

Government of Nepal

Ministry of Physical Infrastructure and Transport

Kathmandu - Terai / Madhes Fast Track Road Project

Mid-Baneshwor, Kathmandu.

EXPRESSION OF INTEREST

Notice No. 1-073/74

Date of First Publication: 2073/04/04

The Government of Nepal, Ministry of Physical Infrastructure and Transport, Kathmandu - Terai / Madhes Fast Track Road Project invites Expression of Interest (EOI) for the purpose of shortlisting the eligible, qualified Consulting Firms for Geo-technical Investigation (Sub-surface Soil) Investigation for the design of bridge, flyover, grade separated intersection including preliminary design. The short list shall be used for consulting services for 5 Packages. The Cost will be funded by the Government of Nepal.

Consulting Firms, willing to provide the services are hereby invited to submit their " Expression of Interest (EOI)". The Standard EOI forms will be available in the Kathmandu - Terai / Madhes Fast Track Road Project, Mid-Baneshwor, Kathmandu. It can also be downloaded free from the website: www.mopit.gov.np.

The EOI shall be submitted in sealed envelop and must reach the same address no later than 2073/04/18 within the working hours. Only the short listed Consulting Firm(s) shall be invited to submit the 'Request for Proposal (RFP)' for the mentioned job at later stage. **In the EOI submission letter the firms shall indicate the Package Number(s) for which they intend to submit Technical / Financial Proposal.**

In case the last day of submission of the EOI falls on a public hoiliday, it shall be submitted off the following working day.

One firm is permitted to submit only one EOI either single or in a joint venture, failing which such Firm shall not be short listed. The Kathmandu - Terai / Madhes Fast Track Road Project reserves the rights to shortlist or not to shortlist any or all of the Firm(s) without assigning any reasons whatsoever. Furhter information or clarification can be obtained from the Kathmandu - Terai / Madhes Fast Track Road Project during office hours.

Project Manager

Government of Nepal
Ministry Of Physical Infrastructure and Transport
Kathmandu - Terai / Madhes Fast Track Road Project

Notice No: 1--073/74

Expression of Interest

Consulting Services for:

Geo-technical (Sub-surface Soil) Investigation for the design of bridges, flyover, grade separated intersection

I Introduction

The Ministry of Physical Infrastructure and Transport, Kathmandu Terai / Madhes Fast Track Road Project (KTFT) invites Expression of Interest (EOI) from consulting Firm(s) for short listing to carry out Geo-technical (Sub-surface Soil) Investigation for the design of bridges, flyover, grade separated intersection and tunnel.

The proposed list of structures (bridges, flyover, intersections) and packaging information is given in Appendix II. In their covering letter the applying firms **must indicate the package numbers for which they intend to submit Proposal (RFP)**.

II Criteria for Short listing

The eligibility and qualifying criteria are provided in Appendix I. The Request for Proposal (RFP) shall be provided only to the short listed Consulting Firms as and when required. **The RFP for the said works shall be provided only for the packages which the firms have indicated in their covering letter.**

III Joint Venture

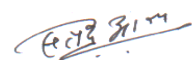
Consulting Firms can form a Joint Venture (JV) with **maximum three partners**, but a firm is not eligible to submit more than one EOI either as a single firm or as a member of a JV. Failing this the EOI of such firm(s) shall be rejected. The EOI must clearly mention the name of the leading firm.

IV Information about the Consulting Firms

The Consulting Firm(s) are required to complete the forms prescribed below. In case of a JV these forms are to be completed individually for each partner, in a sequential manner.

1) Financial Capacity

Annual turnover of the last five years. (The Financial Capacity will be assessed by the values of the Best 3 years within last 5 years.)



Fiscal year	Turnover (NRs)

Notes:

A. The above information must be supported by the auditor's reports. The applicants are advised to indicate the best three years of turnovers. The values of the turnover of previous years will be adjusted according to the National Urban Consumer Price Indices.

B. The firm and/or JV shall have to submit Tax Clearance Certificate of fiscal year 072/73 duly attested by Notary Public. Submission of non attested Tax Clearance Certificate shall not be considered for EOI evaluation.

2) General Experience of the Firm in civil engineering works during the last 5 years with contract amount more than Rs. 0.5 million.

S. No	Name of the Project (Consulting services)	Name of the client	Contract Amount of Consulting Services (excluding VAT)	Year of Completion
1				
2				
3				
...				

The above information must be supported by works completion certificates with clearly indicated contract amount and date.

3) Work Experience in Geotechnical Investigation Works of Motorable Bridge and/or motorable flyover and/or grade separated intersection bridge during the last 5 years

S. No	Name of the Project (Consulting services)	Name of the client	Year of Completion
1			
2			
3			
....			

The above information must be supported by works completion certificates with clear completion date.

4) Office Equipment and Facilities

List office space, Drilling equipment, Lab facilities, Survey equipment and Vehicles available with and owned by the firm(s).

