



NATIONAL HIGHWAY AUTHORITY

Procurement & Contract Administration Section
28 Mauve Area, G-9/I, Islamabad ☎ 051-9032727, 📠 051-9260419

No. 6(403)/GM (P&CA)/NHA/17/80

23rd January, 2017

Director General

Public Procurement Regulatory Authority
1st Floor FBC Building near State Bank,
Sector G-5/2,
Islamabad.

Subject: **ANNOUCNEMENT OF EVALUATION REPORT (PPRA Rule-35):
Consultancy Services For Feasibility Study & Detailed Design
For Construction Supervision Of New Bridge With Approach
Roads Over River Indus Between Sukkur & Shikarpur: Sukkur-
Rohri Bridge Over River Indus**

Reference: PPRA Rule-35

Kindly find attached the duly filled and signed Evaluation Report along with Bid Evaluation Criteria (Annex-I) pertaining to the procurement of subject services in view of above referred PPRA Rule-35 for uploading on PPRA website at the earliest, please.


(Muhammad Azam)
Director (P&CA)

Encl: Evaluation Report along with Annex-I

Copy for kind information to:

- Member (Planning), NHA
- Member (Engineering-Coord), NHA
- General Manager (P&CA), NHA
- S.O (Tech.) to Chairman, NHA

EVALUATION REPORT

(As Per Rule 35 of PP Rules, 2004)

1.	Name of Procuring Agency:	National Highway Authority
2.	Method of Procurement:	Single Stage Two Envelop Procedure
3.	Title of Procurement:	Consultancy Services For Feasibility Study & Detailed Design For Construction Supervision Of New Bridge With Approach Roads Over River Indus Between Sukkur & Shikarpur: Sukkur-Rohri Bridge Over River Indus
4.	Tender Inquiry No.:	6(403)
5.	PPRA Ref. No. (TSE):	TS2866076E
6.	Date & Time of Bid Closing:	7 th September, 2016 at 1130 hours local time
7.	Date & Time of Bid Opening:	7 th September, 2016 at 1200 hours local time
8.	No of Bids Received:	Only One (01) Proposal was received
9.	Criteria for Bid Evaluation:	Criteria of Bid Evaluation is attached at Annex-I
10.	Details of Bid(s) Evaluation:	As below

Name of Bidder	Marks		Evaluated/ Negotiated Cost (PKR)	Rule/Regulation/SBD*/Policy / Basis for Rejection / Acceptance as per Rule 35 of PP Rules, 2004.
	Technical (if applicable)	Financial (if applicable)		
M/s Finite Engineering (Pvt.) Ltd.	562	200	88,527,080	Top scoring firm in combined evaluation (PPRA Rule 36(b) (ix))

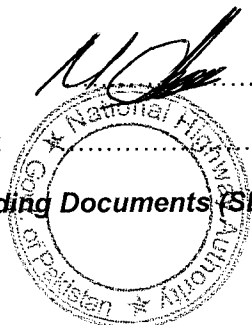
Top Scoring Bidder: M/s Finite Engineering (Pvt.) Ltd.

11. **Any other additional / supporting information, the procuring agency may like to share:** The Procurement was carried out in line with PPRA Rules & Regulations. The bidding was done on QCBS method with 80:20 Technical to Financial Proposals ratio.

Signature: _____

Official Stamp: _____

***Standard Bidding Documents (SBD).**



National Highway Authority



Annex-I

Criteria

FOR

Bid Evaluation

Consultancy Services for Feasibility Study & Detailed Design for Construction Supervision of New Bridge with Approach Roads Over River Indus between Sukkur & Shikarpur: Sukkur-Rohri Bridge over River Indus

January, 2017



NATIONAL HIGHWAY AUTHORITY

Procurement & Contract Administration Section

28-Mauve Area, G-9/1, Islamabad Tel: 9032727, Fax: 9260419

Ref: 6(403)/GM (P&CA)/NHA/16/1360

2nd September, 2016

All Prospective Consultants

Subject: **Minutes of Pre-Proposal Meeting and Addendum No.1 for: Consultancy Services for Feasibility Study & Detailed Design for Construction of New Bridge with Approach Roads over River Indus between Sukkur & Shikarpur: Sukkur-Rohri Bridge over River Indus**

Reference: *Request for Proposal Notice for subject Services appeared in daily newspapers on 10th August, 2016*

Minutes of Pre-Proposal Meeting held on 22nd August, 2016 and Addendum No.1 alongwith Attachments No. I to IV for subject Services being integral part of the Request for Proposal, are enclosed herewith, for necessary action, please.


(Muhammad Azam)
Director (P&CA)

Enclosure:

Minutes of Pre-Proposal Meeting (03 Page)
Addendum No.1 (02 Page)
Attachment I (04 Page)

Copy for kind information to:

- Member (Planning), NHA, Islamabad;
- Member (Engineering Coordination), NHA, Islamabad;
- General Manager (P&CA), NHA, Islamabad;
- SO (Tech.) to Chairman, NHA;
- Office Copy.

