NEPAL ELECTRICITY AUTHORITY
ENGINEERING SERVICES DIRECTORATE
UPPER ARUN HYDROELECTRIC PROJECT

Procurement of Consulting Services
for
Detailed Engineering Design, Tender Document Preparation, and Construction Supervision and Contract Management of Access Road Construction

Expression of Interest Document

Issued on: **3rd July 2016**

Invitation for EoI No.: **UAHEP/AR/QCBS-3**

Upper Arun Hydroelectric Project
Engineering Services Directorate
Nepal Electricity Authority
Durbar Marg, Kathmandu
Tel: +977-1-4153039
Fax: +977-1-4153040
Email: upperarun@nea.org.np

July, 2016

TABLE OF CONTENTS

1. NOTICE

Project Director

NEPAL ELECTRICITY AUTHORITY

(Government of Nepal Undertaking)

ENGINEERING SERVICES DIRECTORATE

UPPER ARUN HYDROELECTRIC PROJECT

Access Road for Upper Arun Hydroelectric Project (UAHEP)

Notice for Expression of Interest

(**First date of publication : 3rd July 2016**)

Reference No.: UAHEP/AR/QCBS-3

1. Nepal Electricity Authority, (NEA) intends to receive funds from the Government of Nepal (GoN) for the construction of new access road of Upper Arun Hydroelectric Project ("the Project") and NEA has received fund from the GON to procure Consulting Services for all associated works of the Detailed Engineering Design, Preparation of Tender Documents and Construction Supervision & Contract Management of the access road ("the Services").

2. The proposed new access road includes about 24 KM of length starts from Gola (proposed powerhouse site of the Project, near Barun Bazar) to Chepuwa (proposed dam site) including about 1.7 km long road tunnel, two bridges over Arun River (one at Gola for Upper Arun Hydroelectric Project and another at UwaGaun for IkhuwaKhola Project) and other civil works.

3. The scope of the Services consists of undertaking the complete review of the feasibility study (1991), detailed engineering survey, investigation, design, cost estimate and preparation of tender documents and assists NEA in procurement of the Contractor and other administrative works in **Phase I**, Construction Supervision and Contract Management in **Phase II**. In particular, the principal activities shall include, but not limited to the following:

   Phase I (10 + 12 calendar months)

   - ***Review of the feasibility study (1991)***
   - ***Conduct the detailed engineering survey, investigation and design***
   - ***Prepare the cost estimate, tender documents and drawings***
   - ***Assist NEA for the procurement of the Contractor***

   Phase II (42 calendar months)

   - ***Construction Supervision and Contract Management***

4. NEA now requests Expression of Interest (EOI) from all Eligible International Consulting Firms individually or as Joint Venture Partners (JVP) or intend to Joint Venture Partners (JVP) and International Consulting firm Joint Venture with Nepalese consulting firm or intend to Joint Venture that have experiences in Detailed engineering survey, design, cost

Project Director

estimate, preparation of tender documents and construction supervision & contract management of

- at least three (3) number of road projects of new or upgrading of the feeder roads or higher standard of at least 24 km of length
- At least two (2) numbers of permanent road bridges and
- At least one (1) number of road tunnel of at least 1.7 km of length

in the last ten (10) years as of the last day of EOI submission.

Note: ***Experience and Qualification of other firms, whether parent or subsidiary firm, will not be considered for evaluation. Likewise, qualification and experience of the consulting firm associated as a sub-consultancy will not be considered for evaluation for shortlisting.***

5. The Project requires "the Services" of the Consultants for the period of **Sixty Four (64) calendar months** in total: **Phase- I** duration is **Twenty Two (22) months** (10 months for detailed design and 12 months for interface period for procurement process and others), whereas **Phase II** duration is **Forty Two (42) months** (30 months for construction supervision and contract management and 12 months for defects liability period).

6. The consulting services will require about 40 experts in total person-months including 13 person months of international experts for **Phase I** service and about 250 expert in total person-months including 46 persons months of international expert for **Phase II** service. The Man months for consulting services are allocated to carry out the works at site office / Kathmandu office.

7. The shortlisted Consultants shall prepare separate technical proposal for Phase I and Phase II and shall be submitted separately during RFP (Request for Proposal) so that the contract can be signed for phase wise services on the basis of separate financial proposals. It is expected that the Contract for the Phase-II will be made upon the successful completion of Detailed Engineering survey and design, cost estimate and preparation of tender documents (Phase I), substantial completion of land acquisition works for the access road and the bridges and approval of fund for the construction of the access road, road tunnel and two bridges from the Government of Nepal.

8. Eligible interested consulting firms must provide information in the form of brochures, description of completed similar assignments and availability of appropriate professional staff etc. including documentary evidence that they are qualified to perform the Services. Such information must also include a brief description of the firm together with the organization structure and staffing. In particular, the information must include experience of the firm in detailed engineering survey, cost estimate, preparation of tender documents, Construction Supervision and Contract Management of new road/upgrading construction. The Consulting firms must provide information on jobs undertaken in the past ten (10) years

Project Director

giving a brief description of each job undertaken and information on the Employer. The firm's experience must be supported by client's/employer's reference.

9. Each firm is permitted to submit only one EOI either single or in a Joint Venture, failing of which shall prevent firms from being shortlisted. Firms participating as a joint venture must mention the name of the lead partner also.

10. All submittals from the consulting firms shall be in English language.

11. The consulting firms will be selected under the Quality and Cost Based Selection (QCBS) method as per the Public procurement Act, 2063 of GoN and Financial By-laws, 2068 of NEA. Only six highest ranked short listed firms with the most appropriate qualifications and references will be invited to submit Request for Proposal.

12. A brief description and further information of the Services and evaluation criteria for short-listing of consulting firms can be either downloaded from the NEA's website: www.nea.org.np or collected from the address mentioned below during office hours.

13. EOI must be delivered in a written form in two copies **(one original and one copy)** to the address mentioned below during office hour on or before 13:00 hrs. local time on **21st August 2016**. In case the dead line falls on a government holiday it shall automatically extend to the next working day. The submission shall be made in sealed envelope and the title shall be

"Expression of Interest (EOI) for consulting services: Detailed Engineering Design, Tender Document Preparation, Construction Supervision and Contract Management of Access Road of Upper Arun Hydroelectric Project".

14. NEA may cancel whole short listing process at any time and that it is not bound to accept any or all EOIs received without incurring any liability to the firms.

Upper Arun Hydroelectric Project,
Engineering Services Directorate,
Nepal Electricity Authority,
Durbar Marg, Kathmandu, Nepal

Tel.: +977-1- 4153039
Fax: +977-1- 4153040
Email: upperarun@nea.org.np

Project Director

2. SECTION 1. INSTRUCTIONS TO CONSULTANTS

2. 1. GENERAL

A. SCOPE OF SERVICE

A.1 Nepal Electricity Authority wishes to receive Expression of Interest (EOI) from the eligible consulting firms for detailed engineering survey, investigation, design, cost estimate, tender document preparation, assist in tender evaluation, Construction Supervision and Contract Management ("the services") of

- About 24 KM of length of access road starts from Gola (proposed powerhouse site of the Project, near Barun Bazar) to Chepuwa (proposed dam site) including about 1.7 km long road tunnel and
- Two bridges over Arun River (one at Gola for Upper Arun Hydroelectric Project and another at Uwa Gaun for Ikhuwa Khola Project) from the nearest point of Koshi Highway (under construction) and other civil works.

A.2 The selected Consultant will be expected to complete the Services within 64 (Sixty Four) calendar months [Phase I duration is 22 months for detailed design including 12 months of interface period allocated for procurement process whereas Phase II duration is 42 months (30 months for construction supervision and contract management and 12 months for defect liability period (DLP)] in total from the date of commencement of the Services as stated in Terms of Reference.

B. B. SOURCE OF FUNDS

B.1. The Government of Nepal (GON) and Nepal Electricity Authority (NEA) will finance the cost for the Services from their own resources.