S. No	Office space/Equipment/Facilities	Quantities	Specifications/Remarks
1			

2			
3			
...			
...			

Notes:

- Lab equipment should include equipment for assessing soil/Rock parameters
- Office space in square meters.
- Only Total Station or other Electronic Theodolites are considered for evaluation
- Only 4WD Utility vehicles are considered for evaluation
- Ownership evidences are mandatory for drilling equipment, survey equipment and vehicles.

5) Manpower Resources

Resource persons and supporting staff working with the consulting firm

S.N.	Resource person / administrative / support staff	Required minimum General Experience	Name(s) of the persons	
			Permanent	On call
1	Bridge / Structural Engineers	10 years		
2	Geotechnical Engineers	5 years		
3	Hydrologists	5 years		
4	Senior Surveyor / Geodetic engineers	5 years		
5	Civil engineers	3 years		
6	Managerial / Administrative staff	N/A		
7	Supporting staff	N/A		

Notes:

- Provide bio-data of only the technical resource persons. The bio-data shall be signed in blue.
- The firm/JV shall have to submit the NEC registration certificate for engineer.
- The firm/JV shall also have to submit the any certificate as evidence of his/her. education

6) Adherence to Code of Ethics and Anti Corruption Policy

Provide the firms' commitment on Code of Ethics and Anti Corruption and their mechanism to monitor the adherence to these policies.

ELIGIBILITY AND QUALIFYING CRITERIA**Eligibility Criteria:**

- a. The firm must be registered in appropriate government office
- b. The firm must be registered in Value Added Tax (VAT) office
- c. Must submit evidence of Tax clearance for up to the last fiscal year (2071/72)
- d. Must commit to adhere to the code of ethics and anti-corruption policy
- e. JV agreement in case of Firms in JV

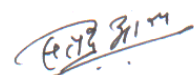
Qualifying Criteria:

- a. **Firm's Capacity - 50 Points**
 - Financial Capacity – 15 points
 - Resource personnel – 20 points
 - Office equipment and facilities – 15 points

- b. **Experience - 50 Points**
 - General Experience of the Firm in Civil Engineering works - 15 Points
 - Detailed Engineering Survey & Geo-technical Investigation of bridges, flyover and grade separated intersection - 35 Points

Notes:

- 1- A successful firm or JV shall secure minimum 60% of the total points and 50% in individual criteria a and b above.
- 2- The same firm shall not be allowed to submit EOI individually and in JV for different packages. Every JV shall be unique. (" Example 1: EOI for Firm A and Firm A JV Firm B"- not allowed) ("Example 2: EOI for Firm A JV with Firm B an Firm B JV with Firm C"- not allowed)
- 3- Allocation of the packages to the firms for the submission of RFP will be carried out from a matrix formed between packages and successful firms kept in ascending order on the basic of technical score considering firm's priority in particular package.



Detailed Geotechnical Investigation of Bridges, flyover, grade separated intersection Site for KTFT Road Project

Note: The number and name of the bridges may change during RFP

S.No.	District	Name of Bridge/Structure	Tentative Chainage	Remarks
Contract No.			KTFT-337141-GEO/INV-072/073-01	
1	Lalitpur	Bagmati-1 Major Bridge	6+350	
2	Kathmandu	Khola-1 Major Bridge	7+290	
3	Kathmandu	Ghorle Khola-1 Major Bridge	9+160	
4	Kathmandu	Maiti Khola-1 Major Bridge	9+780	
5	Lalitpur	Bagmati-2 Major Bridge	13+670	
6	Lalitpur	Khola from Ghusel Major Bridge	14+280	
7	Lalitpur	Bagmati-3 Major Bridge	14+610	
8	Makawanpur	Dobhan-1 Major Bridge	15+290	
9	Makawanpur	Kokte Khola Major Bridge	17+040	
10	Makawanpur	Dobhan-2 Major Bridge	17+580	
11	Makawanpur	Bagmati-4 Major Bridge	18+370	
12	Makawanpur	Bagmati-5 Major Bridge	18+780	
13	Makawanpur	Khola-2 Major Bridge	20+560	
14	Makawanpur	Sim Khola Major Bridge	21+040	
Contract No.			KTFT-337141-GEO/INV-072/073-02	
15	Makawanpur	Kimti/Malta Flyover / Intersection	22+000	
16	Makawanpur	IPA Khola Special Bridge	22+420	
17	Makawanpur	Khola-3 Major Bridge	22+960	
18	Makawanpur	Chausure Khola Special Bridge	25+780	
19	Makawanpur	Mahadev Khola Special Bridge	26+020	
20	Makawanpur	Ipa Khola Special Bridge	27+390	
21	Makawanpur	Pre tunnel Bridge-1 Special Bridge	29+070	
22	Makawanpur	Pre tunnel Bridge-2 Special Bridge	29+650	
23	Makawanpur	Post tunnel Bridge-3 Special Bridge	31+430	
24	Makawanpur	Charghare Special Bridge	31+930	
25	Makawanpur	Dhedre Special Bridge	32+370	
26	Makawanpur	Kholsi-1 Special Bridge	32+940	
27	Makawanpur	Kholsi-2 Special Bridge	33+350	
28	Makawanpur	Kholsi-3 Major Bridge	33+740	
29	Makawanpur	Kholsi-4 Major Bridge	34+120	