MINUTES OF PRE-PROPOSAL
MEETING HELD ON 22nd August 2016

Consultancy Services for Feasibility Study & Detailed Design for Construction of New Bridge with Approach Roads over River Indus between Sukkur & Shikarpur: Sukkur-Rohri Bridge over River Indus

A Pre-Proposal Meeting was held in NHA Auditorium at 1130 hours on 22nd August, 2016 to discuss the Request for Proposal (RFP) for subject Services. Following NHA officers and representatives of prospective consultants attended the meeting:

▪ **National Highway Authority**

- Mr. Arbab Ali ... General Manager (Planning)
- Mr. Asim Amin ... General Manager (Design)
- Mr. Muhammad Azam ... Director (P&CA) - III
- Mr. Dawood Khan ... Deputy Director (P&CA) - II

▪ **Consultants**

- Mr. Aziz Mughal ... M/S MM Pakistan (Pvt.) Ltd.
- Mr. Naeem Mahmood ... M/s SMEC Pty. Ltd.
- Lt. Col. ® Muhammad Hanif Awan ... M/s AA Associates

2. The queries submitted during the above mentioned pre-proposal meeting and their clarifications/ replies are summarized below for information of all prospective bidders:

Sr. No.	Queries	Reply
1.	<u>Staffing Requirement:</u> The TOR has provided for one Senior Bridge Design Engineer and one Structural Engineer in the Key Staff. However, we feel that the structural design of this type of project would require more than the proposed two Structural Engineer. Therefore, we propose three additional Structural Engineers (one senior and the other two junior engineers) in the core team.	One additional Structure Engineer for period of six months and one Junior Structure Engineer for period of six months is added, see Addendum No.1, please.
2.	<u>Time Schedule for the Contract:</u> In our opinion, the proposed time schedule of four months as given in RFP Clause 2.4 is grossly inadequate, considering all the activities mentioned in the TOR. The major task in the project is that of Bridge Design, for which only 20 days have been assigned. It is simply impossible to design a cable-stayed system in just 20 days. Even a traditional girder bridge takes more time to design. Based on our experience in similar type of project, we envisage a time period of at least 8 to 10 months for the successful completion of the project.	Agreed, the time for completion of project will be ten (10) months.
3.	Mitigation of encroachments within ROW/ Corridor is the responsibility of the Client, in	As per NHA standard policy, relocation is done by Client as per design prepared by the consultant



Sr. No.	Queries	Reply
	addition to coordination with concerned agencies for relocation of utilities. Land acquisition will also be responsibility of the Client which may please be clarified.	with its cost estimates.
4.	Will the Client ensure the security arrangements for the safety of consultant's staff during their field visits?	No, security of the consultant's staff during design assignment is their own responsibility.
5.	Refer Key Staff list given on page 11 & 12 of the RFP, we find deficiency of expertise of Contract Engineer/ Specialist, Social Development Scientist and Electrical Engineer for the accomplishment of the assignment. It is requested to be added in the Key Staff list with their appropriate number of man-months.	Only one Personnel "Electrical Engineer" for two (02) months is added. See Addendum, please.
6.	Refer clause 3.1.2(f) on page 4 of RFP regarding past performances in the relevant field, it is to be clarified that how many projects within what number of past years are to be indicated in the Form A-2 of the RFP given on page-20.	Firstly Form A-2 is not on page-20, it is on page-21 of RFP. Secondly the time frame of completed projects is last ten years counting backwards from date of proposal submission. Thirdly you may attach as many project as possible however, it is advised to segregate the project similar to the intended assignment and those to be considered for evaluation of general experience of the firm.
7.	Refer 3.1.4(d) of Data Sheet, which mentions that proposed Key Staff shall preferably be permanent employees who are employed with the consultants at least six (06) months prior to submission of proposal. In this regard, we request relaxation for allowing registered consultants with the firm. Further, refer Annexure-III on page 81 of RFP, is it mandatory to engage Sr. Bridge Design Engineer/ Team Leader as an expatriate Personnel which may be clarified.	The condition of Key Staff to be permanent employees of the firm shall stand as it is. For guidance on proposing Expatriate for the position of Sr. Bridge Design Engineer/ Team Leader see Pakistan Engineering Council (Conduct and Practice of Consulting Engineers) Bye-laws, 1986; however, it must be noted that all rates must be quoted in Pak. Rupees only and accordingly all invoices shall be paid in Pak. Rupees only.
8.	The strict criteria for minimum qualification and relevant experience in NHA may please be relaxed in order to accommodate competition of other consulting firms.	Not acceded to, proceed as per RFP, please.
9.	We assume that in conducting the study, the Client NHA will provide to the consultants the available documentation/ secondary data/ studies/ reports/ surveys/ previous master plans and GIS assistance in collecting additional data/ reports for field investigations and studies related to the project.	The policy of design Section of NHA in this regard has been explicitly communicated to all prospective consultants.
10.	Refer Form A-16 of RFP on page 38, no provisional sum (P.S) amount allocated for Axle Load Study and Topographic surveys as well for soil investigations on the proposed alignment of Approach Roads.	Please see line item No.11 Others not covered above to comply with TOR requirement in Financial Proposal Submission Form A-16 "Direct (Non-Salary) Costs".
11.	Refer page 44 of RFP, the time period of 4-months for accomplishment of the assignment of Feasibility and detailed Design is very tight which in our opinion may please be extended to minimum of nine (09) months keeping in view	The time for completion of project will be ten (10) months.



