
3	4.5				40	40
4	6.0				36	36
5	7.5				51	51
6	9.0	50	5	**150**		>50
7	10.5	50	4	**188**		>50
8	12.0	50	3	**250**		>50
9	13.5	50	5	**150**		>50
10	15.0	50	3	**250**		>50
11	16.5	50	4	**188**		>50
12	18.0	50	7	**107**		>50
13	19.5	50	10	**75**		>50
14	21.0	50	8	**94**		>50
15	22.5	50	13	**58**		>50
16	24.0	50	14	**54**		>50

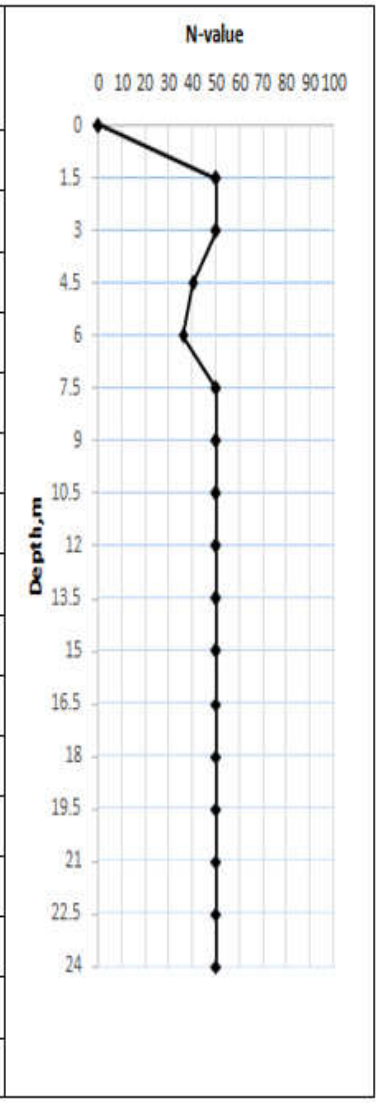


Figure 11-11: SPT value observed in D3B67

S. No	Depth	DCPT		DCPT to SPT	SPT (N)	Combined SPT
	(m)	No. of blows	Penetration (cm)			
1	1.5	50	3	**333**		>50
2	3.0	50	9	**111**		>50
3	4.5	50	12	**71**		>50
4	6.0	50	14	**61**		>50
5	7.5	50	4	**188**		>50
6	9.0	50	3	**250**		>50
7	10.5	50	2	**375**		>50
8	12.0	50	2	**375**		>50
9	13.5	50	3	**250**		>50
10	15.0	50	9	**83**		>50
11	16.5	50	9	**83**		>50
12	18.0	50	2	**375**		>50
13	19.5	50	9	**83**		>50
14	21.0	50	3	**250**		>50
15	22.5	50	3	**250**		>50
16	24.0	50	2	**375**		>50
17	25.5	50	2	**375**		>50
18	27.0	50	3	**250**		>50
19	28.5	50	3	**250**		>50
20	30.0	50	9	**83**		>50
21	31.5	50	2	**375**		>50
22	33.0	50	3	**250**		>50
23	34.5	50	7	**107**		>50
24	36.0	50	9	**83**		>50
25	37.5	50	5	**150**		>50
26	39.0	50	3	**250**		>50
27	40.5	50	8	**94**		>50
28	42.0	50	3	**250**		>50
29	43.5	50	4	**188**		>50
30	45.0	50	2	**375**		>50
31	46.5	50	10	**75**		>50
32	48.0	50	9	**83**		>50
33	49.5	50	12	**62.5**		>50

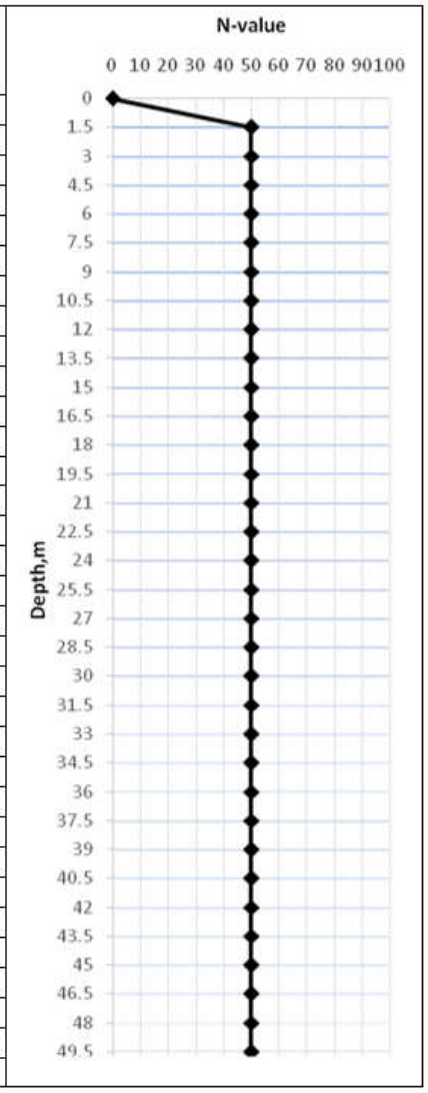


Figure 11-12: SPT value observed at D4B68

S. No	Depth	DCPT		DCPT to SPT	SPT (N)	Combined SPT
	(m)	No. of blows	Penetration (cm)			
1	1.4					0
2	2.5	50	5	200		0
3	3.0				40	40
4	5.0				31	31
5	6.0				30	30
6	7.5				29	29
7	9.0				36	36
8	10.5				13	13
9	12.0				37	37
10	13.5				45	45
11	15.0				32	32
12	16.5				28	28
13	18.0				43	43
14	19.5				39	39

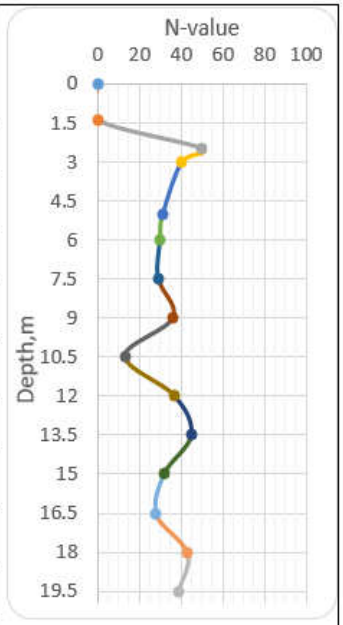


Figure 11-13: SPT value observed at D5B69

11.4 Laboratory Tests and Result

11.4.1 Laboratory Tests on Rock and soil

All together eight different geotechnical tests have been conducted during the investigation period. The list of such tests are;

i. Natural Moisture Content Test
ii. Specific Gravity Test
iii. Bulk Density Test
iv. Sieve Analysis
v. Atterberg's Limit Test
vi. Direct Shear Test
vii. Unconfined Compression Test
viii. Point Load Test

Table 11-5: Summary of lab test result of Borehole RD16BP59

S.N	Depth (m)	Soil Sample												Rock Sample						
		Natural Moisture Content (%)	Specific Gravity	Bulk Density (gm/cm³)	Sieve Analysis				Atterberg's Limit test			Direct Shear Test		Specific Gravity	Water Absorption	Bulk density (gm/cm³)	Unit Weight	Unconfined compression test (UCS) (Mpa)	Point load test (Mpa)	
					Clay (%)	Silt (%)	Sand (%)	Gravel (%)	LL (%)	PL (%)	PI (%)	Cohension (KN/m2)	Friction angle (deg)						Axial	Diametrical
1	3.0	15.549	2.583	–	0.000	13.964	86.036	0.000	–	–	–	30.45	23	–	–		–		–	–
2	4.5	9.973	2.655	–	0.000	21.353	78.647	0.000	–	–	–	–	–	–	–		–		–	–
3	7.5 ~ 9.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2.066	–	122.200		–
4	9.0 ~ 10.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2.035	–	268.702	–	–
5	13.5	19.581	–	–	0.000	14.286	85.455	0.260	–	–	–	57.42	14		–	–	–	–	–	–
6	21.0 ~ 22.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2.288	–	133.205		–
7	36.0 ~ 37.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2.488	–	46.083		–
8	37.5~ 39.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2.033	–	158.424		

Table 11-6: Summary of lab test result of Borehole RD17BP60

S.N	Depth (m)	Soil Sample											Rock Sample						
		Natural Moisture Content (%	Specific Gravity	Bulk Density (gm/cm³)	Sieve Analysis				Atterberg's Limit test			Direct Shear Test		Specific Gravity	Water Absorption	Bulk density (gm/cm³)	Unit Weight	Unconfined compression tes (UCS) (Mpa)	Point load test (Mpa	
					Clay (%)	Silt (%)	Sand (%)	Gravel (%)	LL (%)	PL (%)	PI (%)	Cohension (kN/cm^2)	Friction angle (deg)						Axial	Diametrical
1	3.0	16.129	2.564	1.060	0.000	2.362	97.638	0.000	–	–	–	36.73	18	–	–	–	–	–	–	–
2	6.0	19.753	2.727	1.013	12.810	21.140	65.210	0.840	–	–	–	40.50	18	–	–	–	–	–	–	–
3	39.0	16.667	2.542	1.272	0.000	28.034	58.539	13.426	–	–	–	–	–	–	–	–	–	–	–	–

Table 11-7: Summary of lab test result of Borehole RD18BP61

S.N	Depth (m)	Soil Sample											Rock Sample						
		Natural Moisture Content (%)	Specific Gravity	Bulk Density (gm/cm³)	Sieve Analysis				Atterberg's Limit test			Direct Shear Test (°)	Specific Gravity	Water Absorption	Bulk density (gm/cm³)	Unit Weight	Unconfined compression test (UCS) (Mpa)	Point load test (Mpa)	
					Clay (%)	Silt (%)	Sand (%)	Gravel (%)	LL (%)	PL (%)	PI (%)							Axial	Diametrical
1	6.0 ~ 7.0	–	–	–	–	–	–	–	–	–	–	–	–	–	2.265	–	91.398	–	–
2	8.0 ~ 9.0	–	–	–	–	–	–	–	–	–	–	–	–	–	2.094	–	107.141	–	–
3	15.0 ~ 16.0	–	–	–	–	–	–	–	–	–	–	–	–	–	2.251	–	138.980		–
4	19.0 ~ 20.0	–	–	–	–	–	–	–	–	–	–	–	–	–	2.238	–	52.475	–	–
5	28.0~ 29.0	–	–	–	–	–	–	–	–	–	–	–		–	2.308	–	167.762	–	–
6	34.0 ~ 35.0	–	–	–	–	–	–	–	–	–	–	–	–	–	2.186	–	33.244		–

Table 11-8: Summary of lab test result of Borehole RD19BP62

S.N	Depth (m)	Soil Sample												Rock Sample						
		Natural Moisture Content (%)	Specific Gravity	Bulk Density (gm/cm³)	Sieve Analysis				Atterberg's Limit test			Direct Shear Test		Specific Gravity	Water Absorption	Bulk density (gm/cm³)	Unit Weight	Unconfined compression test (UCS) (Mpa)	Point load test (Mpa)	
					Clay (%)	Silt (%)	Sand (%)	Gravel (%)	LL	PL	PI	Cohension (kN/cm^2)	Friction angle (deg)						Axial	Diametric al
1	3.0	25.510	–	–	0.000	2.519	96.222	1.259	–	–	–	–	–	–	–		–		–	–
2	9.0	16.577	–	–	20.811	23.089	48.000	8.100	22.382	–	–	37.66	24	–	–		–		–	–
3	10.5	22.910	–	–	0.000	6.500	93.500	0.000	–	–	–	37.66	24	–	–	–	–	–		–
4	12.0	19.878	–	–	12.997	14.419	72.584	0.000	20.076	14.286	5.790	24.22	29	–	–		–		–	–
5	18.0	17.560	2.652	1.308	0.000	1.250	75.750	23.000	–	–	–	–	–		–	–	–	–	–	–
6	19.5	17.811	2.609	–	0.000	10.000	85.500	4.500	–	–	–	–	–	–	–		–			–
7	22.5	19.648	–	1.313	0.000	17.750	80.000	2.250	–	–	–	38.05	27	–	–		–			–

Table 11-9: Summary of lab test result of Borehole RD20BP63

S.N	Depth (m)	Soil Sample												Rock Sample						
		Natural Moisture Content (%)	Specific Gravity	Bulk Density (gm/cm³)	Sieve Analysis				Atterberg's Limit test			Direct Shear Test		Specific Gravity	Water Absorption	Bulk density (gm/cm³)	Unit Weight	Unconfined compression test (UCS) (Mpa)	Point load test (Mpa)	
					Clay (%)	Silt (%)	Sand (%)	Gravel (%)	LL (%)	PL (%)	PI (%)	Cohension (kN/cm^2)	Friction angle (deg)						Axial	Diametric al
1	4.5	4.045	2.624	–	0.000	14.500	46.250	39.250	–	–	–	25.105	24	–	–		–		–	–
2	9.0 ~ 10.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2.229	–	151.860	–	–
3	12.0 ~ 13.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2.359	–	81.263		–

Table 11-10: Summary of lab test result of Borehole D1B66

S.N	Depth	Soil Sample												Rock Sample						
		Natural Moisture Content (%)	Specific Gravity	Bulk Density (gm/cc)	Sieve Analysis				Atterberg's Limit test			Direct Shear Test		Specific Gravity	Water Absorption (%)	Bulk density (gm/cc)	Unit Weight (gm/cc)	Unconfined compression test (UCS)	Point load test	
					Clay (%)	Silt (%)	Sand (%)	Gravel (%)	LL (%)	PL (%)	PI (%)	Cohension (kN/cm^2)	Friction angle (^{0})						Axial	Diametrical
1	10.5	11.174	2.565	–	0.00	6.835	90.253	2.911	–	–	–	29.27	18	–	–	–	–	–	–	–
2	13.5	31.481	2.696	–	0.00	22.059	71.849	6.092	–	–	–	48.35	18	–	–	–	–	–	–	–
3	16.5	36.364	2.655	–	0.00	14.679	81.468	3.853	–	–	–	9.37	28	–	–	–	–	–	–	–
4	19.5	13.580	2.625	–	0.00	5.753	92.055	2.192	–	–	–	19.12	24	–	–	–	–	–	–	–