Detailed Geotechnical Investigation of Bridges, flyover, grade separated intersection Site for KTFT Road Project

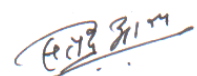
Note: The number and name of the bridges may change during RFP

		Contract No.	KTFT-337141-GEO/INV-072/073-03	
30	Makawanpur	Kholsi-5 Special Bridge	34+490	
31	Makawanpur	Jitpur Approach Special Bridge	35+440	
32	Makawanpur	Jitpur River Special Bridge	36+240	
33	Makawanpur	Kholsi (Karan Khola) Special Bridge	36+680	
34	Makawanpur	Kholsi-6 Major Bridge	37+100	
35	Makawanpur	Kholsi-7 Major Bridge	38+110	
36	Makawanpur	Bandar Kholsi Special Bridge	38+500	
37	Makawanpur	Karm Kholsi Major Bridge	39+670	
38	Makawanpur	Karm Kholsi Major Bridge	39+970	
39	Makawanpur	Khola-4 Major Bridge	43+020	
40	Makawanpur	Khola-5 Major Bridge	43+850	
41	Makawanpur	Budune River Special Bridge	44+510	
42	Makawanpur	Annapani Khola Major Bridge	45+070	
43	Makawanpur	Kholsi-8 Major Bridge	46+690	
44	Makawanpur	Kholsi-9 Major Bridge	47+070	
		Contract No.	KTFT-337141-GEO/INV-072/073-04	
45	Makawanpur	Tuni Major Bridge	47+280	
46	Makawanpur	Kholsi-10 Special Bridge	47+800	
47	Makawanpur	Budne Flyover / Intersection	48+000	
48	Makawanpur	Kholsi-11 Major Bridge	49+460	
49	Makawanpur	Viaduct Major Bridge	50+010	
50	Makawanpur	Kholsi-12 Major Bridge	50+210	
51	Makawanpur	Kholsi-13 Major Bridge	50+520	
52	Makawanpur	Shripur Flyover / Intersection	51+000	
53	Makawanpur	Kholsi-14 Special Bridge	51+200	
54	Makawanpur	Kholsi-15 Major Bridge	51+820	
55	Makawanpur	Dung Dung Khola Special Bridge	52+460	
56	Makawanpur	Kattee Khola Major Bridge	53+280	
57	Makawanpur	Debre Khola Major Bridge	53+710	
58	Makawanpur	Khahare Major Bridge	54+240	
59	Makawanpur	Kholsi-16 Major Bridge	54+470	

Detailed Geotechnical Investigation of Bridges, flyover, grade separated intersection Site for KTFT Road Project

Note: The number and name of the bridges may change during RFP

		Contract No.	KTFT-337141-GEO/INV-072/073-05	
60	Makawanpur	Sangtang-3 Major Bridge	56+170	
61	Makawanpur	Bakaiya-1 Major Bridge	58+630	
62	Makawanpur	Bakaiya-22 Major Bridge	59+190	
63	Makawanpur	Kattee Khola Major Bridge	60+410	
64	Makawanpur	Harda Khola Major Bridge	60+820	
65	Makawanpur	Bakaiya-3 Major Bridge	63+730	
66	Makawanpur	Bakaiya-4 Special Bridge	64+030	
67	Makawanpur	Bakaiya-5 Special Bridge	64+680	
68	Makawanpur	Bakaiya-6 Special Bridge	65+920	
69	Makawanpur	Bakaiya-7 Special Bridge	66+620	
70	Makawanpur	Bakaiya-8 Special Bridge	66+980	
71	Bara	Bakaiya-9 Major Bridge	69+030	
72	Bara	Lal Bakaiya Major Bridge	72+880	
73	Bara	Nijgadh Flyover / Intersection	76+000	



Section 5. Terms of Reference

For Feasibility Study, Detailed Engineering Survey, Soil Investigation and conceptual (Preliminary) Design of Bridges / Culverts

Name of Bridges, Flyover, Grade Separated Intersection: Refer attached package list

Name of Road: Refer attached package list

Location: Refer attached package list

1. INTRODUCTION

The Kathmandu – Terai / Madhes Fast Track Road Project, Mid-Baneshwor Kathmandu (hereinafter referred as "the Project"), intends to utilize services of engineering consulting firms well experienced in the fields of soil investigation, hydrological studies, bridge engineering, river training works, environment aspects etc. for providing engineering consulting services for soil investigation and preliminary / conceptual design work of proposed Bridge(s), Flyovers, Grade separated Intersection and Tunnel.