2. 2. ELIGIBLE CONSULTING FIRMS

a) This Invitation to Expression of Interest is open to all Eligible International Consulting Firms individually or as Joint Venture Partners (JVP) or intends to Joint Venture Partners (JVP) and International Consulting firm Joint Venture with Nepalese consulting firm or intend to Joint Venture that have experiences in Detailed engineering survey, design, cost estimate, preparation of tender documents and construction supervision & contract management of

- at least three (3) number of road projects of new or upgrading of the feeder roads or higher standard of at least 24 km of length
- At least two (2) numbers of permanent road bridges and

Project Director

- At least one (1) number of road tunnel of at least 1.7 km of length

in the last ten (10) years as of the last day of EOI submission. Interested Consultants should provide information demonstrating that they have the required qualifications and relevant experience to perform the Services. All the Consulting firms including JV partners must have been legally registered for at least ten 10 years from the last date of submission of EOI.

b) Experience and Qualification of other firms, whether parent or subsidiary firm, will not be considered for evaluation. Likewise, qualification and experience of the consulting firm associated as a sub-consultancy will not be considered for evaluation for shortlisting.

c) The Consultant or a partner of a Joint Venture shall not be under a declaration of ineligibility for corrupt or fraudulent practices issued by the Government of Nepal.

2. 3. EVALUATION CRITERIA FOR SHORT-LISTING OF THE CONSULTANTS

Applicant/ Consulting Firm will be selected on the basis of Quality and Cost Based Selection (QCBS) method and the selection will be carried out in two stages. The first stage involves short listing of maximum six qualified consulting firms from a long list of firms which have expressed their interest for the Services as described in the notice of Expression of Interest (EOI) for consulting services. In the second stage, the Request for Proposal (RFP) will be issued only to those shortlisted consulting firms. The received RFPs are then evaluated to select the best competitive consulting firm suitable for the proposed Services.

2. 4. EVALUATION PROCEDURE FOR SCREENING/SHORT-LISTING OF CONSULTING FIRMS

The long list will be prepared only of those consulting firms, which have submitted Expression of Interest within the scheduled time in response to the notice of EoI for consulting services published by Nepal Electricity Authority (NEA).

Consulting firms' work experiences shall be evidenced by copies of client's references with contact addresses on the letterhead of the client's organization and shall be written in English. If the references are in other languages, it shall be accompanied by an accurate translation into the English language. **The client's reference will not be considered for evaluation, if the translated version of client's reference is in other language instead of English language.**

Project Director

The evaluation for short listing from this long list will be carried out in three steps. Details of evaluation criteria for short listing the consulting firms are given below:

2.4.1 STEP I: PRELIMINARY SCREENING OF THE CONSULTING FIRMS

In this step, a preliminary screening of the received EOI proposals will be carried out. The consulting firms will be evaluated on 'Pass' or 'Fail' basis. Each consulting firm must 'pass' each and every threshold criterion mentioned below. Any consulting firm not complying with any of the specified threshold criteria shall not be considered for further evaluation.

A. General Threshold Criteria

i. EoI proposal shall be duly received by the last date and time of submission as mentioned in the notice of EOI.

ii. Following documents shall be submitted along with the EOI by the firm or JV partners.

- Copies of Certificates of incorporation or Registration of the Consulting firm.
- Financial Statements or documents to support the annual turnover of the five consecutive fiscal years but not earlier than the year 2010
- Company profile, brochure etc. including the brief description of completed assignment and the list of firm's regular staff

iii. At the time of submission of EOI proposed consulting firms must not be black listed by Public Procurement Monitoring Office (PPMO)/Nepal and NEA.

iv. The firm including JV partners must be a consulting firm legally registered at least for ten (10) years, as of the last date of EoI submission.

v. Minimum average annual turnover of the best three years out of last five fiscal years but not earlier than the year 2010, should not be less than USD 1,800,000.00. In case of JVP, cumulative annual turnover of JVP will be evaluated for average annual turnover.

Project Director

B. Technical Threshold Criteria:

Evaluation under this criterion will be based on the projects completed in the last ten (10) years preceding from the last date of submission of EOI.

i. The Consulting firm or JV must have completed detailed engineering design of at least **3 (three)** number of roads/highway projects of new construction/ upgrading to the feeder roads or higher standard of at least 24 km length or more in single contract individually or in JV with other firms.

ii. The Consulting firm or JV must have completed construction supervision of at least **3 (three)** number of roads/highway projects of new construction/ upgrading to the feeder roads or higher standard of at least 24 km length or more in single contract individually or in JV with other firms.

iii. The Consulting firm or JV must have completed detailed engineering design or construction supervision of at least **one (1)** number of roads/highway projects of new construction/ upgrading to the feeder roads or higher standard of at least 24 km length or more in single contract individually or in JV with other firms completed outside home country.

iv. The Consulting firm or JV must have completed detail design or construction supervision of at least **2 (two)** number of permanent road bridge projects with span of at least 50 meter individually or in JV with other firms.

v. The Consulting firm or JV must have completed detailed design of at least **one (1)** road tunnel of at least 1.7 km length in single stretch individually or JV with other firms.

vi. The Consulting firm or JV must have completed construction supervision of at least **one (1)** road tunnel of at least 1.7 km length in single stretch individually or JV with other firms.

C. Threshold Criteria for Joint Venture (JV) Firms

i. The lead partner of the JV firm must be the International Firm with at least 40% share and each partner must have at least 25% of the share.
ii. Each partner of JV shall meet the above criteria A (ii), A(iii), A(iv).
iii. The combined experience of the JV partners shall meet all the above Criteria B. However, each partner of the JV firm shall meet at least one of the criteria mentioned in B. If any of the partners of the JV does not meet this criterion, the entire JV will not be considered for evaluation.

Project Director

iv. JV firms shall submit the copy of JV Agreement or intended JV Agreement along with their EOI submissions. Such JV must be retained for entire period of Request for Proposal.
v. An applicant must not submit more than **one (1)** EoI proposal as either a single entity or partner in JV.

Notes:

- *The consulting firms or JV **not complying** with any of the threshold criteria stated above in **A, B and C** shall not be considered for further evaluation.*
- *Experience and Qualification of other firms, whether parent or subsidiary firm, will not be considered for evaluation. Likewise, qualification and experience of the consulting firm associated as a sub-consultancy will not be considered for evaluation for shortlisting.*

2.4.2. STEP II: DETAILED EVALUATION OF CONSULTING FIRMS

The consulting firms or JV fulfilling all requirements in the Step I are further evaluated in the Step II. A scoring system is adopted to rank these firms in order of merit based on the criteria mentioned below. The combined experience of JV partners shall be considered in the evaluation except S. No. 1, 2 and 3 of Criteria 1. In S. No. 1, 2 and 3 of Criteria 1, only the lead firm of the JV will be considered for evaluation. The maximum overall score that any consulting firms can obtain is set as One Thousand (1000) points, which are distributed as follows:

Criteria 1: Management Competency of the Consulting Firm: Two Hundred (200) points

Criteria 2: Specific Experience of Consulting Firms: Six Hundred (600) points

Criteria 3: Geographical Experience of Consulting Firms: Two Hundred (200) points

Details of evaluation criteria in each category are as follows. Figures given in brackets indicate the maximum score that can be obtained in each category.

Criteria 1. Management Competency of Consulting Firm [Two Hundred (200) Points]

Management competency of consulting firm will be evaluated based on availability of quality certificate, quality assurance/control plan and organizational strength and the available key professional staffs as shown below for this particular assignment. Team leader and other key professional staffs should have more than 15 and 10 years of working experiences, respectively.

Project Director

1. Team Leader/ Tunnel expert with geotechnical/ rock mechanics background
2. Highway Design Engineer
3. Road Tunnel Engineer/ Specialist
4. Structural/ Bridge Engineer

Key Professional Staff will be evaluated as per S. No. 4 in table below. The point weightage for Team Leader will be 40% of the total point allocated in this category and the 60% of the point will be equally distributed among the other key staffs.