Table 11-11: Summary of lab test result of Borehole D2B67

S.N	Depth	Soil Sample												Rock Sample						
		Natural Moisture Content (%)	Specific Gravity	Bulk Density (gm/cc)	Sieve Analysis				Atterberg's Limit test			Direct Shear Test		Specific Gravity	Water Absorption (%)	Bulk density (gm/cc)	Unit Weight (gm/cc)	Unconfined compression test (UCS)	Point load test	
					Clay (%)	Silt (%)	Sand (%)	Gravel (%)	LL	PL	PI	Cohesion (KN/cm^2)	Friction angle (deg)						Axial	Diametrical
1	4.5	21.705	2.609	–	0.0	10.937	89.063	0.000	–	–	–	41.43	18	–	–	–	–	–	–	–
2	7.5	19.549	2.583	–	0.0	7.927	91.159	0.915	–	–	–	31.97	20	–	–	–	–	–	–	–
3	13.5	19.259	2.585	–	16.708	18.538	64.754	0.000	–	–	–	32.36	20	–	–	–	–	–	–	–
4	22.5	17.012	2.609	–	0.0	22.301	77.699	0.000	–	–	–	23.24	26	–	–	–	–	–	–	–

Table 11-12: Summary of lab test result of Borehole D3B68

S.N	Depth	Soil Sample												Rock Sample						
		Natural Moisture Content (%)	Specific Gravity	Bulk Density (gm/cc)	Sieve Analysis				Atterberg's Limit test			Direct Shear Test		Specific Gravity	Water Absorption (%)	Bulk density (gm/cc)	Unit Weight (gm)	Unconfined compression test (UCS), Mpa	Point load test, Mpa	
					Clay (%)	Silt (%)	Sand (%)	Gravel (%)	LL (%)	PL (%)	PI (%)	Cohension (kN/cm^2)	Friction angle (deg)						Axial	Diametrical
1	4.5	11.494	2.585	–	0.00	13.87	86.13	0.00	–	–	–	21.62	23	–	–	–	–	–	–	–
2	6.0	8.333	2.586	1.376	0.00	10.94	83.33	5.73	–	–	–	–	–	–	–	–	–	–	–	–
3	6.0-7.5																		79.121	153.211
4	12.0-13.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	57.600	41.894
5	15.0-16.5	–	–	–	–	–	–	–		–	–	–	–			2.100		90.378		
6	18.0-19.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2.501	–	129.569	–	27.311

11.5 CONCLUSION AND RECOMMENDATION

11.5.1 CONCLUSION

- The bridge site topographical and cross-section was done prior to start-up of the geotechnical investigation works. Hence, the proposed drilling location may vary from the actual abutment/pier location during construction.
- It is observed that most of the core samples recovered are highly weathered and soft rock type and in many cases the sludge samples were recovered. Hence, the limited number of laboratory works were performed in such sub-soil strata samples thus requiring further tests for the detail design works during construction.
- The limited laboratory tests were not able to evaluate the shear strength parameters for the rock and soil thereby limiting to N-value for bearing capacity evaluation.

11.5.2 RECOMMENDATION

- It is recommended to insert the pile tip at minimum depth of 3m socket length. Based on the super-structure load the socket length can be increased to greater depth.
- There is limitation of number of drill holes per bridge site for the detail design of bridge as it is practice to conduct drilling on each abutment/pier location. So, it is highly recommended to perform confirmatory drilling works before starting up the construction works.
- This report shall be used as Reference Document rather than final conclusion for sub-structure design.

Appendix 1: Laboratory Equipments

The items of laboratory equipment shall be provide in the field laboratory as per approval of the Engineer, for guidelines list of laboratory equipment's are list in below table. The Laboratory equipment's shall be deliver to the site not later than sixty days after the issues a letter to commence the works.

S.N	Description	Unit	Quantity
1	**General**		
	Office Supply (furniture & Furnishes)		
	Laptop	Nos.	1
	Desktop	Nos.	1
	Printer & Photo copy	Nos.	1
	Book Slaves	Nos.	1
	Filing Cabinet	Nos.	2
	Office Table	Nos.	2
	Office Chair with Arm	Nos.	2
	Office Chair for Guest	Nos.	10
	Office Operation including Stationeries	months	36
	Providing Kitchen & Utilities with Tea & Coffee.	months	36
	Supply and Provide and maintained 4WD service Vehicle for the supervision and Monitoring (Quality Control).	months	36
	Others (Stand Fan/ Room Heater/ Water Filter/ Carpet/Curtain etc.)		
	Equipments Supply		
	5- 20 kg capacity, sensitivity 1 g	No	1
	500 gm capacity, sensitivity 0.01 g (electrical)	No	1
	5 kg capacity, sensitivity 0.1 g (electrical)	No	1
	Chemical Balance 100gm capacity, sensitivity 0.001gm		1
	Oven Electrically Operated	Nos.	1
	Water Bath Serological 2 racker solar	Nos.	1
	Mercury Thermometer 250 ^{o}C	Nos.	1
	Dial Thermometer 400 ^{o}C	Nos.	1
	Mercury Thermometer 50 ^{o}C	Nos.	1
	Wet & Dry Thermometer	Nos.	1
	Spatula's 200/150mm	Nos.	1
	GI tray Sets (various Size)	Nos.	1
	Aluminum Moisture container 75 X50mm	Nos.	1
	Rubber Mallet	Nos.	1
	Aggregate Steel Scoop	Nos.	1
	Aluminum Scoop	Nos.	1
	Gauging Trowel	Nos.	1
	S.S Bowel 2 lt.	Nos.	1
	Volumetric Flask (1000/500/250 ml)	Nos.	1
	Measuring Cylinder (1000/500/250/100ml)	Nos.	1
	Beaker(1000/500/250ml)	Nos.	1
	Evaporating Disc-100mm	Nos.	1

S.N	Description	Unit	Quantity
	Venire Caliper-150mm digital	Nos.	1
	Miscellaneous (Safety Accessories)	Nos.	1
	Specific Gravity Bottle	Nos.	1
	Sand Pouring Apparatus 200mm	Nos.	1
	Sand Pouring Apparatus 100mm	Nos.	1
2	**Sieves**		
	Set of GI Sieve 450 dia Size, as per IS 462 with lead and pan;	Set	1
	Set of Brass Sieve 200mm/850mm size dia.as per IS 462 with lead and pan;	Set	1
	Sieve Shaker capable of shaking 200mm & 450 mm dia sieve 9 Electrically operated0	nos	1
3	**Other Miscellaneous (Measuring Cylinders/Beakers/Tray/wash bottle/glass funnels/safety Gloves etc.)**	LS	1
4	**Soil Tests**		
i.	Liquid Limit test set	set	1
ii.	Compaction Apparatus (Proctor) as per IS 2720	set	1
	Dynamic Cone Penetration Equipment complete	set	2
	Water Testing Kit	set	1
	Organic Content testing kit	set	1
	Compaction Mold	set	1
5	**CBR Test set**	Set	1
6	**Core Cutter Apparatus**	Set	1
7	**Concrete tests**		
i.	Slump test Apparatus	set	3
ii.	Aggregate crushing testing machine(ACV)	No	1
iii.	Aggregate Impact testing machine (AIV)	No,	1
iv.	Los Angle Abrasion test Machine (LAA)	No.	1
v.	Concrete cube mold (150*150*150) mm^3	set	3
vi	Mortar cube mold (70.7*70.7*70.7) mm^3	set	3
vii.	Standard sand (Coarse, medium and fine)	Bag	2
8	**Cement Tests**		
i.	Le-chatelier Apparatus for soundness test of cement all complete	set	1
ii.	VI cat needle apparatus for setting time with plungers as per IS 2542 (Part 2)	set	1
9	**Machines**		
2	Digital Compression Testing Machine, Capacity 2000kN Flexure Test Attachment, 100 KN capacity for Digital CTM.	set	1
3	Digital Compression Testing Machine, Capacity 500kN	set	1
6	Concrete/ Pavement Core Drilling Machine Diamond Core Bit, 100mm dia x 200 LONG FOR CONCRETE	set	1
B	**Part 2 Bituminous Test**		
1	Constant temperature bath for accommodating bitumen test specimen, electrically operated, and thermostatically controlled (to accommodate minimum six specimens)	No	1
2	Marshall compaction apparatus, automatically operated as per EN 12697-10-30 complete with accessories (with 180 N Marshall	set	1

S.N	Description	Unit	Quantity
	Moulds)		
3	Viscometer set (for Absolute and Kinematic viscosity of Bitumen, Emulsion,etc.)	set	1
4	Ductility meter	set	1
5	Softening point (Ring and Ball) apparatus	set	1
6	Bitumen laboratory mixer including required accessories (20 litres)	set	1
7	Soxhlet extraction or centrifuge type apparatus complete with extraction thimbles with solvent and filter paper	set	1
8	Penetrometer automatic type, including adjustable weight arrangement and needles as per IS 1203	set	1
9	Riffle box (Riffle Sample Divider,14 slots(13 mm slot width)	No	1
11	Thin film oven test apparatus for modified binder either with PMB or CRMB	No	1
12	Core drilling machine suitable for 150 mm dia core	set	1
	Specific Gravity Apparatus Test for Asphalt core with buoyancy balance of 5kg capacity complete set	set	1
	Filter Paper for Marshal and Extractor Test	set	1
	Water Bath (Digital Automatic temp. controller) for Marsalis Sample.	No.	1
C	**Zinc Coating Tests**		
	Chemical	LS	1
	Digital Screw Gauge	No.	1

Note: The items and their numbers listed above table are indicative only and shall be decided by the Engineer as per requirements of the Project and modified accordingly.

Appendix 2: Optical Fiber Works and Rehabilitation & Reconstruction of Electric work

1. Optical Fiber Details

S.N.	Item	Unit	Qty
1	Normal soil(Depth 1.50 m)	Mtr.	1161
2	Soft Rock(Depth 1.20 m)	Mtr.	3515
3	Hard Rock(Depth 1.00 m)	Mtr.	1900
4	6" GI Clamp in Bridge/Culvert with supply of GI Pipe	Mtr.	370
5	Duct Laying	Mtr.	30527
6	Duct Bed preparation	Mtr.	6576
7	Laying of warning Tape	Mtr.	6576
8	450X450 mm Manhole	Mtr.	8
9	DIT	Mtr.	30527
10	OFC Laying/Blowing	Mtr.	15263
11	Spicing and termination	Fibre	435
12	Drum Test	Nos.	15263
13	Link Test with LSMP	Nos.	1
14	Survey	Mtr.	7632
15	As built drawing with GIS information	Mtr.	7632
16	Earthing	Mtr.	1
17	PCC Protection	Mtr.	63
18	Placement of Route indicator	Nos.	76
19	HDPE Duct(40 mm)	Mtr.	18000
20	End Plug	Mtr.	91
21	Sealing Plug	Mtr.	30
22	Push Fit coupler	Mtr.	30
23	Joint Closure-Branched(T) Type for 96 F	Mtr.	9
24	Optical Fiber cable -96F Armoured Typ Ribbon Fiber	Mtr.	18000
25	Warning Tape(100 mm W & 0.25 mm thickness	Mtr.	6576
26	96 fiber 2U FMS LCPC/LCPC	Mtr.	1

2. Rehabilitation & Reconstruction of Electric work Details

S.N	Material	Qty.	Unit
1	STP Pole (11Mtr)	16.00	nos
2	STP Pole (8Mtr)	11.00	nos
3	T - Channel	10.00	nos
4	8 ft Channel	4.00	nos
5	11 KV Disc insulator (With grapher Set)	36.00	Set
6	12 KV Disc insulator (With Spindle Set)	36.00	Set
7	ACSR Conductor (Size 0.03 sq. inch)	0.90	km
8	Stay set with stay insulator	18.00	Set
9	Stay Wire	90.00	kg
10	HT Cable Connecting kit.	12.00	set
11	HT XLPE Cable (70 mm. sq.) 3 core	920.00	mtr
12	LT Cable connecting kit	6.00	set
13	LT XLPE cable (95 mm. sq) 305 core	360.00	mtr

S.N	Material	Qty.	Unit
14	D- Iron Shackle Insulator	16.00	nos
15	Pole Clamp	22.00	nos
16	Full thread nutbolts (Diff. Size)	1.00	kg
17	Washer	16.00	kg
B)	**Total Material Cost (1+……)**		
S.N (C)	Labour Charge	Qty.	Unit
1	Erection work of STP Pole (11 Mtr)	16.00	nos
2	Erection work of STP Pole (8Mtr)	11.00	nos
3	Installation of stay set	18.00	Set
4	Dis/ Restringing of HT3 Wires (Size 0.05 ACSR)	0.60	km
5	Dismantling of HT 3 Wires (Size 0.05ACSR)	0.80	km
6	Stringing of LT 2 Wires (Size 0.03ACSR)	0.43	km
7	Installation work of HT XLPE Cable head	12.00	Set
8	Laying of HT Cable underground	800.00	mtr
9	Installation work of LT XLPE Cable head	6.00	Set
10	Laying of LT Cable underground	300.00	mtr
11	Dis/Reconnection of Service cable	1	nos
12	Labor Charge (Sum of item 'C')	1	Job
13	Rechargeable Charge (10%)	1	Job
14	Shutdown Charge	1	Job
15	Contingency Charge	1	Job

Bidding Document for Procurement of

Construction of Double Lane Dual Carriageway Standard Expressway Road, Bridges and Allied Works:

of

Contract Package - 3

(Ch. 49+800 to Ch. 57+400)

VOLUME IV:- REFERENCE DRAWINGS (1/3)