2. OBJECTIVE

Objective of this job is to investigate sub-surface soil / rock strata as guided by hydrology and prepare report pertaining to bore log, bearing capacity of strata and preliminary design of Bridge(s), Flyovers, Grade separated Intersection in order to design a *safe, reliable* and *cost effective* bridge, flyover, intersection using the appropriate technology. The investigation is to be carried out considering the availability of skilled manpower, equipment, condition of accessibility and other prevailing working conditions.

3. SCOPE OF WORK

The scope of work to be carried out by the consultant shall include but may not be limited to the following:

3.1. Desk study:

A desk study should be carried out, collecting all data, maps and information relevant to bridge design and reviewing for planning of further field survey and investigation works.

3.2. Feasibility Study :

Feasibility Study shall include the following:

3.2.1. Technical Feasibility study:

It should include reviewing the available data, collecting, reviewing and analysis of field data to be used in the study and conducting analysis to decide upon the technical feasibility of the bridge site(s). A cost comparison of different types of bridge shall be made and discussed with the Project before proceeding to bridge site for soil investigation.

In this study the following points related to the river, its catchment area and all the considered bridge sites should be studied in detail.

- (i) Topography
- (ii) Nature and structure of the surface soil
- (iii) Nature and structure of local as well as regional geology
- (iv) Other information as needed.

3.2.2. Topographical Survey

The topographical survey of the area should cover a minimum distance of **500 m** upstream, **200 m.** downstream and **200 m** from the river banks on either sides of the river at the proposed bridge site. The Topographic map should show the following:

- (i) Contours at 1(one) m. intervals in hilly area and at 0.25 m in plain area.
- (ii) Flood lines on either sides of the river in the entire area surveyed.
- (iii) Lines with spot levels along which the bed slope of the river is taken
- (iv) Both banks of the river
- (v) Lines along which cross section of the river is taken
- (vi) Govt. and/or public establishments
- (vii) Traverse lines, benchmarks reference lines and/or points with respect to which the present topo map is prepared.
- (viii) The angle and direction of skew, if the bridge is proposed to be aligned skew.
- (ix) The Names of the nearest identifiable villages/towns etc. in either ends of the bridge.
- (x) Other information relevant to design, construction and/or maintenance of the bridge.
- (xi) **Bridge axis cross section should be taken by level machine and R. L. computation should be checked with conventional Rise/Fall or Height of Instrument method.**

3.2.3. Hydrological Study

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

- (i) Catchment area of the river up to bridge site
- (ii) Length of the river from origin up to bridge site
- (iii) Possibility of change of catchment
- (iv) Nature, size and quantities of debris carried by the river
- (v) Intensity, duration and distribution of rain in the catchment
- (vi) Vegetation, cultivation etc. of the catchment.
- (vii) Existence of reservoir's, Lakes etc. in the catchment.
- (viii) Existing bridge or other hydraulic structures across the river in the vicinity of the proposed bridge site with their details as much as possible.
- (ix) 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.
- (x) Cross sections covering 200m.beyond flood lines of the river at proposed bridge site, at about 500m. u/s and about 200m d/s. wherein HFL, LWL,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)
- (xi) 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.
- (xii) Maximum discharge calculated by established formulas with different return periods and the peak discharge observed over a period of 100 years.
- (xiii) Velocity and depth of flow at the time of survey.
- (xiv) Shifting of the river in the past at proposed bridge site and in its vicinity.

- (xv) Other information required for river control, design, construction and maintenance of the bridge.

3.2.4. Site Selection of bridges, flyovers, grade separated intersection and tunnel

Alternative sites shall be studied based on 3.2.1 and the most suitable site for the bridge based on the above criteria of the site. The selected site should be clearly indicated in the map and all the characteristic features of the chosen site shall be given, in order to facilitate easy reference while designing the relevant structures.

3.2.5. Seismological Study:

The consultants shall collect and refer to the available data regarding the seismic records of the area. Seismic Forces: According to the Indian Standard Criteria for Earthquake Resistant Design of Structures, IRC: 6 may be followed.

3.2.6. Environmental Study

The consultant shall predict damages to the Environment and attempt to mitigate or minimize the damages by choosing appropriate site, cross-section, type of structures etc. and suggest appropriate measures in the design for protection of surrounding Environment. The Environmental Protection Act, Environmental Protections Rules and the DOR environmental policies including Environmental and Social Management Framework (ESMF), modified by GESU/DOR for bridges should be followed.

3.2.7.

Test pits and auger-holes in the riverbed to a depth as mentioned in the BOQ for determining the mean particle size of riverbed materials in each layer.