Sr. No.	Queries	Reply
	the huge numbers of tasks as 16 in addition to preparation of "Tender Documents" and "PC-1".	
12.	Refer page 81 of RFP, the total Man-months for Environment Specialist, GIS Specialist and Quantity Surveyor as Key Personnel, Computer Operator, Cad Operator, Surveyors and Survey Helpers are quite low which may please be increased till the completion of the whole assignment.	Input of some Key and Non-Key Personnel has been increased. Please see Addendum.
13.	There is no mentioning in the RFP regarding mobilization advance to be paid to the consultant, what percentage will be admissible before mobilization of Consultant staff for accomplishing the Assignment. We recommend at least 15% of the bid amount, which may be deducted in equal installments subject to negotiation during finalization of contract.	Mobilization Advance is not admissible.
14.	Cost of additional services and time will be added as per agreed terms; if it becomes inevitable/ necessary.	Refer Clause 6.6 of draft consultancy contract agreement attached with RFP.
15.	Refer Note on page 77 of RFP regarding Mode of Payment on Deliverables which indicates that 50% payment will be made on submission and 50% on acceptance/approval of deliverables by NHA. It is to be clarified by the Client that what minimum period will be admissible for the approval of submitted deliverables in order to avoid un-precedent delay. It seems to be a hard condition and with-held amount should not be more than 10% as retention money.	Refer Clause 5.1.3 of Special Conditions of Contract on page-114 of RFP.
16.	Who will bear the cost for boarding and lodging of NHA Trainee-Engineers and for how many on the project (refer clause 3.1.4(e) of Data Sheet on page 12).	Boarding and Lodging is not admissible to Trainee Engineers. Number of Trainee Engineers will be two (02). Period of training will be the Contract Period. Minimum salary to be paid by the consultant to each Trainee will be Pak. Rs.40,000/- per month. The consultant shall impart training at no cost to the Client.
17.	Will the Client ensure free access to consultants free of charge, unimpeded access to all land of which access is required for the performance of the Services?	For the performance of Assignment the Client will not impede the consultant's access to the project Site.
18.	Refer Sr. No. 8.1 on page 67 of RFP, pertaining to cost of EIA and obtaining NOC, it is suggested that a separate P.S/ L.S item, "EIA Studies and Obtaining NOC" may be provided to quote its respective cost.	Proceed as per TOR, please.

... 000 0 000 ...



ADDENDUM No.1

Consultancy Services for Feasibility Study & Detailed Design for Construction of New Bridge with Approach Roads over River Indus between Sukkur & Shikarpur: Sukkur-Rohri Bridge over River Indus

Following amendments have been made in the Request for Proposal (RFP) for subject Services under this Addendum No.1, which shall be read and construed as an integral part of RFP and shall take precedence in case of any conflict(s)/ambiguity(s) amongst this Addendum No.1 and other provisions of the RFP.

1. LETTER OF INVITATION DATA SHEET

1.1. Sub Clause 3.1.4 (d)

Refer Page 11 of RFP; insert the qualification and experience criteria of following Key Personnel in Sub-Clause 3.1.4 (d):

Junior Structure Engineer	Minimum B.Sc. (Civil Engineering) with minimum twelve (12) years relevant experience [proven seven (07) years' experience as Structure Engineer on design projects of National Highways including five (05) years designing experience of Bridges on highways]; -OR- M.Sc. (Structure Engineering) with minimum ten (10) years relevant experience [proven five (05) years' experience as Structure Engineer on design projects of National Highways including three (03) years designing experience of Bridges on highways];
Electrical Engineer	B.Sc. (Electrical Engineering) with minimum twenty (20) years relevant experience, proven fifteen (15) years experience as Electrical Engineer on designing of electrification works on major Highways. -OR- M.Sc. (Electrical Engineering) with minimum eighteen (18) years relevant experience, proven thirteen (13) years experience as Electrical Engineer on designing of electrification works on major Highways.

1.2. Summary Evaluation Sheet for Full Technical Proposal (QCBS):

Refer Page 16 of RFP; the "Summary Evaluation Sheet for Full Technical Proposal (QCBS)" is replaced with revised Summary Evaluation Sheet for Full Technical Proposal (QCBS) which is enclosed as **Attachment-I** to **Addendum No.1**.

1.3. Personnel Evaluation Sheet:

Refer Page 17 of RFP; the "Personnel Evaluation Sheet" is replaced with revised Personnel Evaluation Sheet which is enclosed as **Attachment-II** to **Addendum No.1**.



2. TERMS OF REFERENCE (TOR)

- 2.1. Refer page 44 under Chapter No.2 "Description of Project" in Terms of Reference in RFP; the said page 44 is replaced with revised page 44 enclosed as **Attachment-III** to **Addendum No.1**.
- 2.2. Refer page 81 under Chapter No.3 "Scope of Work" in Terms of Reference in RFP; the said page 81 is replaced with revised page 81 enclosed as **Attachment-IV** to **Addendum No.1**.
3. All other terms and conditions shall remain same.