The points will be allocated as shown below

S.N	Description	Points	Weightage
1.	***Company Quality Certification***	***Fifty (50)***	
i	Yes		Fifty (50)
ii	No		Zero (0)
2.	***Quality Assurance/ Control Plan of the firm***	***Fifty(50)***	
i	Yes		Fifty (50)
ii	No		Zero (0)
3.	***Organizational Strength***	***Fifty (50)***	
	Number of existing professional staff in house		
	More than 25		Fifty (50)
	15-25		Thirty Eight (38)
	Less than 15		Twenty Five (25)
4.	***Key Professional Staffs in the company***	***Fifty (50)***	
4a.	Qualification of the Professional Staffs in related field	Twenty (20)	
i.	Master's Degree		Twenty (20)

Project Director

ii.	Bachelor's Degree		Eighteen (18)
4b.	Experiences of professionals in respective field:	Thirty (30)	
A.	For Team Leader: Construction supervision of road tunnel of at least 1.7 km length in single stretch	Twelve(12)	
i.	Two or more Projects		Twelve (12)
ii.	One Project		Six (6)
B.	For Highway Design Engineer: Detailed engineering design of roads/highway projects of new construction/ upgrading to the feeder roads or higher standard of at least 24 km length or more in single contract	Six (6)	
i.	Two Projects or more		Six (6)
ii.	One Project		Three (3)
C.	For Tunnel Engineer/ Specialist: Detailed Design of road tunnel of at least 1.7 km length in single stretch	Six (6)	
i.	Two Projects or more		Six (6)
ii.	One Project		Three (3)
D.	For Structural/ Bridge Engineer: Detailed Design of permanent road bridge projects with span of at least 50 meter	Six (6)	
i.	Two Projects or more		Six (6)
ii.	One Project		Three (3)

Project Director

Criteria 2: Specific Experience of the Consulting Firm [Maximum Six Hundred (600) Points/ One Thousand (1000)]

Evaluation under this criterion is based on the experience of consulting firms in **detailed design, Construction Supervision and Contract Management of road, bridge and road tunnel projects** in the last ten (10) years preceding from the last date of submission of EOI. To be eligible for further evaluation the consulting firm or JV firms must score at least Three Hundred Twenty Five (325) points out of Six Hundred (600) under this criterion. The following will be the breakdown of this particular criterion:

S.N	Description/ Criteria	Points
2.1	***Detail design of road projects (new construction/upgrading/feeder roads or higher standards) of length at least 24 km individually or in JV with other firms***	**One Hundred Twenty Five (125)**
	Five (5) project or more	One Hundred Twenty Five (125)
	Four (4) projects	Ninety Four (94)
	Three (3) projects	Sixty Three (63)
2.2	***Construction Supervision of road projects (new construction/upgrading/feeder roads or higher standards) of length at least 24 km individually or in JV with other firms***	**One Hundred Twenty Five (125)**
	Five (5) project or more	One Hundred Twenty Five (125)
	Four (4) projects	Ninety Four (94)
	Three (3) projects	Sixty Three (63)
2.3	***Detail design of permanent road bridges with span of at least 50 meter individually or in JV with other firms***	**Fifty (50)**
	Four (4) or more bridges	Fifty (50)
	Three (3) bridges	Thirty Eight (38)

Project Director

	Two (2) bridges	Twenty Five (25)
2.4	***Construction Supervision of permanent road bridges with span of at least 50 meter individually or in JV with other firms***	**Fifty (50)**
	Four (4) or more bridges	Fifty (50)
	Three (3) bridges	Thirty Eight (38)
	Two (2) bridges	Twenty Five (25)
2.5	***Detail design of road tunnel of at least 1.7 km length (in single stretch) project individually or in JV with other firms***	**One Hundred Twenty Five (125)**
	Two (2) or more road tunnel	One Hundred Twenty Five (125)
	One (1) tunnel	Sixty Three (63)
2.6	***Construction supervision of road tunnel of at least 1.7 km length (in single stretch) project individually or in JV with other firms***	**One Hundred Twenty Five (125)**
	Two (2) or more road tunnel	One Hundred Twenty Five (125)
	One (1) tunnel	Sixty Three (63)

Criteria 3: <u>Geographical Experiences of Consulting Firm</u> [Maximum Two Hundred (200) Points]

Evaluation under this criterion is based on the experience of consulting firms in road/highway & road tunnel projects in the last Ten years (10) years preceding from the last date of submission of EOI in the Hilly Region. Ongoing and planned projects will not be considered for evaluation. The following is the breakdown of this particular criterion:

Project Director

SN	Description	Points
1.	***Detailed Engineering Design of roads/highway projects of new construction/ upgrading to the feeder roads or higher standard of at least 24 km length or more in single contract in hilly region***	**Fifty (50)**
(i)	Three (3) or more Projects	Fifty (50)
(ii)	Two (2) Projects	Thirty Eight (38)
(iii)	One (1) Project	Twenty Five (25)
2.	***Construction Supervision of roads/highway projects of new construction/ upgrading to the feeder roads or higher standard of at least 24 km length or more in single contract in hilly region***	**Fifty (50)**
(i)	Three (3) or more than three Projects	Fifty (50)
(ii)	Two (2) Projects	Thirty Eight (38)
(iii)	One (1) Project	Twenty Five (25)
3.	***Detailed Engineering Design of road tunnel of at least 1.7 km length in single stretch***	**Fifty (50)**
(i)	Three (3) or more than three Projects	Fifty (50)
(ii)	Two (2) Projects	Thirty Eight (38)
(iii)	One (1) Project	Twenty Five (25)
4.	***Construction Supervision of road tunnel of at least 1.7 km length in single stretch***	**Fifty (50)**
(i)	Three (3) or more than three Projects	Fifty (50)
(ii)	Two (2) Projects	Thirty Eight (38)
(iii)	One (1) Project	Twenty Five (25)

Project Director

2.4.3. STEP III: SHORT-LISTING OF CONSULTING FIRMS

To be qualified for short listing the consulting firm or JV firms must score at least Three Hundred Twenty Five (325) points out of Six Hundred (600) under Criteria 2. In addition to this, the Consulting firms or JV firm scoring less than Five Hundred (500) points in total out of One Thousand (1000) will not be qualified for short listing. For short-listing of the qualified consulting firms, the following procedures will be followed:

a) Rank (Short-list) the firms in order of merit basis according to the points secured by them;

b) Select maximum top six consulting firms as short listed firms to whom RFP will be issued to submit.

If the consulting firms secure equal points after evaluation, then the short listing of those firms will be carried out on the basis of their numbers of projects completed i.e. who have completed more numbers of projects in order of road tunnel project, road project and permanent road bridge project, in the capacity of Construction Supervision and Contract Management will be ranked high/top accordingly.

ALL SUBMITTALS FROM THE CONSULTING FIRMS SHALL BE IN ENGLISH LANGUAGE.

Project Director

3. SECTION 2: EXPRESSION OF INTEREST SUBMISSION FORM

3.1 SUBMISSION FORM

[*Location, Date*]

To: [*Name and address of Client*]

Dear Sirs:

We, the undersigned, offer to provide the consulting services for [*Insert title of assignment*] in accordance with your invitation for Expression of Interest dated [*Insert Date*] and we are hereby submitting our Expression of Interest.

We assure/ intend that the lead partner of our JV will have [*Insert Percentage*] of share whereas the JV partner(s) will have [*Insert Percentage*] and [*Insert Percentage*] of share respectively.

We are submitting our Interest declaring that all the information and statements made in this EOI are true and accept that any misinterpretation contained in it may lead to our disqualification.

We understand you are not bound to accept any Expression of Interest you receive.

We fully understand the Terms of Reference and are aware of the locations of the proposed access road.

We remain,

Yours sincerely,

Authorized Signature [*In full and initials*]: _____
Name and Title of Signatory/Authorized Representative: _____
Name of Firm/JV: _____
Address:
Firm stamp (Lead firm): _____

Project Director

3.2 MANDATORY DOCUMENTS

Following documents shall be submitted along with the EOI by the firm or JV partners:

- **Copies of Certificates of incorporation or Registration of the Consulting firm.**
- **Financial Statements or documents support to the annual turnover of the five consecutive fiscal years but not earlier than the year 2010**
- **Company profile, brochure etc. including the brief description of completed assignment and the list of firm's regular staff**
- **Power of Attorney**
- **Copy of JV Agreement or memorandum of understanding (MOU) of JV Agreement or intended JV Agreement, if applicable.**

3.3 CONSULTANT'S ORGANIZATION AND EXPERIENCE

A. Consultant's Organization

[Provide here a brief description of the background and organization of your firm/entity and each associate for this assignment.]