3.2.8. Bore-holes, field tests and laboratory tests

The properties of the underlying soil are 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. Generally the following tests are conducted for determination of soil properties:

S.N.	Type of test	Frequency
1	Undisturbed Soil Sampling	at least 2 at each borehole
2	Standard Penetration Test	as required but the interval not less than 1.5 m and every change of soil strata
3	Grain size analysis	at least 2 at each borehole
4	Hydrometer analysis	at least 2 at each borehole
5	Moisture content	at least 2 at each borehole
6	Bulk and dry density	at least 2 at each borehole
7	Unconfined compression test	at least 2 at each borehole
8	Consolidation test	at least 2 at each borehole
9	Direct shear test	at least 2 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.

3.2.9. Depth of soil exploration`

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

SN	Type of soil	Governing depth
1	Silty, sandy, clayey soil	3 times the design scour depth, or 1.5 times the least dimension of the foundation footing, or 20 m, whichever is maximum
2	Granular soil (gravels, boulders)	2 times the design scour depth, or 1.5 times the least dimension of the foundation footing, or 16 m, whichever is maximum
3	Rocks (soft or hard)	Not exceeding 8 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. But in any case the Consultant shall be paid only up to the depth mentioned in the Bill of Quantities. If rock is found at the beginning or at mid-depth then the drilling works shall not exceed the depth as mentioned in the table above. In such case the payment shall be made only for the actual depth.

For example, if rock is found at a depth of 12 m. and if the maximum required depth is 16 m, then drilling shall continue only for further 4 m., and the payment shall be done for 16 m. If rock is exposed on the surface then drilling shall be done up to a depth of 8 m., and the payment shall be done for 8 m. But if the thickness of rock at the surface is 6 m then the drilling shall continue further to the required maximum depth.

3.2.10. Changes in soil strata

N/A

3.2.11. Soil exploration works to be certified

The Project, if required, may ask the Consultant to submit the soil/rock samples obtained from the drilling works in core boxes and/or a bore-log certified by the concerned Division/Project Office and/or visual certification by using Mobile Monitoring System (MMS) software (access to MMS software will be provided by DoR).

3.2.12. Other information

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 sketch plan with reference to Bridge site.

3.3. Analysis of Data, Conclusion and Recommendation of Design Parameters.

Based upon the above mentioned studies and investigations the consultants shall make the best use of their technical know-how and professional skill to arrive at and recommend the most cost effective design parameters. The consultant shall discuss in detail at least three different options and shall recommend the most appropriate option.

3.4. Miscellaneous

If not covered by aforesaid, the Consultants shall perform other studies, explorations, tests surveys, calculations, etc. required to produce full and complete set of working drawings.

If it is decided to use any Standard Design, the Payments shall be adjusted according to the Conditions of Contract and/or as mentioned in the BOQ.

3.5. The checklist

The detailed requirements of the design report are given in the checklist at the end of this TOR. Before submitting the report the consultants should verify whether it complies with the checklist.

4. SUBMISSION OF REPORTS AND PRESENTATION OF THE WORKS

In accordance with DOR's standard and procedures the consultant shall submit his reports as under:

4.1. Inception Report

This report shall contain bridge location with alternatives, **cross-section of bridge axis of each alternatives showing hydrological and geological elements**, bank conditions, general geology, general hydrology, location plan, social acceptability, tentative bridge type with length, span arrangement etc. This shall contain Index map as well as location map of the bridge with respect to main road network. Inception report shall be submitted to the Project in one copy and shall be presented in MOPIT, Singhdurbar.

4.2. Field Report & Preliminary Design Report

This report will contain bridge site plan showing alignment of bridge foundations and locations of bore holes, logs with description of samples taken at every change of strata. Preliminary field report shall be submitted to the Project in two copies and should be discussed with the Project / MOPIT.

This report shall contain the preliminary design concepts and short descriptions relating to the proposed structure and its major components, e.g. superstructure, pier, foundations river training/ bank protection structures, approach road etc. It shall include location of proposed foundations and arrangement of the bridge components along with comparison between the possible alternative types. **(Please also see Clause 3.7, Use of Standard Designs)**. This report shall be submitted in **three** copies and the content shall be discussed with the Project / MOPIT **before proceeding to the detailed design of the bridge. The Project / MOPIT may also ask**

to present the Preliminary Design Report to the Project / DOR / MOPIT audience. The cost of such presentation shall be borne by the Consultants.

4.3. Draft Report

This report shall in all respect be complete, containing all the required components of the design and be presented in clear and easy to refer formats as per the general design guidance attached. The complete set of the report shall consist of:

- (i) Volume I – Main Report
- (ii) Volume II – Drawings
- (iii) Appendices

Please refer to the checklist provided with this TOR for number of copies and detailed requirements of the reports. The Report shall also include the drawings,

Presentation of the Draft Report

The Consultants shall present the design report in specified format and defend it to the Project / DOR / MOPIT audience prior to the submission of the final report. They shall review the issues raised during the presentation while finalizing the report and make necessary amendments/corrections if needed. The date and venue of the presentation shall be determined by mutual agreement between the Bridge Branch and the consultants. The cost of such presentation shall be borne by the consultants.