---ooOoo---



Say No to Corruption

SUMMARY EVALUATION SHEET FOR FULL TECHNICAL PROPOSALS (QCBS)

EVALUATION CRITERIA		Max. Weight*	Firm 1		Firm 2	
			Rating	Score	Rating	Score
I. Firms Experience		125				
	a) General Experience of the firm	25				
	b) Specific Experience of the firm	100				
II. Approach and Methodology		180				
	a) Understanding of Objectives	20				
	b) Quality of Methodology	50				
	c) Innovativeness / Comments on TOR	20				
	d) Work Program	40				
	e) Staffing Schedule	40				
	f) Conciseness, clarity and completeness in proposal presentation	10				
III. Personnel (Areas of Expertise - Qualification and Competence of Key Staff)		550				
	a. Sr. Bridge Design Engineer/Team Leader	90				
	b. Structure Engineer-I & II	2x60				
	c. Junior Structure Engineer	50				
	d. Hydrology/Drainage Engineer	50				
	e. Traffic /Highway Engineer	50				
	f. Environmental Specialist	50				
	g. Material/Geotechnical Engineer	50				
	h. GIS Specialist	50				
	i. Electrical Engineer	40				
VI. Present commitment of the firm		25				
VII. Past performance of the consultant in last three assignments		120				
The basis for Past Performance of the consultant is the report from various quarters in NHA particularly Design Section. The Client's satisfaction certificates are also required to be attached for last three completed projects of comparable magnitude. The current commitments are to be assessed as per works in hand by the consultant.						
TOTAL		1000				

Excellent - 100% Very Good - 90-99% Above Average - 80-89% Average - 70-79% Below Average - 1-69% Non-complying - 0%
 Score: Maximum Weight x rating / 100.
 Minimum qualifying score is 70% or 700 marks.



PERSONNEL EVALUATION SHEET

POSITION / AREA OF EXPERTISE	Name	Academic and General Qualification Weight 30%		Project related Experience Weight 60%		Status with the Firm 10%		OVERALL RATING (Sum of Weighted Ratings) (A+B+C)
		Percentage Rating	Weighted Rating (A)	Percentage Rating	Weighted Rating (B)	Percentage Rating	Weighted Rating (C)	
(Show all experts to be evaluated)								
a. Sr. Bridge Design Engineer/ Team Leader								
b. Structure Engineer – I								
c. Structure Engineer – II								
d. Junior Structure Engineer								
e. Hydrology/ Drainage Engineer								
f. Traffic / Highway Engineer								
g. Environment Specialist								
h. Material/ Geotechnical Engineer								
i. GIS Specialist								
j. Electrical Engineer								

Rating: - Excellent - 100% Very good – 90-99%

Above Average – 80-89%

Average – 70-79%

Below Average – 1-69%

Non-complying - 0%

Score: Maximum Weight X rating / 100.

Ph.D. 100%

M.Sc. - 90%

B.Sc. with additional trainings/ courses relevant to assignment - 80%

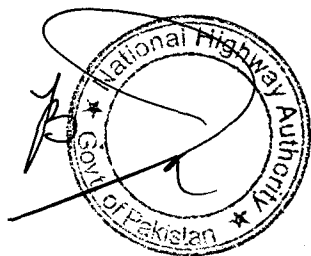
B.Sc. - 70%

Diploma - 60%

Full time - 100%

Part time with previous association - 50%

Part time only for this assignment - 0%



This study will also focus on number of lanes in the light of detailed traffic study. The consultant will study complete area and suggest suitable design/type of bridge and will recommend the best economical option most suited to local conditions (All options will be presented to NHA and approval of location and type of bridge will be obtained).

Recommendations of the Environmental Impact Assessment (EIA) study shall be incorporated in the design.

2.1 TIME OF START:

The services shall be commenced immediately after signing of the Contract Agreement by both the Parties.

2.2 TIME PERIOD:

The services specified in the TOR shall be completed and all relevant reports submitted in the form and format acceptable to the Client, within ten (10) months from the date of Commencement.



S.No.	Position	Man	Months	Total Man months
KEY PERSONNEL				
Expatriate Personnel				
1.	Sr. Bridge Design Engineer / Team Leader	1	10	10
National Personnel				
2.	Structure Engineer	2	06	12
3.	Junior Structure Engineer	1	06	06
4.	Hydrology/ Drainage Engineer	1	02	02
5.	Traffic/Highway Engineer	1	02	02
6.	Environment Specialist	1	03	03
7.	Geo-Technical/ Material Engineer	1	02	02
8.	Quantity Surveyor	2	03	06
9.	Chief Surveyor	1	04	04
10.	GIS Specialist	1	01	01
11.	Electrical Engineer	1	02	02
NON KEY STAFF				
1.	CAD Operator	2	04	08
2.	Computer Operators	2	08	16
3.	Surveyors	3	01	03
4.	Survey Helpers	5	01	05
5.	Office Assistants	2	10	20



National Highway Authority



FRIENDLY HIGHWAYS

REQUEST FOR PROPOSAL

for

**Consultancy Services for Feasibility Study & Detailed Design for Construction of New Bridge with Approach Roads over River Indus between Sukkur & Shikarpur:
Sukkur-Rohri Bridge over River Indus**

Pages (1 to 129)

August, 2016

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APPENDIX (I)

GOVERNMENT OF PAKISTAN
NATIONAL HIGHWAY AUTHORITY
27-Mauve Area, G-9/1,
Post Box No. 1205,
ISLAMABAD

Dated the _____
Ref No. _____

LETTER OF INVITATION (LOI)

To,

All prospective consultants

Gentlemen!