B. Consultant's Experience

[*Using the format below, provide information on each assignment for which your firm, and each associate for this assignment, was legally contracted either individually as a corporate entity or as one of the major companies within Joint venture./an association, for carrying out consulting services similar to the ones requested under this assignment.*

Assignment name:	Approximate value of the contract :
Country: Location within country:	Duration of assignment (months):
Name of Client:	Total No of staff-months of the assignment:
Address:	Approx. value of the services provided by your firm under the contract (USD):
Start date (month/year): Completion date (month/year):	Number of professional staff-months provided by associated Consultants:
Name of associated Consultants, if any:	Name of senior professional staff of the firm involved and functions performed (indicate most significant profiles such as Project Director/Coordinator, Team Leader):

Project Director

Narrative description of Project:
In case of the Road and Road Tunnel, specify the terrain slope of the project area:
In case of the Hilly Road, Please specify:
In case of permanent road bridges, specify the length and maximum span of the bridge:
Description of actual services provided by your staff within the assignment:

To substantiate above, The Consultant shall submit the copies of reference letters.

3.4 ANNUAL TURNOVER

Fiscal years	Turnover	Average Annual Turnover of the best three years of the five fiscal years but not earlier than the year 2010
2010/11		
2011/12		
2012/13		
2013/14		
2014/15		

Turnover for last five consecutive fiscal years are to be provided. To substantiate above, the consulting firm(s) should submit the copies of financial data (Profit and Loss). The financial data printed in the annual book will be considered as audited.

Project Director

3.5 CURRICULUM VITAE (CV) FOR THE PROPOSED PROFESSIONAL STAFF

FORMAT OF CURRICULUM VITAE (CV) FOR PROPOSED PROFESSIONAL STAFF

Proposed Position: _____
Name of Consultant: _____
Name of Staff: _____
Profession: __
Date of Birth: _____
Years with Consultant/Entity: _____Nationality: _____
Membership in Professional Societies: _____
_____
Detailed Tasks Assigned: _____
_____

Key Qualifications:

[*Give an outline of staff member's experience and training most pertinent to tasks on assignment. Describe degree of responsibility held by staff member on relevant previous assignments and give dates and locations. Use about half a page.*]

Education:

[*Summarize college/university and other specialized education of staff member, giving names of schools, dates attended, and degrees obtained. Use about one quarter of a page.*]

Employment Record:

[*Starting with present position, list in reverse order every employment held. List all positions held by staff member since graduation, giving dates, names of employing organizations, titles of positions held, and locations of assignments. For experience in last twenty years, also give types of activities performed and client references, where appropriate. Use about two pages.*]

Languages:

The Team Leader must be fluent in writing and speaking in English language [*For each language indicate proficiency: excellent, good, fair, or poor in speaking, reading, and writing.*]

_____

Certification:

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experience.

_____Date: _____
[Signature of staff member and authorized representative of the consultant]Day/Month/Year

Full name of staff member: _____

Project Director

Full name of authorized representative: _____

4. SECTION 3: OUTLINE TERMS OF REFERENCE (TOR)

4.1 BACKGROUND

NEA is prioritizing the development of a suite of hydropower projects, among which the 335MW Upper Arun Hydroelectric Project (UAHEP) is a high priority due to its expected low generation cost and high availability of firm power. The ultimate purpose of power generation is to increase domestic energy supply through the national grid; in the future, surplus energy maybe exported. NEA is also responsible for the planning and implementation of the Ikhuwa Khola Hydroelectric Project (IKHEP).

In February 2013, a cabinet decision granted the NEA permission to implement the UAHEP under the ownership of the Government of Nepal. The Department of Electricity Development informed NEA that a Survey License would not need to be issued to NEA since NEA would be implementing the project on behalf of the Government of Nepal. The associated IKHEP would be developed under the umbrella of the UAHEP. Nonetheless, irrespective of how the two projects are viewed under national law, for purposes of the proposed studies they are being treated in an integrated fashion.

The World Bank is supporting the Detail Design of UAHEP and IKHEP and the Environment / Social Impact Assessment of UAHEP, IKHEP and proposed access road as part of its ongoing engagement with and support to the Government of Nepal in strategic planning and detailed project preparation for priority projects in the hydropower sector.

The outline of the term of reference (TOR) given below for reference only and may change during the issuance of RFP.

4.2 INTRODUCTION

Nepal Electricity Authority ("the Employer") intends to procure eligible and qualified consulting firm(s), ("the Consultant") for detailed engineering survey, investigation, design, cost estimate, tender document preparation, assist in tender evaluation, Construction Supervision and Contract Management ("the services") of

- About 24 KM of length of access road starts from Gola (proposed powerhouse site of the Project, near Barun Bazar) to Chepuwa (proposed dam site) including about 1.7 km long road tunnel and
- Two bridges over Arun River (one at Gola for Upper Arun Hydroelectric Project and another at Uwa Gaun for Ikhuwa Khola Project) from the nearest point of Koshi Highway under construction and other civil works by GoN.,

Project Director

as stated in this Terms of Reference.

4.3 OBJECTIVE

The Employer has the preliminary alignment of the said access road (determined by the feasibility study 1991) and the Consultant will follow the same alignment to the extent possible but can deviate from the preliminary alignment if the deviation substantially results technically and economically better option shows by the alternative study.

The objective of the consulting services is to assist Nepal Electricity Authority to implement the Project as follows:

i. To carry out detail design of the project access road, road tunnel, permanent road bridges and other related works, prepare detail cost estimate, prepare tender documents and drawings, and assist Employer in procurement of contractor. The access road, bridges and the road tunnel should meet the requirements for the construction of 335 MW to 700 MW hydroelectric projects. The geometry of the road, size / geometry of tunnel and bridge capacity shall meet these requirements.

ii. Ensure high standards of quality assurance in the execution of works and completion of works within stipulated time limit;

iii. Comprehensive supervision of project construction activities carried out by the Contractor(s) to ensure complete compliance with the drawings, technical specifications and various stipulations contained in the Contract Documents; and

iv. Efficient construction supervision by personnel who are experienced in modern methods of contract management.

4.4 SCOPE OF SERVICES

Mainly the Services comprise in two Phases completed over Sixty Four (64) calendar months**.**

Phase I includes detailed engineering survey, investigation, design, cost estimate, tender document preparation of

- About 24 KM of length of access road starts from Gola (proposed powerhouse site of the Project, near Barun Bazar) to Chepuwa (proposed dam site) including about 1.7 km long road tunnel and
- Two bridges over Arun River (one at Gola for Upper Arun Hydroelectric Project and another at Uwa Gaun for Ikhuwa Khola Project) from the nearest point of Koshi Highway under construction and other civil works

Completed over Ten (10) calendar months and

Twelve (12) calendar months for assisting the Employer for the procurement of the Contractor and other administrative works (Interface Period).

Phase II includes Construction Supervision and Contract Management of

- About 24 KM of length of access road starts from Gola (proposed powerhouse site of the Project, near Barun Bazar) to Chepuwa (proposed dam site) including about 1.7 km long road tunnel and
- Two bridges over Arun River (one at Gola for Upper Arun Hydroelectric Project and another at Uwa Gaun for Ikhuwa Khola Project) from the nearest point of Koshi Highway under construction and other civil works

Completed over Forty Two (42) calendar months. These Forty Two (42) months includes (i) Thirty (30) calendar months for the Construction Supervision and Contract Management and (ii) Twelve (12) calendar months for Defects Liability Period. The Services is stipulated to complete all works in site / Kathmandu office during the period of the Services. The outline scope of works is described below.

A. PHASE I

The Consultant shall perform, but not limited to, the Services as stated below:

A. 1 Walkover Survey

The Consultant shall make the walkover survey of the proposed road alignments. During this Walkover Survey, the following aspects need to be considered:

i. Review the available feasibility study (1991).

ii. Confirmation of the preliminary road alignment and deviations required, if any.

iii. Preliminary estimate of size / shapes of cross drainage structures, road side drains, retaining structures as well as river crossings structures (bridges over Arun River) and other structures as required.

iv. Preliminary estimation of tunnel position.

v. Comparison of overall cost analysis (together of road, bridges and with or without road tunnel) between all the possible alternatives (at least 2 alternatives).