Issue Date: 23/July/2021

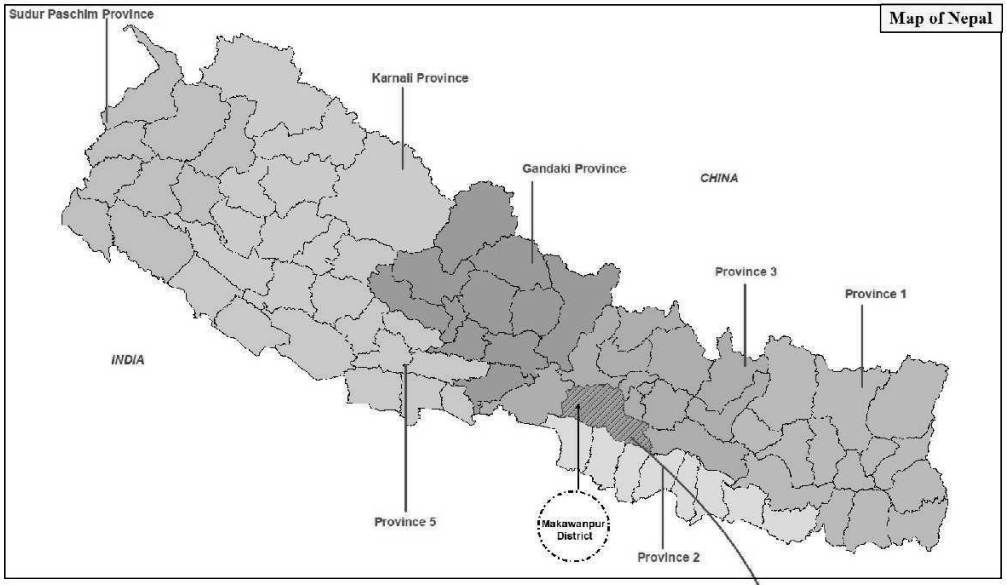
ICB Contract I.D.: KTFT/ICB/WORKS/R&B/078/079/3

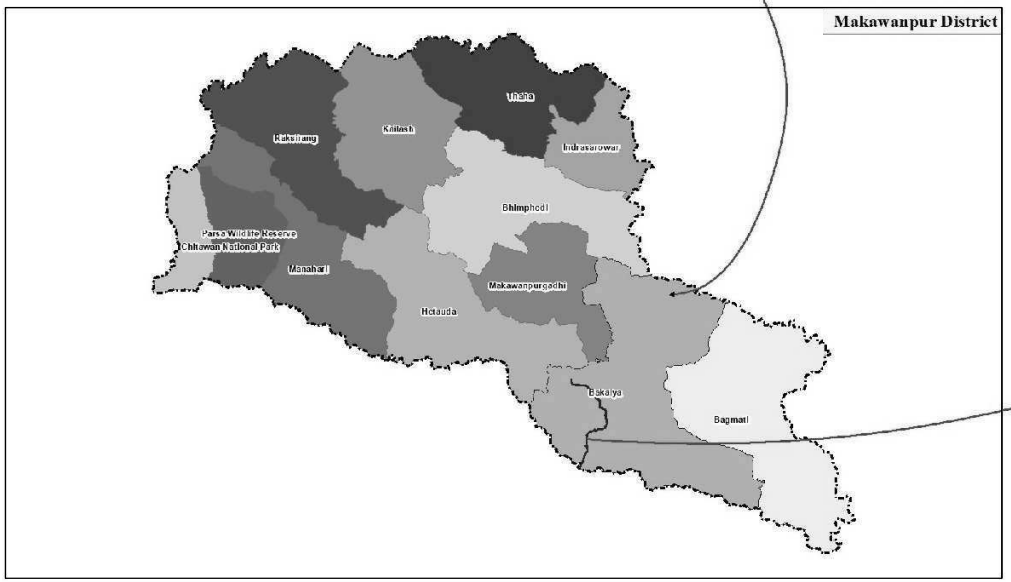
Employer: Kathmandu- Terai/Madhesh Fast Track (Expressway) Road Project, Nepali Army, Government of Nepal

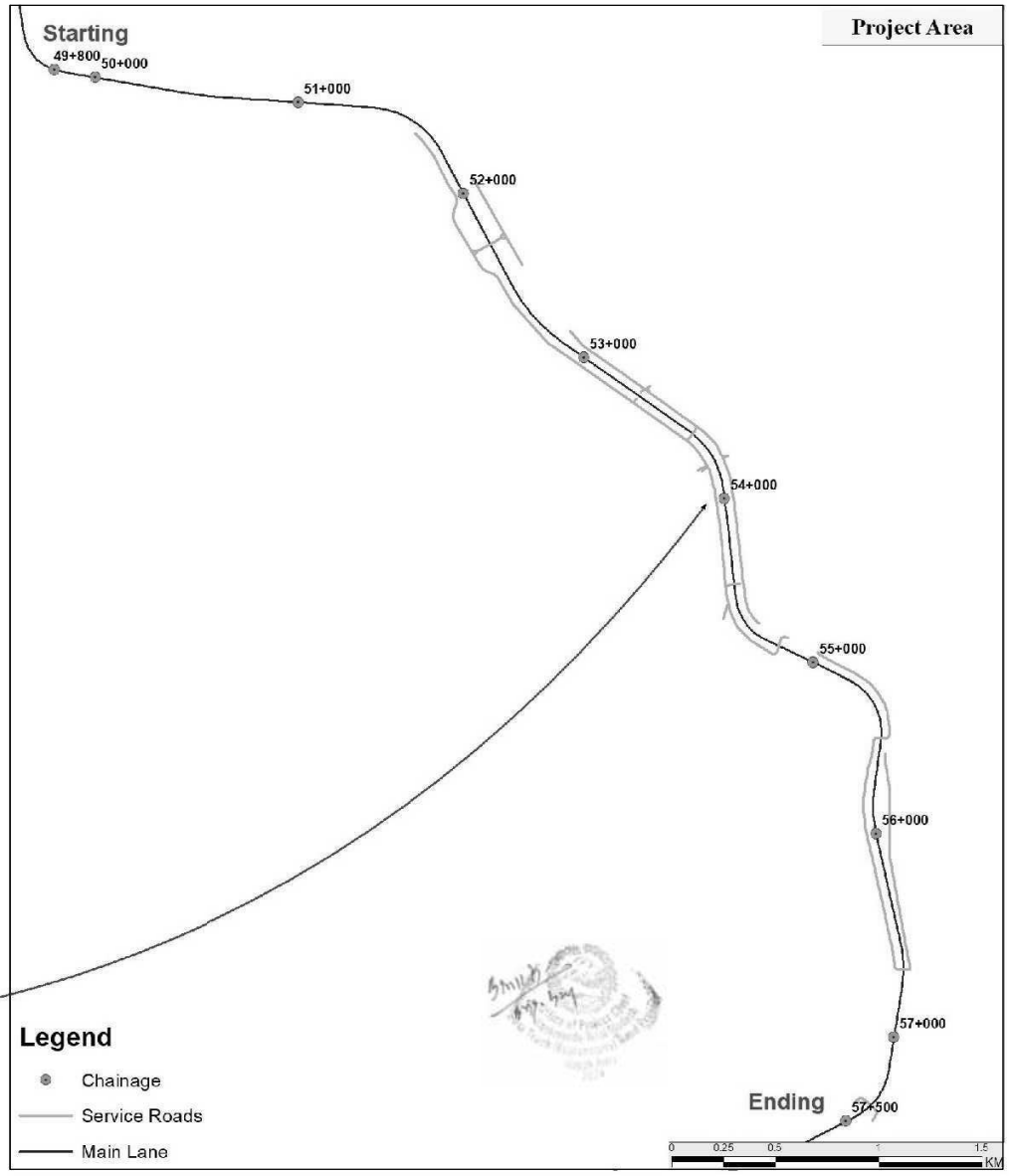
August 2021

KATHMANDU

LOCATION MAP







PROJECT NAME	CLIENT	DESIGN AND SUPERVISION CONSULTANT	DRAWING TITLE
KATHMANDU-TERAI/MADESH FAST TRACK (EXPRESSWAY) ROAD PROJECT	GOVERNMENT OF NEPAL MINISTRY OF DEFENCE NEPAL ARMY KATHMANDU NEPAL	YOOSHIN ENGINEERING CORPORATION, KOREA KOREA EXPRESSWAY CORPORATION, KOREA PYUNGHWA ENGINEERING CONSULTANT LTD, KOREA JV IN ASSOCIATION WITH GARIMA INTERNATIONAL DESIGN ASSOCIATES NEPAL PVT.LTD., NEPAL SITARA CONSULTANT PVT.LTD., NEPAL	LOCATION MAP

N
W
E
S

Coordinate System : Nepal Nagarkot TM 84
Projection: Traverse Mercator
Datum: Nepal Nagarkot
False Easting: 500,000.0000
False Northing: 0.0000
Central meridian : 84.0000
Scale factor: 0.9999
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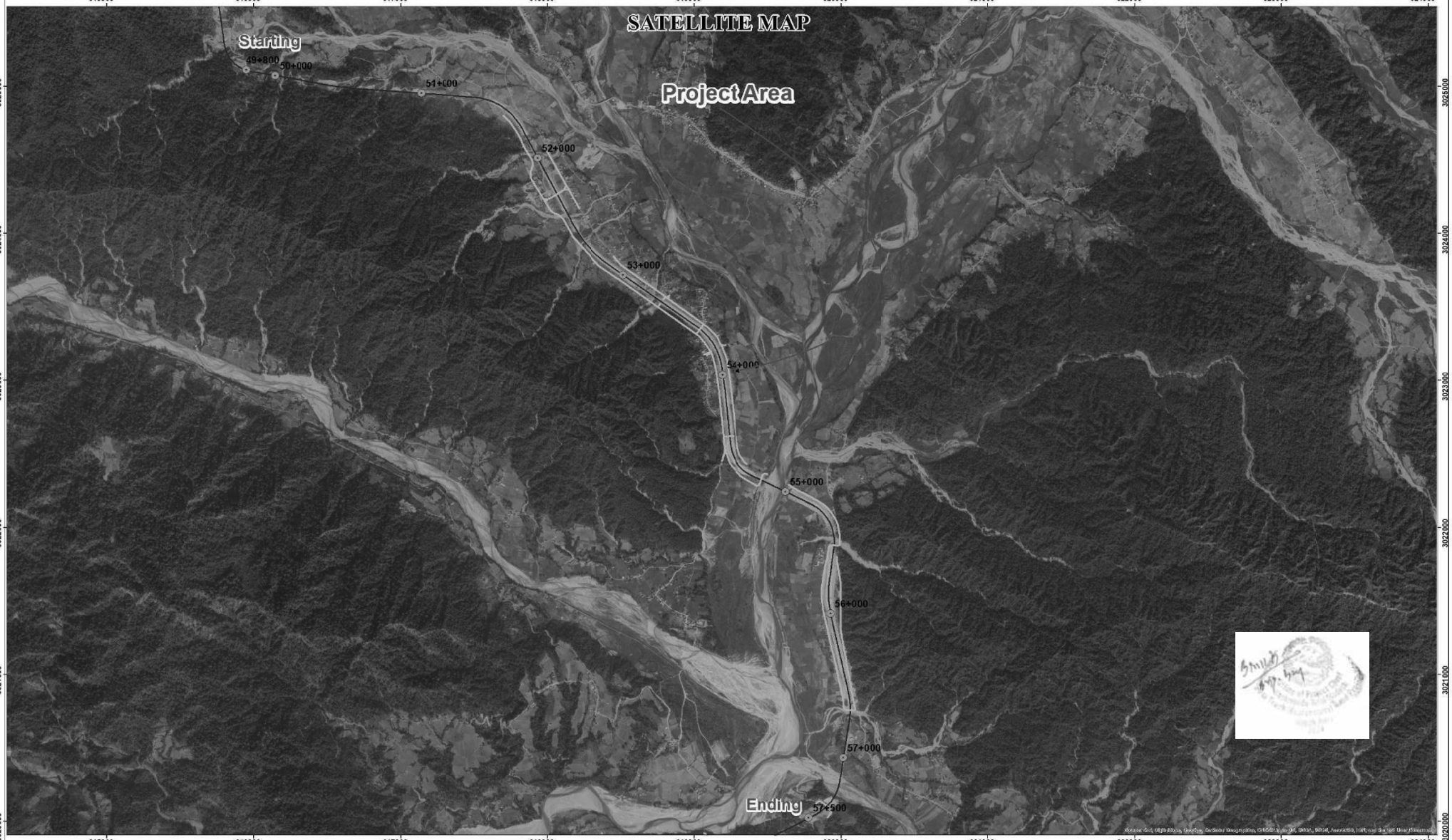
Units : Meter