We extend warm welcome to you and invite you for participating in this project. We hope that you will live up to your reputation and provide us accurate information so that the evaluation is carried out "just and transparent". Please understand that the contents of this RFP, where applicable, shall be deemed part of the contract agreement. An example to this affect can be the contents of your work plan and methodology which you shall be submitting in your technical proposal. Since that is the basis of the selection, therefore, it shall become part of the contract agreement subject to approval/revisions of the same by NHA during the negotiations. Similarly, all other services and the content contributing to services shall be deemed part of the contract agreement unless it is specified for any particular item up-front in your technical proposal which obviously will make your proposal a conditional proposal whereby, authorizing NHA to may or may not consider to evaluate your proposal. Please understand that if no such mention appears up-front (i.e. on front page of technical proposal) then it shall be deemed that the consultant is in 100% agreement to the above. You are also advised to kindly read the RFP thoroughly as it can drastically affect the price structure for various services which may not be appearing directly in the terms of reference. In the end, we appreciate your participation and hope that you will feed a good proposal to merit consideration by NHA.

General Manager (P&CA)
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E-mail: gmpca.nha@gmail.com,
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ATTACHMENTS

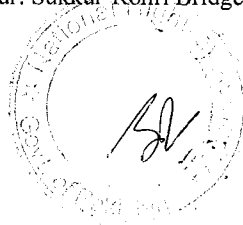
1. Instructions to Consultants (Annex A)
2. Data Sheet (Annex B)
3. Technical Proposal Forms
4. Financial Proposal Forms
5. Appendix A (Terms of Reference)
6. Appendix B (Person-Months and Activity Schedule)
7. Appendix C (Client's Requirements from the Consultants)
8. Appendix D (Personnel, Equipment, Facilities and other services to be provided by the Client).
9. Appendix E (Copy of Model Agreement)



INSTRUCTIONS TO CONSULTANTS

1. INTRODUCTION

- 1.1 You are hereby invited to submit a technical and a financial proposal for consulting services required for the assignment named in the attached LOI Data Sheet (referred to as "Data Sheet" hereafter) annexed with this letter. Your proposal could form the basis for future negotiations and ultimately a Contract between your firm and the Client named in the Data Sheet.
- 1.2 A brief description of the assignment and its objectives are given in the Data Sheet. Details are provided in the attached RFP for design services provided in the Documents, and will become part of agreement subsequently.
- 1.3 The assignment shall be implemented in accordance with the phasing specified in the Data Sheet.
- 1.4 The Client has been entrusted the duty to implement the Project as Executing Agency by Government of Pakistan (GoP) and funds for the project shall be arranged by the Client.
- 1.5 To obtain first-hand information on the assignment and on the local conditions, you are encouraged to pay a visit to the Client before submitting a proposal and attend a pre-proposal conference if specified in the Data Sheet. Your representative shall meet the named officials on the date and time specified in the Data Sheet. Please ensure that these officials are advised of the visit in advance to allow adequate time for them to make appropriate arrangements. You must fully inform yourself of local conditions and take them into account in preparing your proposal.
- 1.6 The Client shall provide the inputs specified in the Data Sheet, assist the Consultants in obtaining licenses and permits needed to carry out the services, and make available relevant project data and reports.
- 1.7 Please note that:
- i. The cost of preparing the proposal and of negotiating the Contract, including a visit to the Client, are not reimbursable as a direct cost of the Assignment, and
 - ii. The Client is not bound to accept any of the proposals submitted.
- 1.8 The names of the invited consultants are given in the Data Sheet.
- 1.9 We wish to remind you that in order to avoid conflicts of interest:
- a. Any firm providing goods, works, or services with which you are affiliated or associated is not eligible to participate in bidding for any goods, works, or services (other than the services and any continuation thereof) resulting from or associated with the project of which this assignment forms a part; and
 - b. Any previous or ongoing participation in relation with the project by your firm, its



professional staff, its affiliates or associates under a Contract may result in rejection of your proposal. You should clarify your situation in that respect with the Client before preparing the proposal.

2. DOCUMENTS

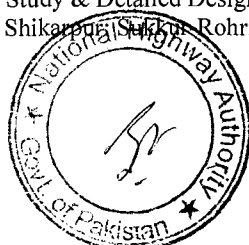
- 2.1 To prepare a proposal, please use the Documents specified in the Data Sheet.
- 2.2 Consultants requiring a clarification of the Documents must notify the Client, in writing, not later than twenty one (21) days before the proposal submission date. Any request for clarification in writing, or by cable, telex or tele-fax shall be sent to the Client's address specified in the Data Sheet. The Client shall respond by cable, telex or tele-fax to such requests and copies of the response shall be sent to all invited Consultants.
- 2.3 At any time before the submission of proposals, the Client may, for any reason, whether at its own initiative or in response to a clarification requested by an invited consulting firm, modify the Documents by amendment. The amendment shall be sent in writing or by cable, telex or tele-fax to all invited consulting firms and will be binding on them. The Client may at its discretion extend the deadlines for the submission of proposals.