A. 2 Detailed Survey and Investigations of Roads

The consultant shall conduct detail topographical and alignment survey of access road proposed by the consultant & approved by NEA. The extent of the survey shall be good enough for the detailed engineering design of the road alignment, river crossings, cross drainage, road tunnel & bridge and other necessary structures as required. The Consultant shall perform all the necessary

Project Director

engineering geological investigations, geo-technical investigations required for the proper design of the road, bridges and road tunnel. The main tasks are, but not limited to, as stated below:

i. Topographical survey of area adequate for the design of road geometrics and road construction works.
ii. Baseline survey and monument works for efficient and accurate control points for vertical and horizontal alignment during construction. The Bench Marks (BM) and Control points shall be linked to the National Coordinate System and fixed with high precision Differential Global Positioning System (DGPS).
iii. Cadastral survey where land acquisition is necessary to carry-out the works and recommendation of the total area to be acquired for the works.
iv. Adequate Geological /Geotechnical investigations including field and laboratory testing works required for design of structures, road pavement and slope-stabilization works and others as required.
v. Construction material survey to identify the source, quality, and quantity of the construction materials and location of borrow pits, quarries and disposal areas.
vi. Hydrological investigation and studies, to determine the different hydrological parameters required for design of road formation, cross drains, longitudinal drainage and subsoil drainage system; identification of erosion prone areas and requirement for their protection etc.
vii. Assessment and design for the required bio-engineering works.
viii. Estimation of the traffic count and axle load for the pavement design work.

For the pavement design, the following geotechnical tests should be performed as per site requirement:

i. Determine the sub-soil condition through pitting (1m x 1m x1m) and Dynamic Cone Penetration (DCP) tests at 2 locations each 100m of the road alignment.

ii. Determine the sub-soil condition through 2m deep pitting and DCP test at each 25 m where a retaining wall of height more than 3 m is required.

iii. Determine the stability of the cut slopes using appropriate stability analysis or through study, field surveys and investigation of materials at site.

iv. Conduct other tests as required by the geological, geotechnical survey and study.

A. 3 Detailed Survey and Investigation Works for Permanent Road Bridges

a) Topographical Survey

The BMs and Control points shall be linked to the national Coordinate System and fixed with high precision Differential Global Positioning System (DGPS).Topographical survey shall be completed covering minimum distance of 500 m upstream, 200 m downstream and 200m from

Project Director

the river banks on either sides of the river of the bridge location. The topographical map shall show the following information:

i. Contours (1m interval in hilly area, 0.25 m in plain area), Flood lines on either side of the river, Both banks of the river, lines along which L-section and Cross-section of the rivers are taken, Bridge axis including skew angle if any, Traverse lines, Bench Marks or any reference lines, Nearest village, town, govt. office, school etc.,

ii. Cross-section covering 100 m beyond flood lines, on the both banks of the river at proposed bridge site and 500m u/s and 200m d/s, showing High Flood Level (HFL) and Lowest Water Level (LWL) at each section

iii. Bed slope of the river starting from 100m up of the u/s cross-section and ending 100m down of the d/s cross-section.

iv. Establishment of Permanent Bench Marks.

b) Hydrological Survey

For determination of all design data the consultant shall carry out a detailed hydrological survey and study of the river and bridge site, which shall include the following:

i. Catchment area of the river up to bridge site

ii. Nature, size and quantities of debris carried by the river Intensity, duration and distribution of rain in the catchment

iii. Existing bridge or other hydraulic structures across the river in the vicinity of the proposed bridge site with their details as much as possible.

iv. General slope of the river from the critical point (origin) of the river up to bridge site and general slope of the catchment in both sides of the river.

v. Cross sections covering 100m on either side. Beyond flood lines of the river at proposed bridge site, at about 500m. u/s and about 200m d/s. wherein HFL, LWL, Lowest Bed Level (LBL), area of the cross section, wetted perimeter and geological profile with silt factor of each strata (at proposed bridge site only) shall be indicated. (Horizontal and vertical scale of the cross section shall be the same.)

vi. Bed slope of the river which must start from 100m up of the U/S cross section and end at 100 m. down of the d/s. cross section.

vii. Maximum discharge calculated by established formulas with different return periods and the peak discharge observed over a period of 100 years.

viii. Velocity and depth of flow at the time of survey.

ix. Shifting of the river in the past at proposed bridge site and in its vicinity.

Project Director

x. Other information required for river control, design, construction and maintenance of the bridge.

The hydrological survey shall collect secondary data, preferably from the governmental sources, to determine the following:

i. Unit hydrograph for the catchment of River for bridge construction

ii. Size of the opening and location of cross drainage structure

iii. Minimize modification to the natural drainage pattern

iv. Determine the HFL for 50 years return period and design appropriate river training structure along the bank of the River

After the selection of the proposed bridge site with alternatives and preparation of topographic maps, the Consultant shall analyze the collected hydrological and other data and decide the following points with the Employer for final decision of the bridge site:

i. Design discharge

ii. Scour depth, Maximum Scour depth

iii. Linear waterway needed to be provided

iv. Anticipated soil condition for foundation

v. The most feasible proposed bridge site

vi. River- training & approach roads

vii. Type of proposed foundation, substructure and superstructure

c) Geotechnical Investigation and Analysis

After discussion and finalizing of the bridge site/axis with the Employer, the Consultant shall carry out surface and subsurface exploration. The investigations shall include the followings.

i) Line Sampling / Test pits and auguring (all test as required in general practice will be carried out)

For determining the mean particle size of riverbed materials, the Consultant shall perform Line Sampling (four locations) of river bed materials in case of mountainous river OR two test-pits / augured sampling, depth 3.0 m for rivers in plain.

ii) Bore-holes, field tests and laboratory tests

Project Director

The properties of the underlying soil shall be determined by field and laboratory tests of the soil samples obtained from the bore holes drilled to a depth as mentioned in the next section and/or the Bill of Quantities. As far as possible, the locations of the boreholes shall be under each abutment and piers. The following tests shall be conducted for determination of soil properties:

SN	Type of test	Frequency
1	Undisturbed Soil Sampling	at least 2 nos. at each borehole
2	Standard Penetration Test	as required but the interval not less than 1.5 m
3	Grain size analysis / Hydrometer analysis	at least 2 nos. at each borehole
4	Moisture content	at least 2 nos. at each borehole
5	Bulk and dry density	at least 2 nos. at each borehole
6	Unconfined compression test	at least 2 nos. at each borehole
7	Direct shear test	at least 2 nos. at each borehole

If required by the field condition, the Consultant shall conduct other types of tests. Similarly, the frequency of the above tests can be increased if required. The cost of all the field and laboratory tests shall be incorporated in the cost of soil investigation works. No separate payment shall be made for the tests.

The depth of soil exploration from ground level shall be as follows:

SN	Type of soil	Governing depth
1	Silty, sandy, clayey soil	10.0 m to 20.0 m
2	Granular soil (gravels, boulders	10.0 m to 20.0 m
3	Rocks (soft or hard)	Not exceeding 5.0 m

The above mentioned depths are indicative. The Consultant shall decide the actual required depth of soil investigation according to the field condition and design parameters. If the governing depth is not reachable due to any reasons, the location can be changed nearby and carry on the scheduled test but no extra payment shall be made for such tests.

Project Director

iii) Soil exploration:

If required, the Consultant may be asked to submit the soil/rock samples obtained from the drilling works in core boxes and/or a bore-log certified by the concerned representative/ personnel at site. The Consultants shall take site photographs, video or other documentation as appropriate for all site investigation, surveys and studies.

iv) Material Availability Survey

The Consultant shall conduct the material availability survey and study. It shall determine the quality and quantity of the materials required for construction. The availability of the necessary material shall be surveyed to determine the following:

i. Suitable quarry site for boulder, sub-base/base/pavement aggregates, concrete aggregates, sand, fill materials
ii. Material to be transported from elsewhere
iii. Material to be imported from outside Nepal, their source and route of transport
iv. Source of water for construction, location of boring if ground water to be used

The Consultant shall conduct study on the availability of construction materials like, sand gravel boulders, timber, etc. with their engineering properties, quantities and lead up to the bridge site. Quarry site of materials with their available quantities should be shown on a detail plan including construction road with reference to bridge /road construction site.