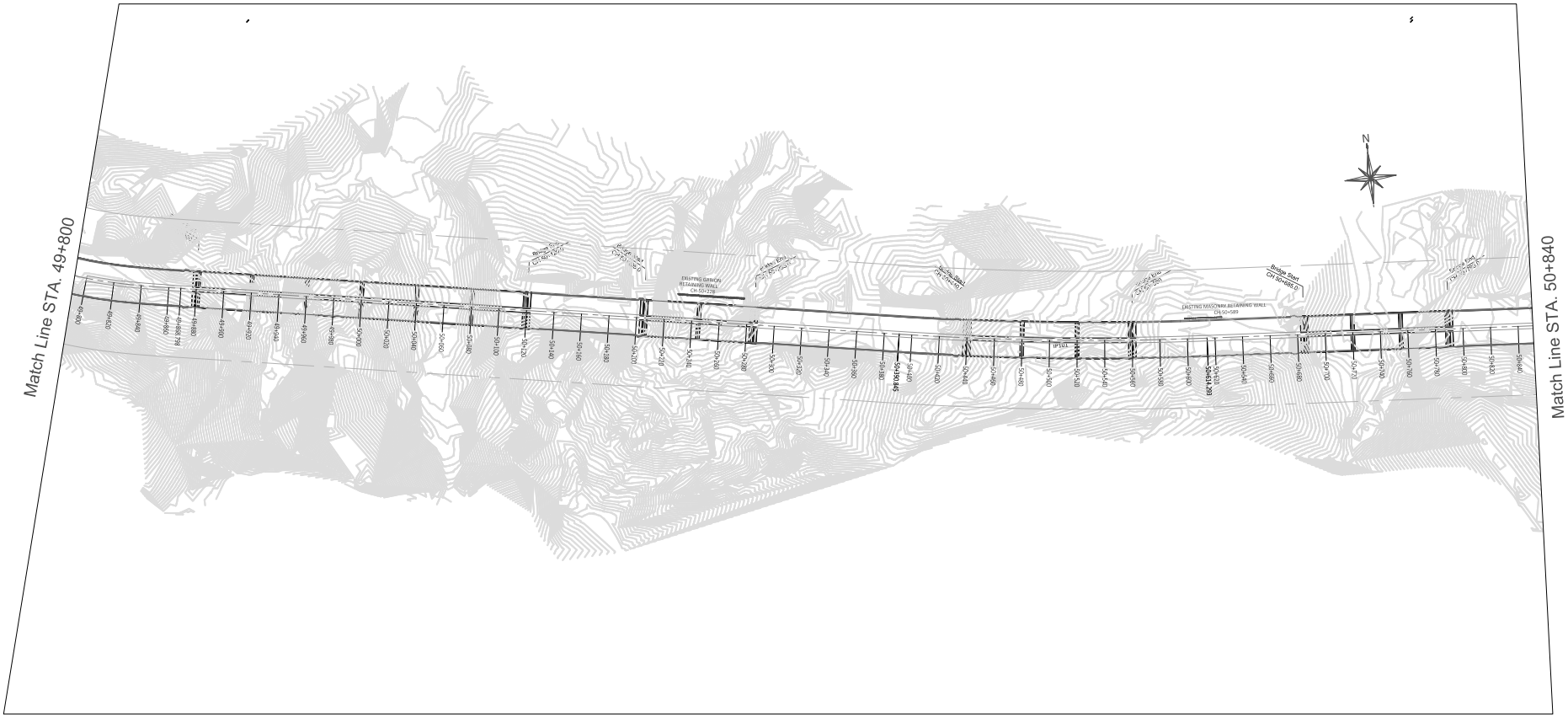


PROJECT NAME	CLIENT	DESIGN AND SUPERVISION CONSULTANT	DRAWING TITLE		
KATHMANDU-TERAI/MADESH FAST TRACK (EXPRESSWAY) ROAD PROJECT	GOVERNMENT OF NEPAL MINISTRY OF DEFENCE NEPAL ARMY KATHMANDU NEPAL	YOOSHIN ENGINEERING CORPORATION, KOREA KOREA EXPRESSWAY CORPORATION, KOREA PYUNGHWA ENGINEERING CONSULTANT LTD, KOREA JV IN ASSOCIATION WITH GARIMA INTERNATIONAL DESIGN ASSOCIATES NEPAL PVT.LTD., NEPAL SITARA CONSULTANT PVT.LTD., NEPAL	SATELLITE MAP	N W E S	Coordinate System : Nepal Nagarkot TM 84 Projection: Traverse Mercator Datum: Nepal Nagarkot False Easting: 500,000.0000 False Northing: 0.0000 Central meridian : 84.0000 Scale factor: 0.9999 Latitude of origin : 0.0000 Units : Meter

Contour Map

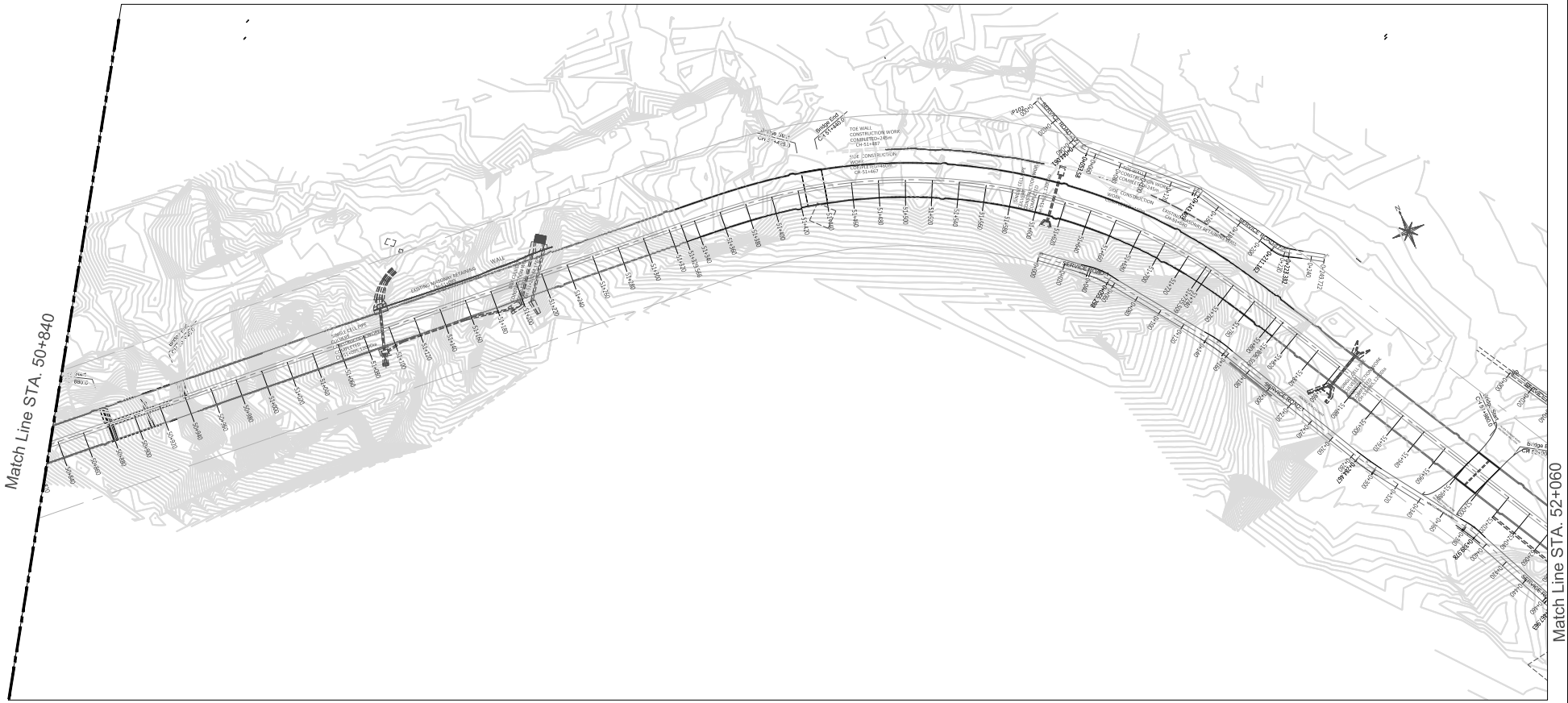
Contour Plan and Profile

(STA. 49+800 ~ 50+840)



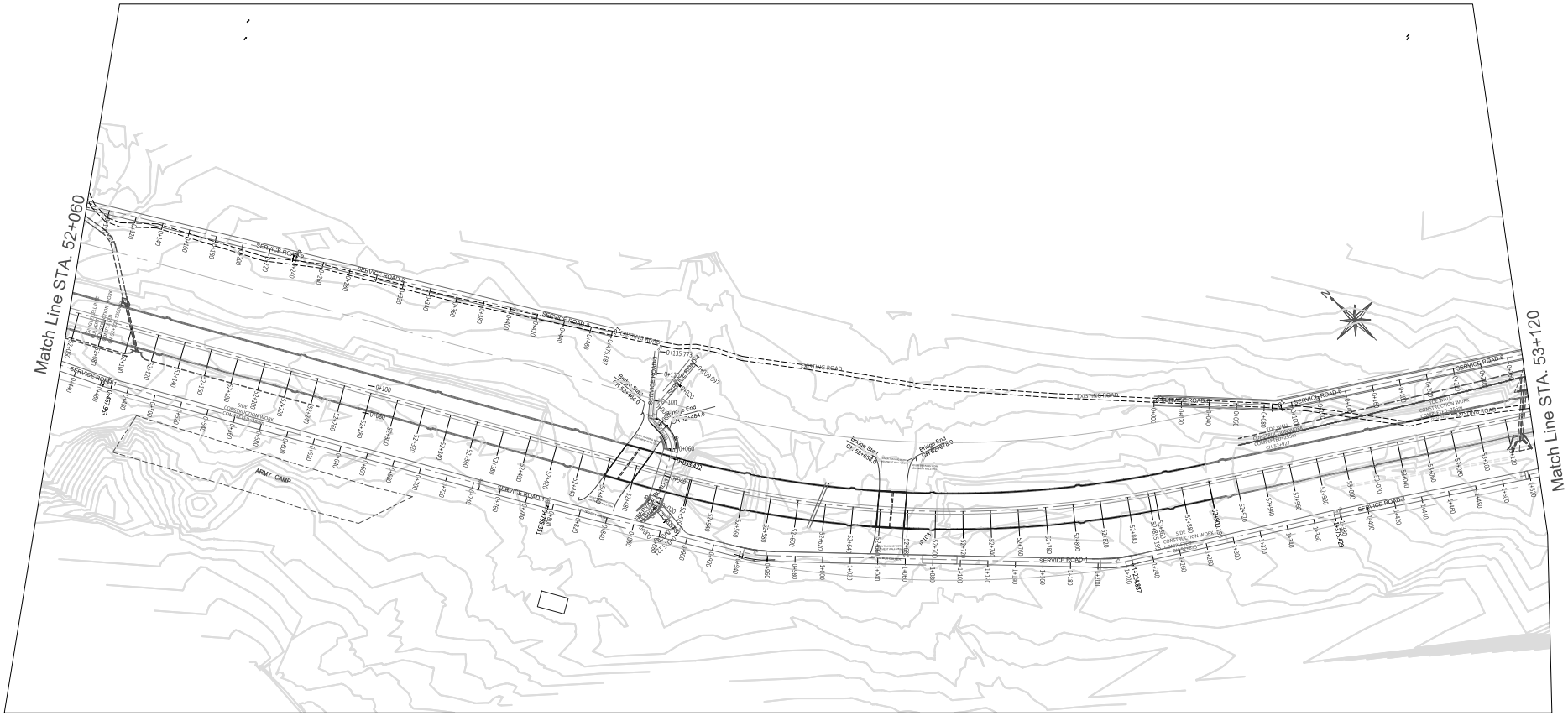
PROJECT NAME	CLIENT	DESIGN AND SUPERVISION CONSULTANT	DRAWING TITLE	SCALE	REV. No			
KATHMANDU -TERAI/MADESH FAST TRACK (EXPRESSWAY) ROAD PROJECT	GOVERNMENT OF NEPAL MINISTRY OF DEFENCE NEPAL ARMY KATHMANDU NEPAL	YOOSHIN ENGINEERING CORPORATION, KOREA KOREA EXPRESSWAY CORPORATION, KOREA PYUNGHWA ENGINEERING CONSULTANT LTD, KOREA JV IN ASSOCIATION WITH GARIMA INTERNATIONAL DESIGN ASSOCIATES NEPAL PVT.LTD., NEPAL SITARA CONSULTANT PVT.LTD., NEPAL	Contour Plan and Profile (STA. 49+800 ~ 50+840)			DESIGNED BY : (HIGHWAY ENGINEER)		DATE : July -2021
						CHECKED BY : (DTL)		DWG No : KTFT/HA
						APPROVED BY : (TL)		SHEET No : 1

Contour Plan and Profile
(STA. 50+840 ~ 52+060)



PROJECT NAME	CLIENT	DESIGN AND SUPERVISION CONSULTANT	DRAWING TITLE	SCALE	REV. No			
KATHMANDU -TERAI/MADESH FAST TRACK (EXPRESSWAY) ROAD PROJECT	GOVERNMENT OF NEPAL MINISTRY OF DEFENCE NEPAL ARMY KATHMANDU NEPAL	YOOSHIN ENGINEERING CORPORATION, KOREA KOREA EXPRESSWAY CORPORATION, KOREA PYUNGHWA ENGINEERING CONSULTANT LTD, KOREA JV IN ASSOCIATION WITH GARIMA INTERNATIONAL DESIGN ASSOCIATES NEPAL PVT.LTD., NEPAL SITARA CONSULTANT PVT.LTD., NEPAL	Contour Plan and Profile (STA. 50+840 ~ 52+060)			DESIGNED BY : (HIGHWAY ENGINEER)		DATE : July -2021
						CHECKED BY : (DTL)		DWG No : KTFT/HA
						APPROVED BY : (TL)		SHEET No : 2