3. PREPARATION OF PROPOSAL

It will consist of two parts – Technical and Financial

3.1 Technical Proposal

- 3.1.1 The Technical Proposal should be submitted using the format specified and shall include duly signed and stamped forms appended with the RFP. This is a mandatory requirement for evaluation of proposals and needs to be filled up carefully.
- 3.1.2 For Technical Proposal, the general approach and methodology which you propose for carrying out the services covered in the TOR, including such detailed information as you deem relevant, together with your appreciation of the Project from provided details and
 - a. A detailed overall work program to be provided with timing of the assignment of each expert or other staff member assigned to the project. This will also provide the Client an opportunity to effectively monitor work progress.
 - b. Total number of man-months and project duration as per TOR.
 - c. Clear description of the responsibilities of each expert staff member within the overall work program.
 - d. The Curriculum Vitae (CV) of all Key Staff members and an affidavit that proposed staff shall be available for the assignment during the project duration and their present place of duty may also be specified. The Consultants are advised to suggest such names that shall be available for the Assignment.
 - e. The technical proposal shall include duly filled in forms provided with this RFP. The name, background and professional experience of each expert staff member to be assigned to the project, with particular reference to his experience of work of a nature similar to that of the proposed assignment.
 - f. Current commitments and past performance are the basic criteria of technical



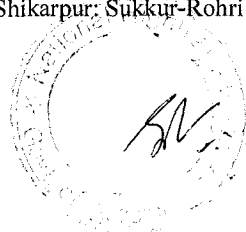
proposal. You are required to provide the details of present commitments/on- going jobs as referred in the Form A-10 of technical proposal. Further, the basis for the past performance is the report from Design Section and Construction Wing of the Client.

3.1.3 In preparing the technical proposal, you are expected to examine all terms and instructions included in the Documents. Failure to provide all requested information shall be at your own risk and may result adversely in the scoring of your proposal. The proposal should be prepared as per RFP and any suggestion or review of staff etc. should be clearly spelt out in form A-4. This will be discussed at the time of negotiation meeting as and when called.

3.1.4 During preparation of the technical proposal, you must give particular attention to the following:

- a. The Firm needs to be registered with Pakistan Engineering Council (PEC).
- b. If you consider that your firm does not have all the expertise for the assignment you may obtain a full range of experience by associating with other firms or entities. You may also utilize the services of expatriate experts but only to the extent for which the requisite expertise is not available in any Pakistani firm. You may not associate with the other firms invited for this assignment unless specified in the Data Sheet. In case of Joint Venture, the proposal should state clearly partners will be "Jointly and Severally" responsible for performance under the Contract and one partner will be "solely" responsible for all dealings with the Client on behalf of the Joint Venture. His "Special Power of Attorney" on this account is to be enclosed. JV will be got registered by PEC. Lead partner shall retain full and undivided responsibility for the performance of obligations and satisfactory completion of the consultancy services works. A copy of joint venture agreement to be provided at the time of finalizing the contract documents with specific responsibilities and assignments to be looked after by each partner.
- c. Subcontracting part of the assignment to the other Consultants is not discouraged and Specialist Sub-Consultants may be included.
- d. The key professional staff proposed shall be permanent employees of the firm unless otherwise specified in the Data Sheet. The minimum stay with the firm for such persons is Six months. No alternative to key professional staff may be proposed and only one CV may be submitted for each position. The minimum required experience of proposed Key Staff is specified in the Data Sheet.
- e. The training shall be imparted during the currency of the contract if specified in the Data Sheet.

3.1.5 The technical proposal shall not include any financial information. The Consultant's comments, if any, on the data, services and facilities to be provided by the Client and specified in the TOR shall be included in the technical proposal.



3.2 Financial Proposal

- 3.2.1 The financial proposal should be submitted using the format specified and enclosed with this RFP. This is a mandatory requirement for evaluation of proposals and needs to be filled up carefully. The total cost is to be specified in the Form A-17.
- 3.2.2 The financial proposal should list the costs associated with the Assignment. These normally cover remuneration for staff in the field and at headquarters, per diem, housing, transportation for mobilization and demobilization, services and equipment (vehicles, office equipment furniture and supplies), printing of documents, surveys and investigations. These costs should be broken into foreign (if applicable) and local costs. Your financial proposal should be prepared using the formats attached as forms A-11 to A-17.
- 3.2.3 The financial proposal shall also take into account the professional liability as provided under the relevant PEC Bye-Laws and cost of insurances specified in the Data Sheet.
- 3.2.4 Costs may be expressed in currency (s) listed in the Data Sheet.
- 3.2.5 The evaluation committee will correct any computational errors. When correcting computational errors, in case of discrepancy between a partial amount and the total amount, or between word and figures the formers will prevail. In addition to the above corrections, activities and items described in the Technical Proposals but not priced, in the Financial Proposals shall be assumed to be included in the prices of other activities or items. In case an activity or item is quantified in the Financial Proposal differently from the Technical Proposal, the evaluation committee shall correct the quantification specified in the Financial Proposal so as to make it consistent with that specified in the Technical Proposal.