4.4. Final Report

Apart from the presentation, the Project / MOPIT will verify the content of the report against the Terms of Reference and the checklist. The Project may also discuss upon the technical content of the report and may suggest some changes if thought necessary. While preparing the Final Report the consultants shall consider the comments/suggestions and make corrections or amendments if required. It does not, however, relieve the consultants of their responsibility over the technical content of the design. The final report shall be submitted in stipulated number of copies as indicated in the checklist.

4.5. Soft copy (electronic copy) of the design report

Apart from the bound report the consultants shall submit soft copies (electronic copies) of the final report in suitable tool as specified in the checklist.

5. TIME SCHEDULE

If not indicated otherwise in the contract documents the consultant shall complete the assigned works as per the following schedule:

- (i) Inception Report within 3 (Three) weeks started from the date of signing of the Agreement.
- (ii) Field Report & Preliminary Design Report within 10 (Ten) weeks started from the date of signing of the Agreement.
- (ii) Draft Report within 12 (Twelve) weeks started from the date of signing of the Agreement.
- (iii) Final Report within 2 (Two) weeks after receiving the Project / MOPIT comments and suggestions on the draft report.

6. WORKING TEAM

The working team for field and office works should necessarily consist of the following Key Personnel together with adequate supporting manpower.

SN	Personnel	Preferred academic qualification	Minimum years of general experience
1	Team Leader (Bridge/Structural Engineer)	Master's in Civil Engineering	10 years
2	Geotechnical Engineer / Engineer Geologist / Geologist	Master's in Geotechnical Engineering / Engineering Geology / Geology	5 years
3	Hydrologist	Master's degree in Hydrology/Water Resources	5 years

If a consulting firm/s is selected for more than 1 package, a separate team of key personnel with equivalent or better qualification shall be proposed for other package prior to signing of the contract. Upon failure to do so, the next consultant securing high combined score will be called for agreement.

DEFECT LIABILITY

6.1. Responsibility for survey and field investigation report

Submission of the final reports does not relieve the consultant from their responsibility to the content of the field investigation report. They shall bear full responsibility for:

- (i) Authenticity of all the field data including socio-economic, environmental, topographic, hydrological and geological information;
- (ii) Correctness of the drawings;
- (iii) Correctness of any other details related to construction

6.2. Assistance during construction phase

During construction the consultants, upon written request from the Project, shall visit the bridge site and provide necessary technical assistance. The consultants shall be paid for such visits (travel cost and daily allowances) as per the approved norms. But if any changes in the design are required **as per ToR**, the consultants shall furnish it free of cost as per the Condition of Contract.

6.3. Acceptance of responsibility

The Consultants may be asked to submit signed Statement of Acceptance of Responsibility as mentioned above in sections 8.1 and 8.2 attached together with the final report.

Checklist for Detailed survey and design of bridges

This paper serves as a guideline for checking the detailed engineering survey and design of bridges, received from the consultants.

General procedure for checking the design report:

Checklist for content of the package:

Particulars	Required information / number / range / value(s)
Volume I - Main report	Draft – 2 copies; Final – 3 copies
Volume II – Drawings with calculation	Draft – 2 copies; Final – 3 copies
Soft (electronic) copies of the report	2 copies in CD-ROM with hard plastic case

1. Content of Main Report (Volume I)

1.1 Statement of acceptance of responsibility

A signed acceptance of responsibility to the authenticity of field data and correctness of design shall be attached to each copy of the main report.

1.2 Salient features:

Particulars	Required information / number / range / value(s)
Name of the Project :	Job description as mentioned in the work-order
Location :	
Development Region	Central
Zone	Bagamati / Narayani
District	Kathmandu / Lalitpur / Makawanpur / Bara
Village/town	Name of the surrounding VDC/town/municipality or any pertinent landmark in the vicinity of the bridge.
Name of the Road :	Popular / formal name of the road (e.g. East – West Highway) and road reference number from the SRN data (if applicable)
Origin and Destination of the Road	Kathmandu – Nijgadh
Chainage of the Bridge Site	chainage from the origin of the road
Geographical Location :	
Easting	East coordinate
Northing	North coordinate
Classification of the Road	Asian Highway Primary Class Standard – Access Controlled Expressway
Type of the road surface	BT / Concrete
Terrain / Geology	General terrain (Hill, mountain or plain) and general geology
Information on structure:	
Total length of the bridge	Total length between edges of the end decks
Span arrangement	Number x effective lengths of spans
Total width of the bridge:	Total width between edges of the deck i.e, the Formation Width = 23.5m