A. 4 Detailed Survey and Investigation Works for Road Tunnel

The proposed investigation for planning and design of the road tunnel shall include the following components:

- Existing Information Collection and Study
- Surveys and Site Reconnaissance
- Geological and Geotechnical Investigation, and Construction Material Survey
- Environmental and Social Issues
- Seismicity

a) Existing Information Collection and Study

The Consultant shall collect and review of available information to develop an overall understanding of the site conditions and constraints. Existing data can help identify existing conditions and features that may impact the design and construction of the proposed tunnel, and can guide in planning the scope and details of the subsurface investigation program to address these issues.

Published topographical, hydrological, geological, geotechnical, environmental, zoning, and other information shall be collected, organized and evaluated. Historical seismic records shall be collected and used to assess earthquake hazards. Records of landslides caused by earthquakes

Project Director

and other causes shall be collected which can be useful to avoid locating tunnel portals and shafts at these potentially unstable areas.

Topographic maps and aerial photographs shall be used to identify the terrain and geologic features (i.e., faults, drainage channels, sinkholes, etc.). Aerial photographs taken on different dates may reveal the site history in terms of earthwork, erosion and scouring, past construction, etc. The Consultant is advised to use all such information.

b) Surveys and Site Reconnaissance

The reconnaissance shall cover the immediate project vicinity, as well as a larger regional area so that regional geologic, hydrologic and seismic influences can be accounted for. A preliminary horizontal and vertical control survey shall be carried out to obtain general site data for route selection and design. This survey shall be expanded from existing records and monuments that are based on the same horizontal and vertical datum that will be used for final design of the structures. Additional temporary monuments and benchmarks shall be established, as needed, to support field investigations, mapping, and environmental studies.

i) Topographic Survey:

Detailed topographic maps, plans and profiles shall be developed to establish primary control for detail design based on a high order horizontal and vertical control field survey. A tunnel centreline developed during design shall be composed of tangent, circular, and transition spiral sections that approximate the complex theoretical tunnel centreline. The principal survey techniques include:

- Global Positioning System (GPS)
- Electronic Distance Measuring (EDM) with Total Stations.
- Laser Scanning

ii) Hydrographical Surveys

Hydrographical surveys shall comprise the preliminary identification of ground water levels, ground water reserves and source of existing springs along the tunnel alignment.

iii) Identification of Underground Structures and Other Obstacles

The underground structures may exist that may impact the alignment and profile of the proposed road tunnel, and will dictate the need for structure protection measures during construction. These existing underground structures may include existing or abandoned structure foundations, underground quarry sites, soil treatment areas, and soil or rock anchors that were used for temporary or permanent support of earth retaining structures. Initial surveys for the project shall therefore include a survey of existing and past structures. In addition, historical maps and records shall be reviewed to assess the potential for buried abandoned structures.

Project Director

c) Geological, Geotechnical and Construction Material Investigation

This investigation involves the geological mapping, geotechnical investigation and construction material survey as described below:

i. Geological Mapping

After collecting and reviewing existing geologic maps, aerial photos, references, and the results of a preliminary site reconnaissance, surface geologic mapping of available rock outcrops shall be performed by an experienced engineering geologist to obtain detailed, site-specific information on rock quality and structure. Geologic mapping collects detailed geologic data systematically, which is used to characterize and document the condition of rock mass or outcrop for rock mass classification such as:

- Discontinuity type
- Discontinuity orientation
- Discontinuity infilling
- Discontinuity spacing
- Discontinuity persistence
- Weathering

In addition, the following surface features shall also be observed and documented during the geologic mapping program:

- Landslides, new or old, particularly in proposed portal and shaft areas
- Faults
- Rock weathering
- Sinkholes and karstic terrain
- Stress relief cracks
- Presence of talus or boulders
- Thickness of Bedding Rock (By Engineering Geological study)

Engineering geological mapping of the road tunnel alignment will be prepared on topographic maps at 1: 5,000 scale.

ii. Geotechnical Investigation

2D Electrical Resistivity Survey:

The 2D electrical resistivity profiling shall show both lateral and vertical variation in electrical resistivity and shall get information from deeper part of the sub-surface. It shall be capable of detecting boundaries between unconsolidated material and rock and identifying weathered rock from fresh rock and contact between rocks of different lithology and different rock mass quality.

The 2D electrical profiling shall be conducted by using any of the standard configurations that may be varied according to the depth requirement. The planned depth of investigation is between

50- 100 m depending upon the type of the structure to be considered. The investigation shall be done on both portals of tunnel.

Data processing shall be done in two stages: electrical imaging and polygon modelling. Suitable computer software shall be used in each stage. Geological interpretation shall be given to the electrical resistivity values obtained during polygon modelling. Final interpretation shall be presented in the form of geo-electric section showing both bed-rock overburden boundary and zones of different rock mass quality.

iii. Construction Material Investigation

The Consultant shall conduct the material availability survey and study. It shall determine the quality and quantity of the construction materials required for construction of the road tunnel. The availability of the necessary material shall be surveyed to determine the following:

i. Suitable quarry site for concrete aggregates, sand and fill materials
ii. Material to be transported from elsewhere
iii. Material to be imported from outside Nepal, their source and route of transport
iv. Source of water for construction, location of boring if ground water to be used

The Consultant shall conduct study on the availability of construction materials like, sand aggregate etc. with their engineering properties, quantities and lead up to the both portals of road tunnel construction site. Quarry site of materials with their available quantities should be shown on a detail plan including construction road with reference to the road tunnel construction site.

d) Environmental and Social Issues

Although tunnels are generally considered environment friendly structures, certain short-term environmental impacts during construction are unavoidable. Early investigation and resolution of environmental issues is an essential objective for any underground project since unanticipated conditions discovered later during design or construction could potentially jeopardize the project.

The Environmental Impact Assessment and Social Impact Assessment (EIA/SIA) will be carried out by others (different consulting package). The Consultant shall review the EIA/SIA reports and comment over the issues addressed in the report, if any. The Consultant shall implement the recommendations mentioned in the report to reduce the Environment and Social Impact from the construction works.

e) Seismicity

The release of energy from earthquakes sends seismic acceleration waves travelling through the ground. Such transient dynamic loading instantaneously increases the shear stresses in the ground and decreases the volume of voids within the material which leads to an increase in the pressure of fluids (water) in pores and fractures. Thus, shear forces increase and the frictional

forces that resist them decrease. Other factors also can affect the response of the ground during earthquakes.

- Distance of the seismic source from the project site.
- Magnitude of the seismic accelerations.
- Earthquake duration.
- Subsurface profile.
- Dynamic characteristics and strengths of the materials affected.

In addition to the distance of the seismic source to the project site, and the design (anticipated) time history, duration and magnitude of the bedrock earthquake, the subsurface soil profile can have a profound effect on earthquake ground motions including the intensity, frequency content, and duration of earthquake shaking.

The ground accelerations associated with seismic events can induce significant inertial forces that may lead to instability and permanent deformations (both vertically and laterally) of tunnels and portal slopes. In addition, during strong earthquake shaking, saturated cohesion less soils may experience a sudden loss of strength and stiffness, sometime resulting in loss of bearing capacity, large permanent lateral displacements, landslides, and/or seismic settlement of the ground. Liquefaction beneath the vicinity of a portal slope can have severe consequences as the global instability in forms of excessive lateral displacement or lateral spreading failure may occur. The Consultant shall consider all these issues in the preliminary design and analysis of the Tunnel section.

A.5 Detailed Engineering Design

a) Detailed Design of Access Road

On the basis of the above mentioned survey and investigation works, the Consultant should determine the extent and type of road, (minimum Feeder road standard but also fulfil the requirements for the construction of 335 MW to 700 MW hydroelectric projects.) bridges and road tunnel construction works throughout the road length.

In case of road works, the Consultant shall prepare the Detailed Engineering Analysis and Design for execution of the all the works relates with road construction along with drainage structures, retaining and protection structures, slope stabilization and bioengineering works, road pavement works, road safety works and miscellaneous ancillary works.