4. SUBMISSION OF PROPOSALS

- 4.1 You shall submit one original technical proposal and one original financial proposal and the number of copies of each specified in the Data Sheet. Each proposal shall be in a separate envelope indicating original or copy, as appropriate. All technical proposals shall be placed in an envelope clearly marked "Technical Proposal" and the financial proposals in the one marked "Financial Proposal". These two envelopes, in turn, shall be sealed in an outer envelope bearing the address and information specified in the Data Sheet. The envelope shall be clearly marked, "DO NOT OPEN, EXCEPT IN PRESENCE OF THE EVALUATION COMMITTEE."
- 4.2 In the event of any discrepancy between the copies of the proposal, the original shall govern. The original and each copy of the technical and financial proposals shall be prepared in indelible ink and shall be signed by the authorized Consultant's representative. The representative's authorization shall be confirmed by a written power of attorney accompanying the proposals. All pages of the technical and financial proposals shall be initialed by the person or persons signing the proposal.
- 4.3 The proposal shall contain no interlineations or overwriting except as necessary to correct errors made by the Consultants themselves. Any such corrections shall be initialed by the person or persons signing the proposal.



- 4.4 The completed technical and financial proposals shall be delivered on or before the time, date, and the location specified in the Data Sheet.
- 4.5 The proposals shall be valid for the number of days stated in the Data Sheet from the date of its submission. During this period, you shall keep available the professional staff proposed for the assignment. The Client shall make its best effort to complete negotiations at the location stated in the Data Sheet within this period.

5. PROPOSAL EVALUATION

- 5.1 A Single-Stage-Two-Envelope procedures shall be adopted in ranking of the proposals. The technical evaluation shall be carried out first, followed by the financial evaluation. The Consultants shall be ranked using a combined technical/financial score.

5.2 Technical Proposal

- 5.2.1 The evaluation committee appointed by the Client shall carry out its evaluation for all the projects as listed in Para 1.1, applying the evaluation criteria and point system specified in the Data Sheet. Each responsive proposal shall be given a technical score: S_t . The Consultants scoring less than seventy (70) percent points shall be rejected and their financial proposals returned un-opened.

5.3 Financial Proposal

- 5.3.1 The financial proposals of the three top-ranking qualifying Consultants on the basis of evaluation of technical proposals shall be opened in the presence of the representatives of these Consultants, who shall be invited for the occasion and who care to attend. The Client shall inform the date, time and address for opening of financial proposals as specified in the Data Sheet. The total cost and major components of each proposal shall be publicly announced to the attending representatives of the firms.
- 5.3.2 The evaluation committee shall determine whether the financial proposals are complete and without computational errors. The lowest financial proposal (F_m) among all shall be given a financial score: S_f of 1000 points. The financial scores of the proposals shall be computed as follows:

$$S_f = (1000 \times F_m) / F$$

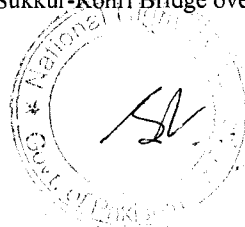
(F = amount of specific financial proposal)

- 5.3.3 Proposals, in the Quality Cum Cost Based Selection (QCBS) shall finally be ranked according to their combined technical (S_t) and financial (S_f) scores using the weights (T- the weight given to the technical proposal, P = the weight given to the financial proposal, and $T+P=1$) stated in the Data Sheet:

$$S = S_t \times T \% + S_f \times P \%$$

6. NEGOTIATION

- 6.1 Prior to the expiration of proposal validity, the Client shall notify the successful Consultant who submitted the highest ranking proposal in writing, by registered letter, cable telex or facsimile and invite it to negotiate the Contract.



- 6.2 Negotiations normally take from two to five days. The aim is to reach agreement on all points and initial a draft contract by the conclusion of negotiations.
- 6.3 Negotiations shall commence with a discussion of your technical proposal. The proposed methodology, work plan, staffing and any suggestions you may have made to improve the TOR. Agreement shall then be reached on the final TOR, the staffing, and the bar charts, which shall indicate activities, staff, and periods in the field and in the home office, staff months, logistics and reporting.
- 6.4 Changes agreed upon shall then be reflected in the financial proposal, using proposed unit rates (no negotiation of the staff month rates).
- 6.5 Having selected Consultants on the basis of, among other things, an evaluation of proposed key professional staff, the Client expects to negotiate a contract on the basis of the staff named in the proposal. Prior to contract negotiations, the Client shall require assurances that the staff members will be actually available. The Client shall not consider substitutions of key staff except in cases of un-expected delays in the starting date or incapacity of key professional staff for reasons of health.
- 6.6 The negotiations shall be concluded with a review of the draft form of the contract. The Client and the Consultants shall finalize the contract to conclude negotiations. If negotiations fail, the Client shall invite the Consultants that received the second highest score in ranking to Contract negotiations. The procedure will continue with the third in case the negotiation process is not successful with the second ranked consultants.