	for Bridge Length >50m and = 27.40m for Bridge Length < 50m.
Width of:	
Carriageway:	Clear width available to vehicles 2X9m for Bridge length >50m and 2X11m for Bridge length <50m.
Footpath(s):	Clear width available to pedestrians i.e. footpath 2x1.5m
Kerbs	Width at the bottom of the kerb
Type of superstructure:	Overall system (e.g. Three girder RCC T-beam & deck / <Type> Steel truss & RCC deck / Four Steel plate I-girders & RCC deck, arch, prestressed etc. etc.)
Type of bearings:	Type of bearings with their dimensions
Type of abutments:	Shape and material in the abutment (e.g. Rectangular RCC with cantilever return wall, or RCC isolated columns with stone pitched slope and wing walls, etc.)
Type of pier(s):	Shape and material (e.g. Rectangular solid / hollow RCC wall, or RCC Hammer-head with solid circular body, etc.)
Type and depth of foundations:	Type and depth from the maximum scour level. Separately for each, if type and depth of foundations for different units are varying
Sketches:	Sketches of the general arrangement of the bridge with gross dimensions (plan, elevation and cross section) in a reduced scale from the main drawings to be attached in A4 or A3 size sheet.
Design data:	
Live load:	Load classes considered
Net bearing capacity of soil	Net bearing capacity applied in design
Design discharge	
Linear waterway	

1.3 Field works:

The following should be complied with at the proposed bridge site.

Centreline of the proposed bridge	<p>Three R.C.C. posts (1:2:4) of 15cm x 15cm in section and 1m length each should be installed minimum 30m apart and projecting 15cm above the ground in the centre line of the bridge.</p> <p>Iron rods of not less than 15cm in length and 8mm in dia fixed in centre and flushing top surface of the each post shall form the centreline of the bridge. All posts shall be installed beyond the zone of inundation and there should be at least one post on each bank of the river.</p>
Bench Marks	<p>Similar posts (at least one post in each bank) should be fixed in the right of way and beyond the zone of inundation's as Bench Marks, whereon B.M. No. and elevation must be written in fast colour paint on two opposite faces of the post. If permanent structures are available, they can be used for B.M. in lieu of the posts.</p> <p>All central line and Bench Mark posts should be connected with sufficient permanent reference points.</p>

Bore/drill logs	Bore/drill logs should be certified by the expert / engineer of the as nominated by the Project. .
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1.4 Detailed Engineering Study and Survey:

Geology and topography	General description of geologic and topographic parameters as per section 3.2.2 and 3.2.4. of the TOR. Specific geo-technical and topographic parameters shall appear in the design calculations and drawings, respectively.
Hydrology	<p>General description of hydrological aspects as per section 3.2.5 of the TOR. Detailed hydrological parameters shall appear in the design calculations and drawings.</p> <p>The main report should have information on:</p> <ul style="list-style-type: none"> • Catchment area characteristics • Summary of rainfall data • Stream / channel characteristics including : <ul style="list-style-type: none"> ▪ Type of river ▪ Flood characteristics ▪ HFL, LWL and afflux ▪ Depth of scour • Summary of discharge calculation by various methods and determination of design discharge • Determination of effective linear waterway, bridge span arrangements and freeboard. • Summary of required river training works with their justification
Feasibility/selection of the bridge site	<p>The report should review existing studies (if available) and field data to decide upon the technical feasibility of the bridge site.</p> <p>The bridge site should be selected among at least three locations. Selection criteria shall incorporate geo-physical, topographic, hydrological, social, environmental and economic parameters.</p> <p>The bridge site is discussed with the Project representatives. The report should present a gist of the discussion and conclusion.</p>
Selection of bridge type, length and span arrangement	<p>The type of bridge, its length and span arrangement is determined after desk study and field works except detailed subsoil exploration on the basis of the following parameters:</p> <ul style="list-style-type: none"> • Design discharge • General and maximum scour depth • Linear waterway to be provided • Anticipated soil condition

	<ul style="list-style-type: none"> • Selected bridge site • River training and approach road • Construction/maintenance cost • Availability of material and labour <p>The report should present a comparative evaluation of different types of bridges on the basis of the above parameters. The type of bridge is discussed with the Project before proceeding to soil investigation. design pertaining to the selection of the type of structures (bridges, flyovers, grade separated intersections). The report should include the gist of discussion and conclusion.</p>
Environmental study	should review the project as per the Environmental Protection Act, Environment Protection Rules and DOR environmental policies including Environmental and Social Management Framework (ESMF), modified by GESU/DOR for bridges .
Seismological study	The report should review the information and past seismic records of the project area as per section 3.2.6 of the TOR.
Sub-surface exploration	<p>The subsurface exploration shall proceed after final selection of the bridge type and axis conforming to the requirement as per section 3.3 of the TOR. The main report should include the following:</p> <ul style="list-style-type: none"> • General description of the subsoil strata • Bore logs • Sectional elevation of the subsoil strata showing locations of bore-holes and proposed foundations • Net bearing capacity, selection of foundation and its depth on the basis of the above parameters. <p>Detailed analysis of subsoil strata and test results shall appear in Design Calculations and Appendix-1</p>