In all cases the Consultant shall also substantiate that the “Survey and Investigation done” is rationally sufficiently for the analysis and design. All the Analysis and Design for road construction shall include;

All the design works must follow the requirement and standard acceptable to the Client and should be based on current proven and accepted practices based on Feeder Roads Standard of Department of Roads and relevant codes of practice. The road should meet the requirement for the transportation of equipments, machineries and logistics for 335 to 700 MW hydropower project. The tentative salient feature of the road shall be as follows:

- Formation width= 6m
- Carriageway width= 4m
- Shoulder either side= 1.0m
- Camber= 4%
- Maximum gradient= 12%
- Minimum horizontal curve radius= 12m
- Minimum vertical curve radius= 300m
- Design speed= 30kmph
- Provision of extra widening as per requirements
- Provision of vertical curves as per requirements
- Provision of side drainage as per requirements

The right of way on either side of the road to the possible extent = 15m (ROW=30.0m).The consultant's design should take into consideration the probable damages to the environment by the proposed works and the design should attempt to mitigate or minimize such damages with inclusion of appropriate measures in the design. Environmentally safe tipping areas for surplus mass of excavated or any other material should be identified during design. Design consideration should also tackle environmental problems affected by the proposed road works. Consultant shall strictly follow the Environmental and Social Management Frameworks and other applicable Environmental guidelines.

Undertake necessary survey along the final road alignment to prepare specific cadastral map by fixing the road Centre line as per the detail design and recommend for approval the final list of land parcel that is to be acquired permanently.

b) Detailed Design of Drainage Structures

While designing the drainage structures, the Consultant shall use the data collected during the hydrological survey and determine the following:

- Type of the cross-drainage structure
- Structural design of slab and box culverts
- Size and location of road-side drainage and cross drainage structures (appropriate side drains and cross drainages such as pipe culverts)
- Design of the water conduit/rain water inlets/manholes to take storm water safely to the nearby natural stream

c) Detailed Design of Permanent Road Bridge

The two new bridges need to be constructed over Arun River, one at Gola and other at Uwagaun. Therefore, detailed design of bridges is another important component of this consultancy service. Based on the collected information and results of the discussions mentioned above the Consultant shall design the bridge follow the standard codes of practice, norms and guidelines. In addition, the designer shall take into considerations of general aesthetics and architectural perspectives of the bridges to be designed.

The consultant shall first finalize the type of the bridge suitable with close co-ordination with the Employer .The bridges shall be designed based on standards set by Department of Roads for Strategic Roads Networks. The bridge design shall include design of river training works also; the design should be safe, reliable and cost effective with maximum use of appropriate technology. The type and feature should be given due consideration while designing the new bridges.

- Suitability to the road alignment.
- Type, size, span of bridge
- Topography and location of bridges
- Rural environment and aesthetics of the surrounding area
- Nature and structure of the soil underneath

The Consultant shall produce detailed quantity estimate of the bridge and its accessories. They shall collect information on sources of materials and their lead distances and prepare rate schedules and cost estimates based on the standard norms and prevailing district rates.

d) Detailed Design of Road Tunnel

The primary objective of this task is to refine, update and supplement as required the design and drawings developed in the Feasibility Study to the level of Detail Engineering Design and to prepare technical specification. The consultant shall formulate prior to detail engineering design, a Design Base Memorandum (DBM) to record the basis on which a design will be developed. It shall establish the design and functional criteria, and prepare the layout and design concepts of the road tunnel; state the assumptions, parameters, and standards applied, loading conditions, factors of safety, allowable stresses, stability criteria, and all other factors which are necessary to fully carry out the detailed design. The design criteria shall describe in sufficient detail methodologies and analysis methods, data base and international standards or codes and prudent practices employed. The design criteria shall be submitted to NEA for review, comments and approval and shall not be modified unilaterally after it has been approved.

Detail Design and Technical Performance Specifications shall be prepared to the international standards. They shall be carried out to a level of detail such as to enable contractors and suppliers to clearly interpret type and scope of works involved and to submit competitive tenders.

The consultant shall prepare confirmatory stability, stress analysis and reinforcement design and details for the road tunnel and other associated structures using the state of the art techniques in consistent manner by matching the methods to needs.

The Consultant shall substantiate the concept of the tunnel's geometry and take approval from the Employer before commencing the detail design of the tunnel including the construction method to be adopted. The design shall be the acceptable from safety point of view also. The Consultant shall also be responsible to design the ventilation, lighting and other safety measure to be incorporated in the road tunnel.

e) Construction Planning

Notwithstanding the fact that the contractor will eventually develop his own construction operation and plan, the Consultant shall prepare, from a contractors point of view of operation, a realistic and practical construction and equipment procurement plan along with construction power supply. The plan shall serve to establish construction schedules, with start and finish and interim critical milestone dates as well as key dates for interfaces between road tunnel, road and bridge construction works.

The Consultant shall carryout material handling studies which will aid the contractor to efficiently quarry, store, haul, use and dispose huge amount of construction material required for construction of the physical project. The result of material handling studies shall be incorporated in the construction plan which shall be supported by network and logic diagram showing the sequence in which construction activities are to be performed, their interdependencies, constraints and the critical path of the execution of the work, and so on.

The consultant has to make detailed construction planning mentioning all interfaces dates, all work activities related to the packages of the road, bridges and road tunnel construction and critical path associated with the different packages. The Consultant shall prepare Construction Plan and Schedule in consultation with the Employer.

A.6 Cost Estimation & Lot Splitting

The consultant shall, parallel to the development of the construction plan and schedules, prepare an Engineer's cost estimate based on the Bill of Quantities (BOQs) and unit rates, consistent with the construction plan and schedule. The estimates shall serve as a baseline for comparing and valuating the bid prices and be suitable for presenting to international financing agencies and organizations, commercial banks and export credit.

The Consultant shall prepare detail quantity estimate based on detail engineering design and tender drawings for the purpose of cost estimate. Preparation of the BoQ shall be in accordance with recognized standard method of measurement of civil engineering works and shall be appropriate to the level of information available.

Project Director

For civil works, the unit cost for each individual item shall be composed of labor and staff costs, construction materials, plant and equipment costs, fuel and lubrication, transport, electrical power etc. Custom duties, taxes, fees, royalties, and levies due in Nepal shall be presented separately. The cost estimate needs to be based on construction methodology and planning as determined in Construction Planning.

The cost estimates shall be prepared from a contractor's point of view using resource based costing and shall follow international standard practice (Cost and Performance Calculations of the Construction Industry) and Nepalese practices including other recognized estimating methods. The Consultant shall add an appropriate sum as price and physical contingencies to allow for potential physical or design conditions requiring additional funding for the execution of the project of this nature and for unforeseen conditions.

The Consultant shall also prepare cost estimates for bidding documents with slicing and packaging, if any. The Consultant shall make appropriate size of contract packages for the Services /works in close consultations with the Employer with respect to the type of packages (single/double) and prepare suitable Bid Documents (ICB/NCB) as per prevailing acts, rules and regulations and as agreed with Employer for the procurement of the Contractor.

A.7 Final Detailed Design Report

The Consultant shall submit Final design report with full documentation of the actual design including principal design criteria, parameters and standards, major calculation and analyses. The Consultant shall furnish the important documents, reports, drawing and other necessary information in the Employer acceptable format in soft copies.

A.8 Preparation of Tender Documents, Tender Drawings & Lot Splitting

The Consultant shall prepare complete Tender/Bidding Documents complete with Tender Drawings for all works with appropriate details and specifications, BoQ and other necessary documents for bidding purpose. The title and contents of the Tender Documents shall be finalized in consultation with NEA.

The Consultant shall make his recommendations and discuss in detail with NEA for the extent to which bidders should be permitted to suggest alternative designs, construction methods or temporary works. The Tender Documents shall describe the works, including temporary works as necessary in sufficient detail to allow bidders to confidently determine the cost of construction and ensure competitive and comparable tenders.

Tender Documents shall be prepared in the following volume:

Volume 1 Information for Bidders

Volume 2 General Conditions

Volume 3 Particular Applications

Volume 4 Specifications

Volume 5 Drawings

A.9 Transition Phase (Interface Period)

This phase includes:

- The consultant shall provide the necessary assistance to the Employer in the procurement of the Contractor and as needed by the Employer as well as in Bid Evaluation and Contract Negotiation.