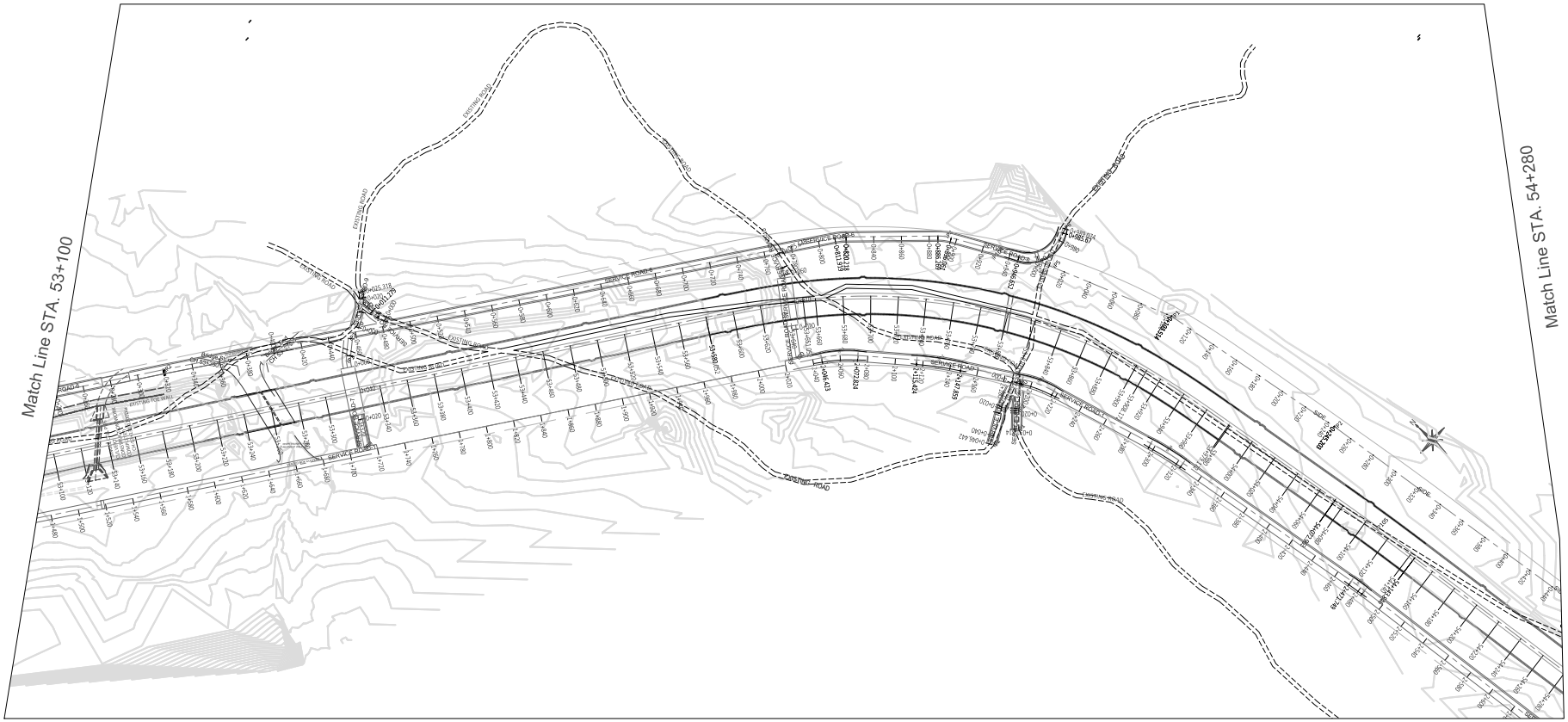
Contour Plan and Profile
(STA. 52+060 ~ 53+120)



PROJECT NAME	CLIENT	DESIGN AND SUPERVISION CONSULTANT	DRAWING TITLE	SCALE	REV. No			
KATHMANDU -TERAI/MADESH FAST TRACK (EXPRESSWAY) ROAD PROJECT	GOVERNMENT OF NEPAL MINISTRY OF DEFENCE NEPAL ARMY KATHMANDU NEPAL	YOOSHIN ENGINEERING CORPORATION, KOREA KOREA EXPRESSWAY CORPORATION, KOREA PYUNGHWA ENGINEERING CONSULTANT LTD, KOREA JV IN ASSOCIATION WITH GARIMA INTERNATIONAL DESIGN ASSOCIATES NEPAL PVT.LTD., NEPAL SITARA CONSULTANT PVT.LTD., NEPAL	Contour Plan and Profile (STA. 50+060 ~ 53+120)			DESIGNED BY : (HIGHWAY ENGINEER)		DATE : July -2021
						CHECKED BY : (DTL)		DWG No : KTFT/HA
						APPROVED BY : (TL)		SHEET No : 3

Contour Plan and Profile

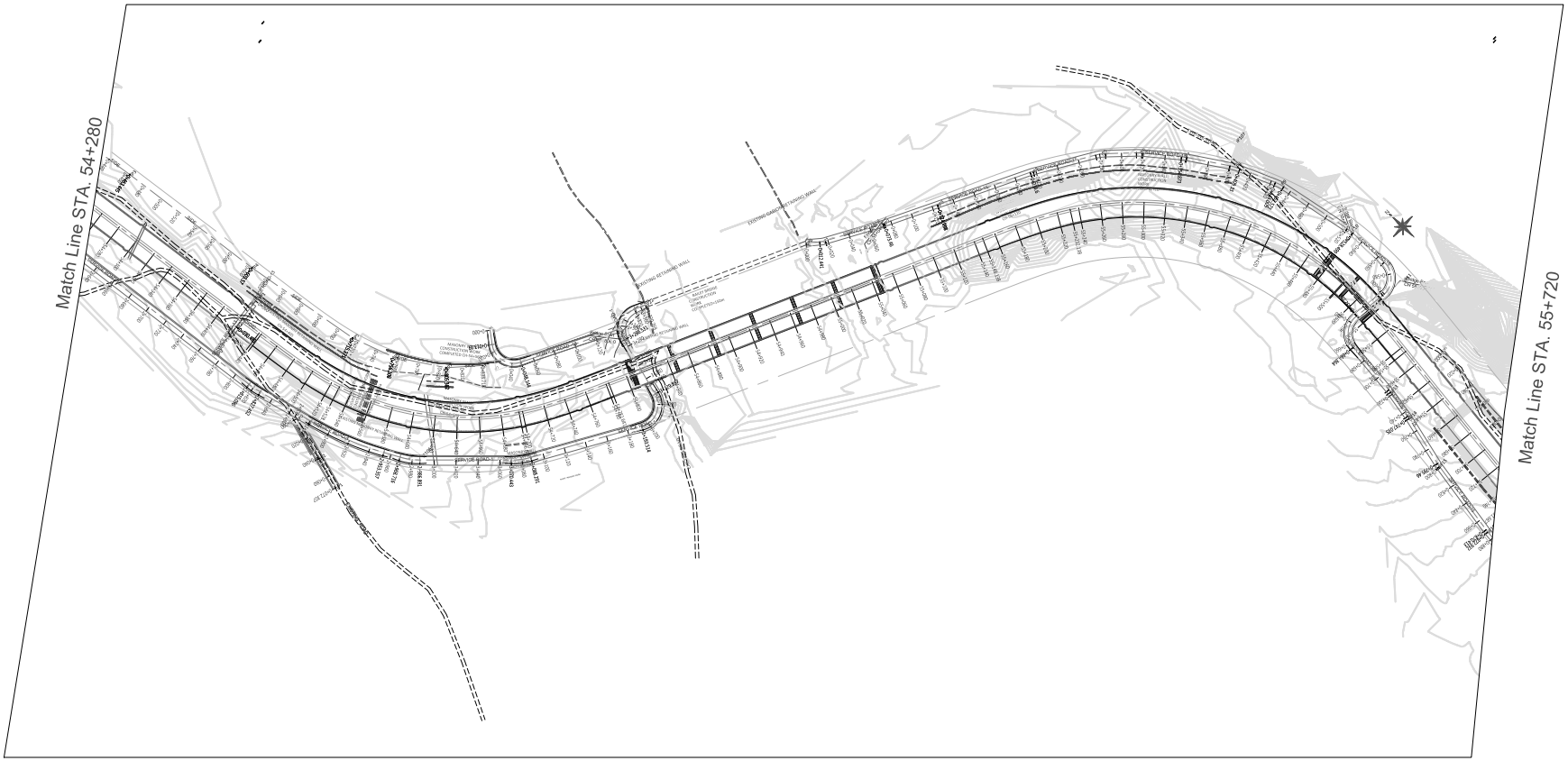
(STA. 53+100 ~ 54+280)



PROJECT NAME	CLIENT	DESIGN AND SUPERVISION CONSULTANT	DRAWING TITLE	SCALE	REV. No			
KATHMANDU -TERAI/MADESH FAST TRACK (EXPRESSWAY) ROAD PROJECT	GOVERNMENT OF NEPAL MINISTRY OF DEFENCE NEPAL ARMY KATHMANDU NEPAL	YOOSHIN ENGINEERING CORPORATION, KOREA KOREA EXPRESSWAY CORPORATION, KOREA PYUNGHWA ENGINEERING CONSULTANT LTD, KOREA JV IN ASSOCIATION WITH GARIMA INTERNATIONAL DESIGN ASSOCIATES NEPAL PVT.LTD., NEPAL SITARA CONSULTANT PVT.LTD., NEPAL	Contour Plan and Profile (STA. 53+100 ~ 54+280)	H=1:1000 V=1:400		DESIGNED BY : (HIGHWAY ENGINEER)		DATE : July -2021
						CHECKED BY : (DTL)		DWG No : KTFT/HA
						APPROVED BY : (TL)		SHEET No : 4

Contour Plan and Profile

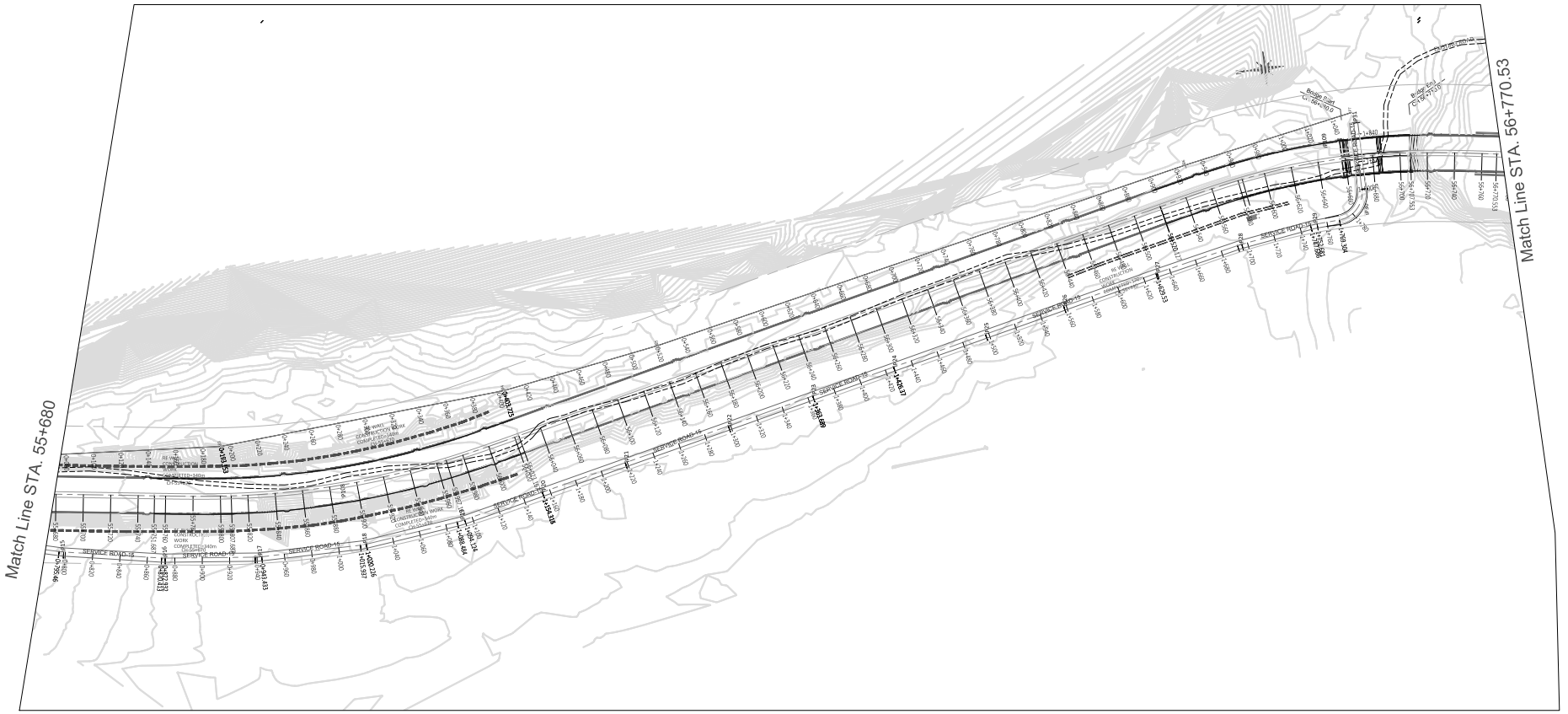
(STA. 54+280 ~ 55+680)



PROJECT NAME	CLIENT	DESIGN AND SUPERVISION CONSULTANT	DRAWING TITLE	SCALE	REV. No			
KATHMANDU -TERAI/MADESH FAST TRACK (EXPRESSWAY) ROAD PROJECT	GOVERNMENT OF NEPAL MINISTRY OF DEFENCE NEPAL ARMY KATHMANDU NEPAL	YOOSHIN ENGINEERING CORPORATION, KOREA KOREA EXPRESSWAY CORPORATION, KOREA PYUNGHWA ENGINEERING CONSULTANT LTD, KOREA JV IN ASSOCIATION WITH GARIMA INTERNATIONAL DESIGN ASSOCIATES NEPAL PVT.LTD., NEPAL SITARA CONSULTANT PVT.LTD., NEPAL	Contour Plan and Profile (STA. 54+280~ 55+680)			DESIGNED BY : (HIGHWAY ENGINEER)		DATE : July -2021
						CHECKED BY : (DTL)		DWG No : KTFT/HA
						APPROVED BY : (TL)		SHEET No : 5