1.5 Detailed analysis and design calculation of following elements should be provided. **The design calculations should mention the governing design code or guideline wherever they are applied.**

Hydrology	
Hydrological data	<ul style="list-style-type: none"> • Catchment area characteristics: <ul style="list-style-type: none"> - The catchment area size, shape (classified as fan, pear, long or narrow), slopes (Longitudinal and Cross-sectional). - Surface characteristics (whether sandy, clayey etc. including percolation and interception characteristics). - Whether land is under forestation, deforestation or is dotted with urban areas, cultivated areas or storage areas, e.g. lakes, swamps, tanks, reservoirs etc. shall be determined. • Rainfall Data:

	<ul style="list-style-type: none"> - Maximum in 24 hours. - Maximum in any one hours. - Rainfall distribution in the catchment area. - Duration and frequency of the rain. - Raingauge data of the storms along with the corresponding stream gaus data (data for unit hydrograph). - Average annual rainfall characteristics (from relevant meteorological records). - Probability plotting (a graph plotted between the flood magnitude against its return period). <ul style="list-style-type: none"> • Stream / channel characteristics <ul style="list-style-type: none"> 1. Type of river <ul style="list-style-type: none"> - Seasonal or Perennial. - Meandering or Straight. - Other classification, e.g. boulderly, flashy, well defined, tidy etc. - Length, slope, cross-sections of the river. 2. Water Level <ul style="list-style-type: none"> - Highest flood in living memory and other major floods before start of investigation. - Highest flood level and year of its occurrence, showing the areas flooded. - Records of flood gauging stations. - Lowest Water Level (LWL). - Afflux, if observed. - Observed maximum depth of scour and scour level, indicating what obstruction if any, and other special causes, which can be responsible for the scour at site. - Sediment Data, indicating bed material particle size, aggradations (degradation of bed, bank erosion (reference to flood stage) etc. - Erodibility of riverbanks and river bed. - Scour Data (as observed, particularly downstream of any obstructions to the flood flow).
<p>Analysis of hydrological data and determination of associated elements</p>	<ul style="list-style-type: none"> ▪ Discharge calculation by various methods including WECS method, comparison of discharges, determination of design discharge expected to pass under the bridge and justification for adapting the design discharge, natural stream velocity and flood velocity. ▪ Maximum mean or maximum velocity of flood flow. ▪ Effective linear waterway required under the bridge (after allowing for average thickness of each pier and its foundation, between High Flood Level and Normal Scour Level, ignoring the earth fills in front of the

	<p>abutment).</p> <ul style="list-style-type: none"> ▪ High Flood Level, Afflux and Water Level. ▪ Freeboard required between the affluxed High Flood Level and soffit of deck from the considerations of unobstructed flow of floating debris with the flood discharge. ▪ Normal and Design (maximum) scour levels at piers and abutments (Consider higher watermarks in the area and at and near the site). ▪ Minimum founding levels at piers and abutments from consideration of maximum scour etc.
Sub-soil investigation.	
Investigation data	<ul style="list-style-type: none"> ▪ Bore-log of each bore-hole showing: Depth gauge, soil description of encountered layers with depth marks, sample collection points, depth and types of tests performed, Ground water table, number of blows for SPT/CPT, N-values ▪ Certificate of sub-soil investigation from respective Division / project office indicating depth of each bore-hole and confirming that soil-samples of each strata in each borehole are deposited in core boxes for the record. ▪ Laboratory test result of the samples as specified in section 3.3 of the TOR.
Analysis of sub-soil data	<ul style="list-style-type: none"> ▪ Determination of bearing capacity and other parameters at different depths required for different types of foundations, determination of design bearing capacity. ▪ Comparison and determination of type(s) of foundation for abutments and piers. ▪ Summary of subsoil characteristics and types of foundations.
Preliminary Design of bridge elements	<p>On the basis of the topographic survey, hydrological, sub-soil and seismological analysis the report should present preliminary design of the following parts of the bridge:</p> <ul style="list-style-type: none"> ▪ Design of superstructure and its parts: deck, main and cross girders, bearings, railing posts, bracings, stiffeners, joints etc. as applicable. ▪ Design of substructure: pier/abutment cap, substructure body ▪ Design of foundation and its part: foundation base, well/pile cap, well steining, pile grouping, individual pile body, pile head, cutting edge, top/bottom plug as applicable. ▪ Design of river training works ▪ Design of approach roads

5. Soft (electronic) copies of the part of the report

Two copies of the report in electronic files should be submitted in suitable tool, which shall include the following:

- Text of main report (in MS Word format)
- Rate analysis and cost estimates (in MS Excel format)
- All the drawings in format compatible to AutoCAD.

6. Appendices

The following should be submitted as appendices to the main report:

1. Laboratory test results of subsoil strata as specified in section 3.3 of the TOR
2. Detailed rate analysis
3. Certified district rates