B. PHASE II

The scope of consulting services for the Contract Management (Phase II) for the construction of the access road to UAHEP to be provided by the consultant shall comprise but not limited of following tasks:

B. 1 Construction Supervision & Contract Management

The consultants shall provide complete construction supervision and contract management of new access road construction and post- construction activities for the construction of the Access Road including bridges and road tunnel. Under this heading the consultant's services shall include but not limited to the following:

- Discharge the Engineer’s duties in the administration of contracts and supervision of construction activities.
- Prepare suitable standard formats and establish effective and efficient documentation and reporting procedure for contract administration, monitoring of schedules and quality assurances of the construction works
- Carry out additional survey work to provide adequate control points and reference points to the contractor for setting out of the Services to be carried out by the contractor.
- Check and approve the setting out of the works undertaken by the contractors on the basis of the control/reference points.
- Recommend for approval and issue working drawings/construction drawings.
- Obtain, check and approve the contractors resource based work program, resource plan, method statements for quality assurance and material sources.

Project Director

- Check adequacy of contractor facilities at site and capability of their staff to perform the contract.
- Check and monitor contractor's labor camp facilities so as to meet the provisions of the contract and Environmental and Social Management Framework (ESMF) requirement.
- Ensure that the approved drawings and documents are implemented. The consultants shall ensure that the recommendation of the "Environmental Management Guidelines" of the Road sector in Nepal are implemented in the project and shall monitor and evaluate Environment Monitoring Action Plan (EMAP) implementation of each contract.
- Ensure that the all borrow pits are operated and reinstated according to the EIA requirements.
- Identify environmentally safe tipping areas for surplus mass of excavated or any other material in addition to that specified in the design specifications. The consultant shall also assist the Employer to ensure that the contractor and the work force engaged in construction are aware and comply with the spoil disposal restrictions. Obtain, check and approve the site specific quarry or disposal plan of the contractor.
- Ensure that the contractor removes all installations and surplus materials and leaves the site in clean and original condition.
- If and where required develop and monitor Resettlement Action Plan Implementation in accordance with EIA requirements.
- Assist the Employer to implement, monitor and ensure the compliance of the approved land acquisition and resettlement action plan, if required.
- Inspection, including sample testing, where required, of all materials and workmanship to ensure that they comply with the specifications and design. Recommend actions to be taken and issuing of notices to the contractors for correction of any defects or deficiencies observed during the inspections.
- Assist the Employer in the relocation of utilities to be carried out during construction.
- Closely monitor and evaluate project progress and ensure that the works are executed on schedule and meet the established standards of performance and quality. To keep the project implementation adherence strictly to the planned schedule, prepare quarterly reports in accordance with the financial management system requirements for the project and suggest measures to overcome implementation difficulties to the Employer.
- Certification and acceptance of each part of work completed by the contractors.
- Provide recommendations to the Employer regarding the required modifications/ additions/ deletion in design and specification during construction.
- Measurement of quantities of approved and accepted work & materials, checking and recommendation of the contractor’s payment certificates for payment.

- Periodic checking of contract quantities and a constant check on the cost variation including a quarterly updating of monthly cash flow projections.
- Maintain appropriate records, correspondence and diaries during construction for efficient supervision and post construction for sufficient period of time to assist the Employer to process contractor's claims/ disputes, if any.
- Assess and examine the contractor's claims and provide interpretation of related contract provisions to arrive at suitable decision with regards to the claims. Negotiate with the contractor(s) to finalize rates of new work items which are not included in the Bill of quantities on the basis of the existing BOQ contract rates established by competitive bidding.
- Arrangement of monthly progress meeting with Employer and contractor.

B. 2 Completion of the Construction Works/ Defects Liability Period (DLP)

The consultant's services on completion of the Services and during the contractual Defect's Liability Period shall be as detailed below and the services during this period shall be provided on the basis of intermittent input of the consultant's staff.

- The consultant, upon completion of the Construction works to the satisfaction of the Employer, shall recommend to the Employer for the issuance of the Taking over Certificate (TOC). The date of the issuance of the TOC shall be considered as the date of commencement of the Defect Liability Period for each portion of Construction works.

- Supervision of routine maintenance works as per the provision of the contract during the Defect's Liability period.

- Carrying out inspection of the completed works at appropriate interval to note down any defects and issue instructions to the contractor for the rectification of the defective works and ensuring that the contractors are carrying out their contractual obligations in respect of maintenance, repair and reconstruction of the works.

- Shortly before the end of the Defects Liability period, the consultant shall carry out thorough inspection of the Structures and other construction works and designate the rectification work to be done and supervise the rectification works. Once all the designated rectification work is completed to the Employer's satisfaction the consultant shall recommend to issue the Certificate of Final Acceptance

- Submission of "As-built" drawings showing details of changes from the original plans in construction details or materials, drainage, utilities, etc. The responsibilities for checking and certifying precise and correct "As- built" drawings submitted by the Contractor will lie on the Consultant. The Consultant shall make cost provision for the final print of the checked drawings. Six copies of the approved As- built drawings

Project Director

and electronic soft copy shall be enclosed in the Project Completion Report and shall be submitted to the Employer.

4.5 TIME

The estimated time of the entire service is about sixty four (64) calendar months which includes

Phase I 22 Months (10.0 Months Detailed Design Phase + 12.0 Months Interface Period)

Phase II 42 Months (30 months for Construction Supervision and Contract Management and12 months for DLP)

4.6 IMPLEMENTING ARRANGEMENT

The project shall be implemented by Nepal Electricity Authority, Engineering Services Directorate, Upper Arun Hydroelectric Project. The Consultant shall report to the Project Director, Nepal Electricity Authority, Engineering Services Directorate, Upper Arun Hydroelectric Project. The project offices will operate its' work from both site & Kathmandu offices.

4.7 STAFF INPUT

Phase I and Phase II works will be carried out by the group of International and National Key Professionals Staff. For both phases, the International Key Staffs are Team Leader/ Highway/ Transport Engineer, Road Tunnel Engineer, Contract Specialist/ Engineer & other Experts. The National Key Staffs for Phase I are Highway Engineer/ Resident Engineer, Structural Engineer, Geo-technical Engineer, Geologist, Environmental Experts/ Bio Engineer, Hydrologist, Contract Specialist and Bridge Design Engineer where as for Phase II, the National Key Staffs are Highway Engineer, Structural Engineer/ Bridge Design Engineer, Geo-technical Engineer/ Material Engineer, Geologist, Safe Guard Specialist (Environmental/ Social) and Quantity Surveyor/ Assistant Residence Engineer.

Project Director

4.8 REPORT REQUIREMENT

All the report will be in English Language and tentative schedule will be as follows:

S.N.	Report Type	Duration and Copies
Phase- I	Inception Report	• Within 1 month from the date of signing of Contract • 7 hard copies along with electronics copies
	Field Report	• Within 4 months from the date of signing of Contract and after completion of all the field survey and investigation works • 7 hard copies along with electronics copies
	Draft Design Report (Road, Bridge, and Tunnel) including Drawings	• Within 8 months from the date of signing of Contract • 12 hard copies along with electronics copies
	Monthly Progress Report (Road, Bridge, and Tunnel)	• Every month • 10 hard copies along with electronics copies
	Final Design including drawings and Tender Documents	• Within 10 months from the date of signing of Contract • 15 hard copies along with electronics copies
Phase II	Inception Report (Road, Bridge and Tunnel)	• Within 1 month from the date of commencement • 5 hard copies along with electronics copies
	Shift Report (in case of Tunnel works only	• Shift Report on next day • 5 hard copies along with electronics copies
	Weekly Report (in case of Tunnel Works)	• Summary of the Shift report following week • 5 hard copies along with electronics copies
	Monthly Progress Report (Road, Bridge, and Tunnel)	• Within first week of following month • 10 hard copies along with electronics copies
	Trimester Progress Report (Road, Bridge, and Tunnel)	• Within first week of following month • 10 hard copies along with electronics copies
	Annual Progress Report (Road, Bridge, and Tunnel)	• Within first half month of the following year • 10 hard copies along with electronics copies
	Contract Completion Report (for each Contract Package)	• Within 2 weeks from the end of DLP period of each contract • 10 hard copies along with electronics copies
	Consulting Services Completion Report	• Within 2 weeks from the end Consulting Service period • 15 hard copies along with electronics copies

Project Director