Contour Plan and Profile

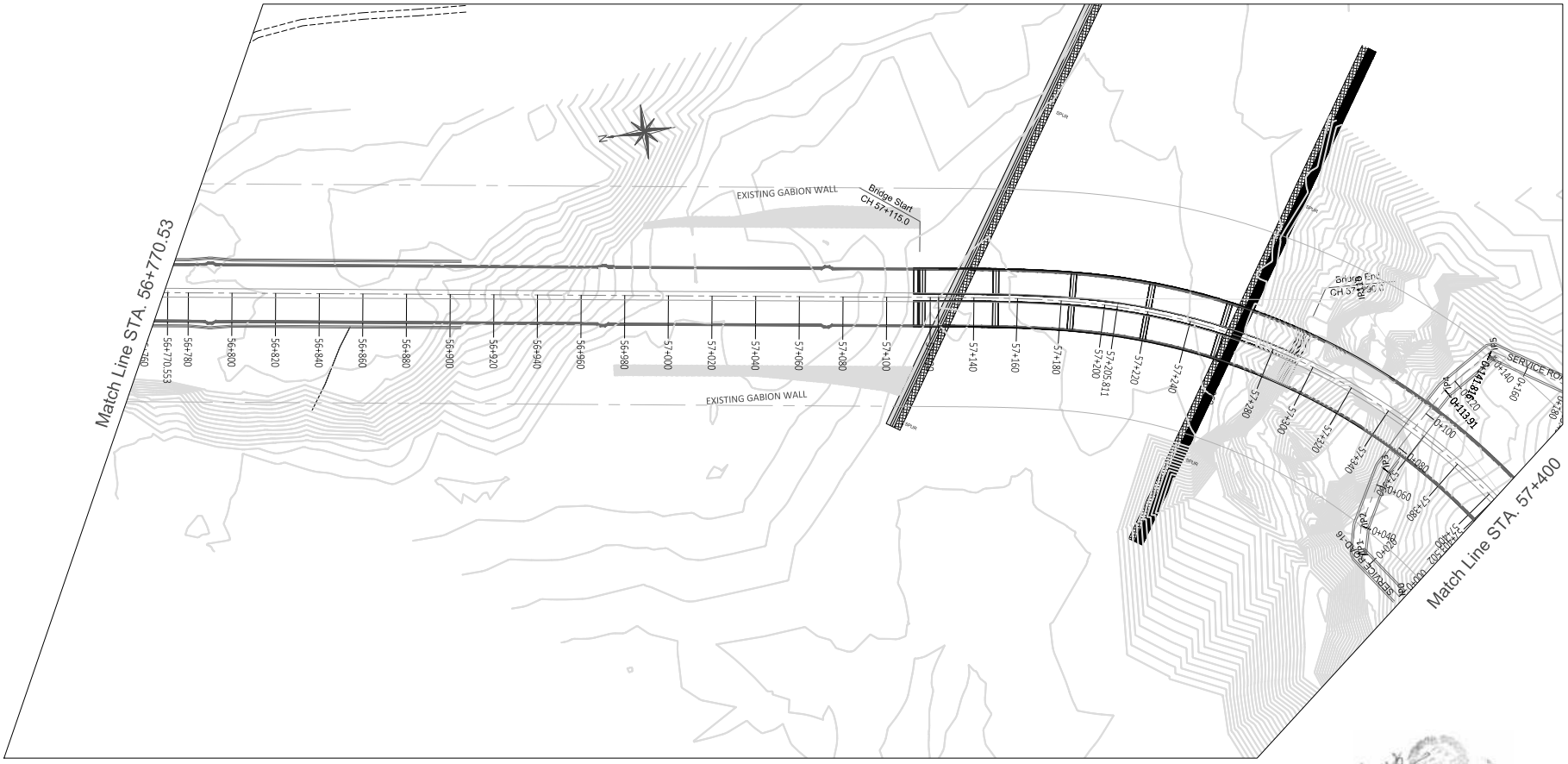
(STA. 55+680 ~ 56+770.53)



PROJECT NAME	CLIENT	DESIGN AND SUPERVISION CONSULTANT	DRAWING TITLE	SCALE	REV. No			
KATHMANDU -TERAI/MADESH FAST TRACK (EXPRESSWAY) ROAD PROJECT	GOVERNMENT OF NEPAL MINISTRY OF DEFENCE NEPAL ARMY KATHMANDU NEPAL	YOOSHIN ENGINEERING CORPORATION, KOREA KOREA EXPRESSWAY CORPORATION, KOREA PYUNGHWA ENGINEERING CONSULTANT LTD, KOREA JV IN ASSOCIATION WITH GARIMA INTERNATIONAL DESIGN ASSOCIATES NEPAL PVT.LTD., NEPAL SITARA CONSULTANT PVT.LTD., NEPAL	Contour Plan and Profile (STA. 55+680 ~ 56+770.53)			DESIGNED BY : (HIGHWAY ENGINEER)		DATE : August -2021
						CHECKED BY : (DTL)		DWG No : KTFT/HA
						APPROVED BY : (TL)		SHEET No : 6

Contour Plan and Profile

(STA. 56+770.53 ~ 57+400)



PROJECT NAME	CLIENT	DESIGN AND SUPERVISION CONSULTANT	DRAWING TITLE	SCALE	REV. No			
KATHMANDU -TERAI/MADESH FAST TRACK (EXPRESSWAY) ROAD PROJECT	GOVERNMENT OF NEPAL MINISTRY OF DEFENCE NEPAL ARMY KATHMANDU NEPAL	YOOSHIN ENGINEERING CORPORATION, KOREA KOREA EXPRESSWAY CORPORATION, KOREA PYUNGHWA ENGINEERING CONSULTANT LTD, KOREA JV IN ASSOCIATION WITH GARIMA INTERNATIONAL DESIGN ASSOCIATES NEPAL PVT.LTD., NEPAL SITARA CONSULTANT PVT.LTD., NEPAL	Contour Plan and Profile (STA. 56+770.53 ~57+400)			DESIGNED BY : (HIGHWAY ENGINEER)		DATE : July-2021
						CHECKED BY : (DTL)		DWG No : KTFT/HA
						APPROVED BY : (TL)		SHEET No : 7

SECTION-VI

Bill of Quantities

Notes for Unit Rate Contracts :

Objectives

The objectives of the Bill of Quantities are

(a) to provide sufficient information on the quantities of Works to be performed to enable Bids to be prepared efficiently and accurately; and

(b) when a Contract has been entered into, to provide a priced Bill of Quantities for use in the periodic valuation of Works executed.

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

Content

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

(a) Preamble;

(b) Work Items (grouped into parts);

(c) Day works Schedule;

d) Provisional Sums; and

(d) Summary.

Preamble

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

Work Items

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

Day work Schedule

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

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

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

Provisional Sums

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

Summary

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

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

Bill of Quantities

1 Provisional Sum

Procument Item Details

SL. No	Item Description	Unit	Quantity	Unit Rate(NPR)	Amount(NPR)
1	Providing Insurance of Works, Plants, Equipments, Employers, Labors, Personal Injuries for the Employer's Design Work and Contractor's Design Work as per the conditions of contract, instruction of Engineer and all complete.	PS	1.0	1.5E8	150,000,000.00
2	Additional testing of materials as instructed by the Engineer if required. (Test: within the Country or outside of Country)	PS	1.0	5000000.0	5,000,000.00
3	Miscellaneous: Dismantling & reconstruction of existing infra-structures and its disposal to approved site as per requirement. Construction & development of new civil supplementary infrastructures as per required and as per specification and instruction of Engineer	PS	1.0	4.0E7	40,000,000.00

2 Construction work

2.1 Road Construction Work

Procument Item Details

SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
1	Earth work Site clearance including removal of bushes, debris, rubbish, garbage in and outside of highway and service road etc. as per specification and instruction of Engineer	m2	98800.0			
2	Earth work Excavation in roadway, drain, retaining structures foundation and sub-structures of the expressway in all types of soil including removal and satisfactory disposal and stacking or hauling (to sites of embankment construction) of suitable cut materials as required and excavation for existing all type of pavement as per specification and instruction of Engineer. Mechanical Means	m3	292685.1			
3	Earth work Excavation in roadway, drain, retaining structures foundation and sub-structures of the expressway in all types of soil including removal and satisfactory disposal and stacking or hauling (to sites of embankment construction) of suitable cut materials as required and excavation for existing all type of pavement as per specification and instruction of Engineer. Manual Means	m3	900.2			

Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
4	Earth work Construction of roadway and drain in embankment and miscellaneous backfilling areas for road, drain and structures with approved material obtained from roadway excavation and from outside location including transportation, spreading in layers, watering and compaction by machine equipment / manually as per specification and instruction of Engineer. Earthwork in Filling	m3	298857.2			
5	Earth work Construction of roadway and drain in embankment and miscellaneous backfilling areas for road, drain and structures with approved material obtained from roadway excavation and from outside location including transportation, spreading in layers, watering and compaction by machine equipment / manually as per specification and instruction of Engineer. Earthwork in filling with soil borrowing from outside	m3	216507.88			
6	Earth work Construction of roadway and drain in embankment and miscellaneous backfilling areas for road, drain and structures with approved material obtained from roadway excavation and from outside location including transportation, spreading in layers, watering and compaction by machine equipment / manually as per specification and instruction of Engineer. Back filling with Granular Material behind	m3	4599.14			
7	Structures and Drain & Drainage Structures Supplying, Placing and compacting pitching / soling works of stone, according to the design line and level, all complete as mention in drawing, specification and directed by Engineer.	m3	18511.56			
8	Structures and Drain & Drainage Structures Providing and placing different grades of concrete for Road and Bridge DoR specification for foundation, base, structures, cover slab, drain, box culvert etc. including mixing, laying, compacting, form work and curing all complete as mentioned in drawing and directed by Engineer. M15 / 20	m3	6922.4			

Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
9	Structures and Drain & Drainage Structures Providing and placing different grades of concrete for Road and Bridge DoR specification for foundation, base, structures, cover slab, drain, box culvert etc. including mixing, laying, compacting, form work and curing all complete as mentioned in drawing and directed by Engineer. M20 / 20	m3	23805.83			
10	Structures and Drain & Drainage Structures Providing and placing different grades of concrete for Road and Bridge DoR specification for foundation, base, structures, cover slab, drain, box culvert etc. including mixing, laying, compacting, form work and curing all complete as mentioned in drawing and directed by Engineer. M25 / 20	m3	447.72			
11	Structures and Drain & Drainage Structures Providing and placing different grades of concrete for Road and Bridge DoR specification for foundation, base, structures, cover slab, drain, box culvert etc. including mixing, laying, compacting, form work and curing all complete as mentioned in drawing and directed by Engineer. M30 / 40	m3	14963.84			
12	Structures and Drain & Drainage Structures Providing and placing of reinforcement bar of high yield for structure, drain, drain cover, box culvert, existing & proposed infrastructures including cutting, placing, binding and fixing and all complete as mentioned in drawing, specification and directed by Engineer.	MT	4947.2			
13	Structures and Drain & Drainage Structures Providing and laying of hand pack cobble/natural Stone (approx. size 10cm x 9cm x 9cm) with granular material bedding on prepared surface in line & level of Dummy, drain and structures as per drawing, technical specification and directed by Engineer.	m3	2485.56			
14	Structures and Drain & Drainage Structures Providing, fixing and erecting 50 mm diameter steel pipe railing in 3 rows duly painted on medium weight steel channels(ISMC series) 100 mm x 50 mm, 1.2 meters high aboveground, 2 m center to center, complete as per drawing, technical specifications and directed by Engineer.	Rm	2969.4			

Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
15	Structures and Drain & Drainage Structures Providing and filling joint sealing compound with coarse sand and 6 percent bitumen by weight as per drawing, technical specification and as directed by Engineer.	Rm	1562.8			
16	Structures and Drain & Drainage Structures Supplying and laying of outer diameter 315mm perforated HDPE(10 kg/cm2) Pipe, including proper bedding underneath with water tight connections at the joints as per design, drawings, specifications and instructions all complete.	Rm	21160.0			
17	Structures and Drain & Drainage Structures Providing and laying grating of different size (as per drawing) of steel material as per specification and instruction of Engineer.	kg	2215.16			
18	Structures and Drain & Drainage Structures Providing and Laying Reinforced cement concrete 300mm NP3 internal diameter pipe including fixing with cement mortar 1:2 as per Drawing, technical specification and directed by Engineer.	rm	701.0			
19	Structures and Drain & Drainage Structures Providing and Laying Reinforced cement concrete 600mm NP3 internal diameter pipe including fixing with cement mortar 1:2 as per Drawing, technical specification and directed by Engineer.	Rm	4060.0			
20	Structures and Drain & Drainage Structures Supplying and laying, brick masonry for structural works in 1:4 cement sand mortar all complete works as mention in drawing, specification and directed by the Engineer.	m3	242.53			
21	Structures and Drain & Drainage Structures Supplying and laying, stone masonry for structural works in 1:4 cement sand mortar all complete works as mention in drawing, specification and directed by the Engineer.	m3	33511.64			
22	Supply and placing mechanically woven double twisted crates / mattress including rolling, cutting and with lacing wire and binding wire all complete as per Drawing and Technical Specifications.	m2	41051.96			
23	Structures and Drain & Drainage Structures Providing and filling stone/boulder in gabion boxes/mattress etc., including dressing, bedding, bonding all complete as per drawing and Technical specifications.	m3	21039.83			

Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
24	Structures and Drain & Drainage Structures Providing, laying and fixing of Geo membrane (Geo-textile) all complete as per drawing, specification and directed by Engineer.	m2	18172.44			
25	Structures and Drain & Drainage Structures Supply, Providing and fixing of steel manhole cover in line and level as per specification and drawings.	No.	140.0			
26	Structures and Drain & Drainage Structures Supply, Providing and fixing of Steel Galvanized Angle for the fencing and proposed work as per drawings, specification and instruction of Engineer.	kg	291664.8			
27	Structures and Drain & Drainage Structures Supply, Providing and fixing of Galvanized steel wire for the fencing and proposed work of different size as per drawings, specification and instruction of Engineer. having size 2.1m Height	Rm	18004.0			
28	Structures and Drain & Drainage Structures Supply, Providing and fixing of Galvanized steel wire for the fencing and proposed work of different size as per drawings, specification and instruction of Engineer. having size 0.3m Height	Rm	18004.0			
29	Structures and Drain & Drainage Structures Providing, fixing and erecting of PVC water Stopper as per specification, drawing and as directed by Engineer.	Rm	1371.6			
30	Slope Protection Work Providing and Installation of Soil Nails 25 . Fe-500D bar or equivalent, including drilling with more than diameter 75mm, grouting, inserting Rod, fixing with bearing plate, nut, coupler, etc. all complete accessory as per drawing, specification.	rm	5364.0			
31	Slope Protection Work Providing and fixing permanent ground anchors (Strand type): Supplying and installation of Anchor 6?12.7 strand type and accessories (grouting with cement grout in the drilled hole /including assembling of unbound part, bond part and spacer. etc. of anchor body/ inserting/ fixing with Anchor plate such as accessories and concrete grid block) as per specification and drawing.	rm	6780.0			

Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
32	Slope Protection Work Supplying and Installation with more than 50mm HDPE perforated pipes for drainage ground water in slope and laying with Geotextiles as per Specification.	rm	830.0			
33	Slope Protection Work Mobilization and Demobilization of drilling / Boring equipments, accessories, etc for Permanent Ground Anchors, Drainage hole, Water Level Indicator and Inclinometer etc.	Job	3.0			
34	Slope Protection Work Erect dismantle and move boring rig with drilling equipments at each bore hole complete for the Installation of Permanent Ground Anchors, Drainage pipe(HDPE), Water level Indicator and Inclinometers etc. as per drawing.	No.	275.0			
35	Slope Protection Work Drilling/Boring with more than 127mm diameter in all soils and weathered rock to a depth below ground level complete for the Installation of Permanent Ground Anchors as per drawing, specification.	Rm	6780.0			
36	Slope Protection Work Drilling/Boring with more than 76mm diameter in all soils and rock to a depth below ground level complete for the Installation of Drainage pipe (HDPE), Water Level Indicator and Inclinometers etc. as per drawing and specification	rm	920.0			
37	Slope Protection Work Water Level Indicator : Providing & installing Water Level Indicator at the location of each bore holes for measure of the water level of slope. Water level reading and reporting work to be carried out daily for a period of 42 month	No.	1.0			
38	Slope Protection Work Inclinometer : Providing & installing Inclinometer at the location of each bore holes for measure of the lateral movement of slope. Lateral movement reading and reporting work to be carried out daily for a period of 42 month	No.	2.0			
39	Slope Protection Work Target & Prism : Providing & installing Target & Prism at the location of each location as drawing for measurement of deformation during construction Slope . Total measuring work displacement to be carried out daily for a period of 42 month.	No.	6.0			
40	Pavement work Preparation of subgrade as mentioned in the drawing, specification and directed by the Engineer.	m2	278302.25			

Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
41	Pavement work Supplying, providing, laying, spreading, watering, leveling, compacting and all complete for gravel sub-base over prepared subgrade according to the designed camber including transportation all complete as mentioned in the drawing, specification and directed by Engineer.	m3	81050.56			
42	Pavement work Supplying, providing, laying, spreading, watering, leveling, compacting and all complete for crusher run base material grading of standard specification including transportation from source as mentioned in drawing, specification and directed by the Engineer.	m3	44295.32			
43	Pavement work Providing, laying, transporting and all complete of primer coat as mentioned in drawing, technical specification and directed by the Engineer.	Lit.	220927.25			
44	Pavement work Providing, laying, transporting and all complete of tack coat as mentioned in drawing, technical specification and directed by the Engineer.	Lit.	220531.36			
45	Pavement work Providing, mixing, laying, compacting, transport and all complete Dense Bituminous Macadam (DBM) pavement surface as mentioned in drawing, specification and directed by Engineer.	m3	21993.75			
46	Pavement work Providing, mixing, laying, compacting, transport and all complete of asphalt concrete pavement as mentioned in drawing, specification and directed by Engineer.	m3	11046.36			
47	Bio-Engineering Providing and planting of permanent hedges of ornamental plants not greater than 2m (center of median) and not greater than 1m (edge of median (both side) including digging of trenches, 60cm wide and 45cm deep, refilling the excavated earth mixed with farmyard manure, supplied at the rate of 4.65 cum per 100m and supplying and planting hedge plants at 30 cm apart all complete and maintenance of hedge for 5 years including all materials required as per instruction of Engineer & technical specification.	rm	19200.0			

Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
48	Bio-Engineering Providing and planting flowering plants and shrubs in central verge and providing & maintenance of flowering plants and shrubs in central verge for five years as per drawing, specification and directed by Engineer.	rm	25600.0			
49	Bio-Engineering Providing and planting rooted grass slips on the slopes <45o including preparation of slips on site, a max of 5 cm depth with metal rod or operation includes digging planting hole to hard-wood peg, depending on the nature of the soil and as per directed by Engineer and drawing and specification.	m2	179163.9			
50	Bio-Engineering Planting containerized tree and shrub seedlings, including pitting, transplanting, composting and mulching, on slopes < 30o with pit size 30 cm diameter x depth mix Compost with soil and back fill into pit to 1/4 of the pit volume as per drawing, specification and directed by Engineer.	No.	259068.0			
51	Bio-Engineering Providing and Planting of trees by the road side in 0.60 m diameter holes, 1 m deep dug in the ground, mixing the soil with decayed farm yard/sludge manure, planting the saplings, backfilling the trench, watering, fixing the tree guard and maintaining the plants for five year as per drawing, specification and directed by the Engineer.	No.	2280.0			

Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
52	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Providing, Supplying and Installing of 180W +/- 10 % Top Maintainable LED Street Light luminaire with System efficacy of 110 lm/W. LED Street Light shall be made up of Die Cast aluminum housing suitable to mounted on 55-68 mm OD bracket arm. Luminaire shall have two separate compartments for LEDs and driver and both compartments should be hermitically sealed to achieve IP 66 ingress protection. Optical compartment shall be provided to withstand IK 07 impact rating, while control gear shall be provided with die cast aluminum cover for safety. LM 80-08 compliant, LEDs should be provided. LEDs used in the product shall comply with EN 62471 for Photo-biological safety and certificate for the same from manufacturer shall be provided for Risk Group 2 maximum. Luminaire manufacturer shall produce certificate of association with LED manufacturer for minimum 5 year. LEDs used shall have maximum allowed junction temperature of 125 Deg C with actual operating junction temperature not more than 90 Deg C at an ambient temperature of 35 Deg C. The LENS used shall have optical grade PMMA-HT / Polycarbonate to provide street light distribution for Uniform lighting. LED optical lens should be properly fixed to MCPCB and should not be only fixed by glue. LED optical lens shall have temperature withstand capacity of greater than 85 Deg C and Transmissivity of more than 90%.The LED shall be compliant with LM80-08 standard with Useful L70 life of 50000 Hrs. tested at maximum current and at 105 Deg C case temperature (Complete LM 80 test report for LED should be submitted for 10000 hrs. of testing). The LEDs used in Street Light should be Macadam Step 5 standard Rated LED with CCT of 5700 K and CRI of Minimum 70. Maximum permissible driving current of LEDs are from 0.15A to 2A. Actual Driving Current of LEDs shall be less than 1000mA for life long reliability. LED Driver should be BIS Registered. LED Driver shall be Isolated type, Constant Current topology driver in	Nos.	641.0			

Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
	metal enclosure with proper heat sink for heat dissipation suitable to operate in input voltage range of 150V to 270V (nominal rated voltage 240V) with 4KV internal surge protection in both Common Mode and Differential Mode. LED Driver shall be potted type. Power factor greater than 0.95 and total harmonic distortion (THD) of less than 10% should be integral to the luminaire. LED driver shall have output short circuit & over voltage withstanding protection inbuilt. Luminaire shall be external SPD of 10KV with minimum one TMOV mounted inside luminaire. Bidder shall submit necessary test reports as mentioned in the description					

Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
53	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Providing, Supplying and Installing CCMS System Details: Smart Feeder Panel made up of single / double door CRCA Sheet Steel with Grey Powder Coating / Painting of minimum 22 SWG and with IP54 Protection with A) Switching Point Controller: This hardware consists of MCBs, Contactors and Fuses which protects system and operators in case of electrical malfunction, Switching point controller VA rating is designed for twice the lighting load requirement, SPC uses Class 1.0 Single or Three Phase energy meter, It should allow Manual override of the system with Isolator during maintenance and system faults. It should have single phase/ three phase energy meter, Street light Feeder pillar with CCMS Controller and Switching components, web based application and cloud server. System capabilities including Scheduling, Individual lamp dimming, fault notifications and report generation in command CVS format. B) Energy Meter: It compliance with the standard IS: 13779/1999 or IEC: 1036. CBIP Report-325 Complied. Voltage Rating should be 10- 60A, Class 1.0, Rated frequency 50Hz, Power factor 0.25 lag - Unity 0.5 lead, as per IS13779. The system monitors energy parameters and communicate it with CCMS unit to transmit it to server, Voltages each phase, Current each phase, PF each phase, Metering KWH cumulative, Metering KVAH, Number of operational light, Number of non-operational lights, Failure of contactor, Status of the incoming supply (power failure), High /low voltage, Overload on the phases. C) CCMS Controller: Power supply - 230VAC, Communication through GSM/GPRS or Wi-Fi. It Should supports Phase wise on /off switching by Schedule or by built in astronomical clock for ON/OFF/Dimming luminaires based on individual selection and Manual ON/OFF/Dimming of lights of a particular switching point or networked switching points from Central Control Station. Battery Backed RTC in built in side CCMS Controller. CCMS supports wireless	Nos.	16.0			

Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
	Low Power RF 2.4 ZigBee communication with maximum 100 nos. of individual node/Luminaire controller which can dim up/down the led lamp up to 500W. Network Fault Tolerance: self-forming and self-healing RF mesh network having Open Field Range: 200 m. internal storage Memory 256MB X NAND Flash. Optional - Ethernet. Inbuilt Micro SD card for data storage (Capacity up to 16GB). Alert message in pre-defined abnormal system conditions through SMS (5 numbers) and web based application through GSM/GPRS for: i) Phase-wise currents on crossing threshold values ii) Phase-wise voltages on crossing threshold values. iii) MCB trips, iv) Theft alerts, v) No output supply vi) Group failure of lights vii) No input/output supply. Serial Communication: RS485/RS232, CCMS Controller can be remotely configurable through server. Communication Protocol - Street Light Gateway supports RS485 MODBUS communication and HTTPS support for Wireless communication with server using SIM based GPRS Connection.					

Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
54	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Providing, Supplying and Installing of Local / Cloud managed Web based Application Software - It Enables comprehensive display of live and historical data with remote configurations features. Configuration and Control Allows user to communicate with individual and networked switching points and Individual/Group of Street lights remotely. Fault Alarms/Alerts Switching point failures, Group Luminaires failure, excess voltage/current drawn, no mains power, and GPS Location change and contactor failure. Allows user to trace switching points, Allows user to generate various reports, possible to configure switching points through web application. Remote configuration includes new ON/OFF/Dimming timings, RTC time, Real time data of each switching point, Energy meter parameters, Web application enables user safety with multiple user privileges and differentiates admin/general users, System is fail proof with password protection, Web application provides comprehensive dashboard with real time status of switching point, real time faults of various switching points, power consumption, cumulative data, Google map integration for individual lamp on map along with its real time status with basic energy parameters of individual controller etc., Web based software offers SMS and Email alerts for various faults. Also, provides daily/ weekly/ monthly reports through email, Minimal interval of data update 15 mins and programmable up to 1 min (Recommended >5 mins). It also enables user to identify each SPC with unique/Asset ID with additional information like individual SPC's real time status and basic electrical parameters. It is also possible to link details of every street light with reference to particular switching point.	Nos.	1.0			

Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
55	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Providing, Supplying and Installing of Server Cloud: The server/Cloud platform shall be of dedicated Windows / Linux server with minimum of 16GB RAM with sufficient bandwidth. Software shall be installed in server i. java language ii. MySQL server, The server/Cloud platform should support sufficient storage, Server/Cloud platform provider shall have capable to perform auto backup and restore facilities, Server/Cloud platform provider shall have regular maintenance of the server and immediately address in case of server down, Server/Cloud platform shall have minimum uptime of 99%, Server/Cloud should able to handle minimum of 1000 concurrent connections. It shall support GDPR guidelines prevailing at the time of commissioning and installation. Charges for 2 years to be quoted in the initial quote only.	Nos.	1.0			
56	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Providing, Supplying and Installing of SIM based GPRS Connection (On clients scope)	Nos.	16.0			
57	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Providing, Supplying and Installing of 11m Octagonal Pole: Top Dia. 90mm, Bottom Dia. 210mm Sheet, Thickness 4.5 mm, Base Plate Dimensions (L x B x T) 350X350X30, PCD (275mm), Foundation bolt M25mmX1000mmX4	Nos.	641.0			

Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
58	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Providing, Supplying and Installing of Single Arm Bracket 2000mm	Nos.	1542.0			
59	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Providing, Supplying and Installing of RCC Concrete foundation for pole	No.	1542.0			
60	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Providing, Supplying and Installing of Junction box of IP-65 Grade with 3 phase 100 A copper busbar and two nos. 16 Amp DP MCB of 15 KA(as an option)	No.	1542.0			

Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
61	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Providing, Supplying and Installing of Two Pole Structure: C Class Heavy Duty: Supply, Installation, Testing & Commissioning of 2 pole structure for terminating 11 KV O.H. supply from NEA as per specifications and drawing. The two pole structure shall comprise of:- steel tubular two pole structure 11 mtrs high(6" Dia) (as per NEA approved), in cement concrete foundation 1:1.5:3 (1 cement : 1.5 coarse sand : 3graded aggregate 40mm nominal size) including excavation and refilling etc. as required. The rate shall be inclusive of painting with 2 coats of aluminum paint (on red oxide). The portion of pole under the ground shall be provided with 2 coats of bituminous paint - 2 Nos. Steel sections, channels angles, flats, clamps, GI nuts, bolts and required hardware etc of different sizes for cross arms(with 42 x 42 and 5 mm thick, bracings, supports etc. for pole GOD etc. including ant climbing barbed wires (conforming to IS:278) having 4 points barbs spaced 75 12mm apart. All steel structure shall be given 2 coats of red oxide primer and 2 finishing coats of aluminum paint as required. - Lot. 11 KV class disc/pin/support insulators complete with clamps and fixing hard wares etc. complete as required. 11 KV station class thyrite type lightening arrestors complete with mounting arrangement (on all phases) - 3 Nos. Drop out - lock out (DOLO) fuse, gang operating device (Air Break Switch) with pad locking arrangement (operating rod to be supported properly), complete with operating handle and locking arrangement - 1 Set. GI stay set complete with 20mm dia 1.8 M long stay rod with 450 x 450 x 7.5 mm anchor plate with thimbles, stay clamps,8 mm dia GI stay wire, turn buckle (20mm x 600mm) strain insulator bow tighten in cement concrete 1:3:6 foundation as excavation and refilling - 2 Set	set	3.0			

Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
62	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Providing, Supplying, Installing, laying, testing and commissioning of H.T. Cabling: following sizes of 11 KV grade (earthed), copper conductor, cross linked polyethylene, insulated, individual core screened, flat steel strip armored, PVC sheathed cable complete as required. Laying of cable is Overhead/underground/trench. (The rate shall also include the laying of cable, excavation, sand filling, bricks and refilling the trench).If underground should make cable trench and provide cable marker above ground showing HT cable below on certain depth on every 5 m distance. 3 C x 35 Sq.mm XLPE HT 11 KV AL cable	RM	3675.0			
63	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Supply, installation of 11 meters high (6" Dia) steel pole for HT Cable support including cable hanging support with all accessories (as per NEA approved), in cement concrete foundation 1:1.5:3 (1 cement : 1.5 coarse sand : 3graded aggregate 40mm nominal size) including excavation and refilling etc. as required. The rate shall be inclusive of painting with 2 coats of aluminum paint (on red oxide). The portion of pole under the ground shall be provided with 2 coats of bituminous paint - 2 Nos.	No.	184.0			
64	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Supplying and Installing of following types of End Termination: Heat shrinkable cable jointing of 3 core x 50 sq.mm 11 KV volts grade XLPE insulated armored cables with suitable cable termination using Raychem/ MECP kits including all accessories.	set	3.0			

Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
65	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Supply, installation, testing and commissioning of Maintenance Free compound earthling stations by means of 2 meter long, 50 mm diameter integrated with 100x32x6 mm terminals filled with earth enhancing compound in required quantity all complete with 300 x300 x450 mm masonry enclosure with pre cast cover. All earthling arrangements must comply with IS3043.The resistivity should be below 3 ohm.	No.	17.0			
66	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Supply and installation of distribution transformer 100 KVA three phase NEA approved ONAN type with no load ratio of 11000/433 volts with both low and high voltage windings of high purity electrolytic copper. The transformer shall be complete with rating and diagram plate, 2 Nos. earthling terminals, and high winding temperature indicator. The distribution transformer shall be On load tap changer with -15% and +5% tapings in step of 2.5% each step on HV side, 3 phase 50 Hz with standard accessories. The transformer is pad mounted type so the cost must include 1.5 meter. high concrete foundation suitable for transformer installation.	No.	3.0			
67	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Supply, installation of 110 mm dia. HDP Pipe of 6 kg pressure on both side of road for laying of power cable.	RM	14385.0			

Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
68	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Trench for 110 mm HDP Pipe laying . The cost must include HT wrapping tape and cable marker up to height of 1000 mm at 5 meter spacing. The pipe must have 150 mm sand all around and then filling of digged material.	RM	14385.0			
69	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Supply, installation of 32 mm dia. HDP Pipe of 6 kg pressure on both side of road for laying of power cable	RM	3846.0			
70	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Supply, installation of hot dip galvanized ladder type cable tray of size 450x 60 mm with all support and accessories for cable laying in bridge	RM	641.0			
71	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Supplying, laying, testing & commissioning of the 1100 Volts PVC/XLPE insulated PVC sheathed/ XLPE cable of following size 3C x 2.5 mm2 cu. Unarmored cable	RM	8974.0			
72	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Supplying, laying, testing & commissioning of the 1100 Volts PVC/XLPE insulated PVC sheathed/ XLPE cable of following size 4C x 10 mm2 cu. Armored cable	RM	3960.0			

Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
73	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Supplying, laying, testing & commissioning of the 1100 Volts PVC/XLPE insulated PVC sheathed/ XLPE cable of following size 4C x 16 mm2 cu. Armored cable	RM	10425.0			
74	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Supplying, laying, testing & commissioning of the 1100 Volts PVC/XLPE insulated PVC sheathed/ XLPE cable of following size 4C x 70 mm2 cu. Armored cable	RM	56.0			
75	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Construction of brick masonry chamber of internal size 450x450mm with 250mm thick brickwork in 1:4 cement mortar, 450x450mm concrete manhole cover with frame (heavy duty), cement plaster inside, height varies from 300 to 1000mm.The manhole must have drain out provision.	No.	641.0			
76	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Construction of brick masonry chamber of internal size 600x600mm with 250mm thick brickwork in 1:4 cement mortar, 450x450mm concrete manhole cover with frame (heavy duty), cement plaster inside, height varies from 300 to 1000mm.The manhole must have drain out provision.	No.	6.0			

Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
77	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Panel-IP 65 floor mounted as per following details: Incomer: 125 4 pole MCCB of 25 kA with complete features of microprocessor release unit , for short circuit, over current and earth fault protection with adjustable setting with following accessories :(1) Under voltage protection (2) Over voltage protection (3) Instantaneous Over Current protection (4) Auxiliary contacts required for under voltage, over voltage and necessary interlocking of breakers. (5) Reverse Power relay. (6) Bus bar : (Heat shrinkable colored sleeve) 200 A TPN Copper (7) Outgoings:(a) 4 Nos. 32 A 15 kA 2-P MCB (b) 6 Nos. 32 A 25 kA 4-P MCCB	No.	3.0			
78	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Provide, supply and install, testing & commissioning and approvel from NTC/NEA as specified in Appendix-2 of Employer's Requirements to perform complete work of Optical Fiber.	Job	1.0			
79	Electric Work Electric Work and Optical Fiber Work: Providing, installing, excavation, testing and connecting, approved by NEA and Nepal Telecom all Complete as per instruction of Engineer, NEA specification, drawings. Provide, supply and install, testing & commissioning and approvel from NEA as specified in Appendix-2 of Employer's Requirements to perform complete work of Rehabilitation and Reconstruction of Electric work (i.e. 11kv crossing, 132 kv crossing, electric tower etc and newly construction of underground crossing of proposed electric work as per NEA specification, drawings and instruction of Engineer and all complete with closed co-ordination of NEA)	Job	1.0			

Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
80	Road Furnitures Providing and laying of hot applied thermoplastic compound on rough surface (similar to Asphalt concrete and rigid pavement)at least 2 mm thick including reflectorizing glass beads as per DOR Traffic sign manual/ Specifications .The finished surface to be level, uniform and free from streaks and holes.	m2	9025.5			
81	Road Furnitures Providing and fixing of retro-reflectorized warning, Regulatory and informatory sign as per specification clause 1501made of high intensity grade sheeting, fixed over aluminum sheeting, 1.5mm thick supported on a 50 mm internal diameter steel tube or mild steel angle iron post 75 mm X 40 mm x 6mm firmly fixed to the ground by means of properly designed foundation with M 10/40 grade cement concrete 30cm x 30cm x 30cm below ground level or as per drawings and Technical Specification.80cm x 60cm rectangular	No.	199.0			
82	Road Furnitures Providing and fixing of retro-reflectorized warning, Regulatory and informatory sign as per specification clause 1501made of high intensity grade sheeting, fixed over aluminum sheeting, 1.5mm thick supported on a 50 mm internal diameter steel tube or mild steel angle iron post 75 mm X 40 mm x 6mm firmly fixed to the ground by means of properly designed foundation with M 10/40 grade cement concrete 30cm x 30cm x 30cm below ground level or as per drawings and Technical Specification.90cm equilateral triangle.	No.	20.0			
83	Road Furnitures Providing and Fixing Reinforced cement concrete M 15 grade kilometer Post including painting and printing as per Standard Drawing-2070 and Technical Specifications. One kilometer post (precast)	No.	14.0			
84	Road Furnitures Providing and Fixing Reinforced cement concrete M 15 grade kilometer Post including painting and printing as per Standard Drawing-2070 and Technical Specifications. Five kilometer Post (precast)	No.	2.0			

Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
85	Road Furnitures 200 m Marker Stone: Providing and fixing of road stud 100x100, die-cast in aluminum, resistant to corrosive effect of salt and grit, fitted with lenses reflectors, installed in concrete or asphaltic surface by drilling hole 30mm up to a depth of 60mm and bedded in a suitable bituminous grout or epoxy mortar, all complete as per drawing and Technical Specifications.	No.	58.0			
86	Road Furnitures Bridge Name Plate Sign (C29): Providing, fixing and erecting 50 mm diameter steel pipe railing in 3 rows duly painted on medium weight steel channels(ISMC series) 100 mm x 50 mm, 1.2 meters high aboveground, 2 m center to center, complete as per Drawing and Technical specifications.	No.	70.0			
87	Road Furnitures Guard Rail: Providing and erecting "W" metal beam crash barrier comprising of 3 mm thick corrugated sheet metal beam rail, 70cm above road/ground level, fixed on ISMC series channel vertical post, 150x75x5mm spaced 2m c/c, 1.8m high, 1.1m below ground/road level, metal beam rail to be fixed on the vertical post with a spacer of channel section 150x75x5mm, 330mm long complete as per drawing and technical specifications.	rm	10767.0			
88	Road Furnitures Road Delineators Post: Providing and installation of 150 mm * 150 mm 1. 5 m long delineators (road way indicators, hazard markers, object markers), 80-100 cm high above ground level, painted black and white in 20 cm wide strips, buried or pressed into the ground and conforming to the drawings and Technical Specifications.	No.	657.0			
89	Other Works Provide, supply and install Laboratory building including services, essential supplies like water, electricity, sanitary services and their maintenance and cost of all equipment, tools, materials, labour and incidentals as specified in Appendix-1 of Employer's Requirements to perform tests and other operations of quality control according to the specification and directed by Engineer.	Month	36.0			

Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
90	Other Works Providing and maintaining of Contractors site office & camp, Engineers site office, storage yard, equipment and workshop facilities including water supply, electricity, drainage, communication, security and all the facilities as per employers requirement and conditions of contract.	Month	36.0			
91	Other Works Prepare and submit monthly / Quarterly / Yearly / update of existing Environment Management Plan / progress report 6Nos. of copies each with soft copy and color prints in A4 size paper with color photo.	Month	36.0			
92	Other Works Prepare and provide as built drawings in GIS base maps including report in 4hard copies and 2CDs all complete set as per instruction of Engineer	Set	1.0			
2.2 Bridge Construction Work						
Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
1	Conduct detailed survey, geo-physical and geo-technical investigation, hydrological investigation and preparation of detailed design and construction drawings for the Contractors Design Works comprising 14 Nos. of Twin Bridges and associated works as per the Employers Requirement.	LS	1.0			

Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
2	Construction of foundations, sub-structures (Pier and Abutments), super structures, protection works; approach slab, wing/return walls, Asphalt overlay, including utility works e.g. electrical and lighting works, optical fiber works, ; ancillary. for double lane bridges(twin) all complete as per the employer's requirement and as per the Employer's Requirement and condition of contract for the Bridges and associated works as outlined below; 1. (a) CH 49+880 to CH 50+120, approx. 240 m length (Kathmandu) (b) CH 49+890 to CH 50+130, approx. 240m length (Terai) (a) CH 50+205 to CH 50+285, approx. 80m length (Kathmandu) (b) CH 50+215 to CH 50+295, approx. 80m length (Terai) ii. (a) CH 50+440 to CH 50+560, approx.120 m length (Kathmandu) (b) CH 50+450 to CH 50+570, approx.120 m length (Terai) iii. (a) CH 50+684 to CH 50+789, approx.105 m length (Kathmandu) (b) CH 50+695 to CH 50+800, approx. 105 m length (Terai) iv) (a) CH 50+879 to CH 50+939, approx.60 m length (Kathmandu) (b) CH 50+890 to CH 50+950, approx.60 m length (Terai) iv) CH 51+425 to CH 51+440, approx. 15m length (Ref concept. Drawing for bridge width) -Both Kathmandu and Terai. vi) CH 51+980 to CH 52+000 approx. 20 m length (Ref concept. Drawing for bridge width) -Both Kathmandu and Terai. vii) CH 52+464 to 52+484 approx. 20 m length ((Ref concept. Drawing for bridge width) -Both Kathmandu and Terai. viii)CH 52+658 to 52+678 approx. 20 m length ((Ref concept. Drawing for bridge width) -Both Kathmandu and Terai. ix) CH 53+250 to 53+270 approx. 20 m length ((Ref concept. Drawing for bridge width) -Both Kathmandu and Terai. x) (a)CH 54+799 to CH 55+039, approx.240m length (Kathmandu) (b)CH 54+813 to CH 55+053, approx.240m length (Terai) xi) (a)CH 55+478 to CH 55+538, approx.60m length (Kathmandu) (b)CH 55+476 to CH 55+536 approx.60m length (Terai) xii) (a) CH 56+666 to CH 56+716, approx. 50m length (Kathmandu) (b)CH 56+664 to CH 56+714 approx.50m length (Terai) xiii) (a)CH 57+119 to CH 57+294, approx.175m length (Kathmandu) (b)CH 57+111 to CH 57+286 approx.175m length (Terai) Note: *Width of each bridge is 11.8 m as per standard and as per the indicative drawings. The Bridge width may increase at the curved sections for	LS	1.0			

Procument Item Details						
SL. No	Item Description	Unit	Quantity	Bidder's Rate (NPR)	Bidder's Rate (in words)	Total Amount (NPR)
	extra widening. *The length and height of the Bridges may vary during design as per design requirements.					

Total of Procument Items	
Total Item Price	
VAT	
Grand Total	