7. AWARD OF CONTRACT

- 7.1 The contract shall be awarded after successful negotiations with the selected Consultants and approved by the competent authority. Upon successful completion of negotiations/initialing of the draft contract, the Client shall promptly inform the other Consultants that their proposals have not been selected.
- 7.2 The selected Consultant is expected to commence the assignment on the date and at the location specified in the Data Sheet.

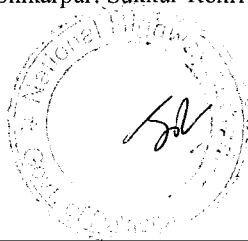
8. CONFIRMATION OF RECEIPT

- 8.1 Please inform the Client by telex/facsimile courier or any other means:
- (i) That you received the letter of invitation;
 - (ii) Whether you will submit a proposal; and
 - (iii) If you plan to submit a proposal, when and how you will transmit it.

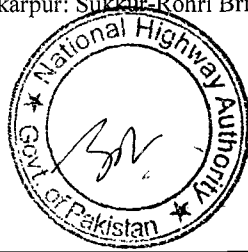


DATA SHEET

LOI Clause No.	DESCRIPTION OF CLAUSE
1.1	<p>The name of Assignment is:- Consultancy Services for “Feasibility Study & Detailed Design for Construction of New Bridge with Approach Roads over River Indus between Sukkur & Shikarpur: Sukkur-Rohri Bridge over River Indus”.</p> <p>The Client’s Name is:- National Highway Authority</p>
1.2	<p>The description and the objectives of the assignment are: As per TOR</p>
1.3	<p>Phasing of the Assignment (if any): Nil</p> <p>The Consultant shall commence the assignment upon signing of Contract Agreement between NHA and the successful Consultant.</p>
1.5	<p>Pre-Proposal Conference: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>The name(s) and address(es) of the Official(s) is (are):</p> <p>General Manager (P&CA) National Highway Authority 28, Mauve Area, G-9/1 Islamabad</p> <p>Date, Time and Venue for Pre-proposal Conference:</p> <p>Date: 15th August, 2016 Time: 1130 hours Venue: NHA Auditorium (HQ) National Highway Authority 28, Mauve Area, G-9/1 Islamabad.</p>
1.6	<p>The Client shall provide the following inputs:</p> <p>As per TOR and Appendix D.</p>
1.7	<p>Following sub-clauses are added:</p> <p>iii. The Consultant may please note not to suggest names of key staff already proposed in other proposals with the Client or awarded recently. This will affect adversely marking of these professionals in evaluation of the technical proposal. Their secured points are liable to be reduced by 50% if their name appears in more than 1 previous proposal in which they are ranked No.1. Also the existing load of work with a firm shall be considered as one of the factors</p>



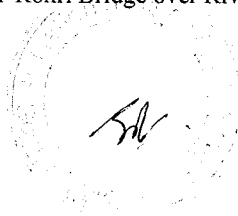
	<p>for the consideration in the award of the work.</p> <p>iv. Form A-4 is meant for comments on provision contained in RFP and Terms of Reference (TOR) and unless the observations are noted in this particular form, anything written elsewhere on this account including financial implications, if any, shall be considered of no consequence in the evaluation process.</p>
1.8	<p>The Invited Consultants / Eligible Consultants are:</p> <p>Any firm meeting the following requirements:</p> <p>(a) Valid Registration Certificate of Pakistan Engineering Council.</p> <p>(b) Affidavit in original bearing the subject with project name on stamp paper duly attested by the Oath Commissioner to the effect that the firm has neither been blacklisted nor any contract rescinded in the past for non-fulfillment of contractual obligations (By all partner firms in case of JV, association and/or sub-consultant).</p> <p>(c) Facilities available with the Consultant to perform their functions effectively (proper office premises, software, hardware, record keeping etc.)</p> <p>(d) Client's satisfaction certificates (Performance Reports) for the last three relevant assignments from the respective Clients. Moreover any adverse report regarding performance of Consultant on NHA projects received from NHA's any relevant quarter may become basis for its disqualification from the services above named in clause 1.1. Man-months of staff and Project Duration as per TOR.</p>
2.1	<p>The Documents are:</p> <p>(a) Letter of Invitation (LOI).</p> <p>(b) LOI Data Sheet.</p> <p>(c) Technical Proposal Forms.</p> <p>(d) Financial Proposal Forms</p> <p>(e) Appendix – A: TOR and Background Information.</p> <p>(f) Appendix – B: Man-Months and Activity Schedule</p> <p>(g) Appendix – C: Client's Requirements from the Consultant.</p> <p>(h) Appendix – D: Personnel Equipment, Facilities and Other Services to be Provided by the Client.</p> <p>(i) Appendix – E: Copy of Model Agreement/ Draft Form of Contract & Appendices etc.</p> <p>(j) Form of Contract (<i>For Consultants to perform services as a Joint Venture</i>)</p>



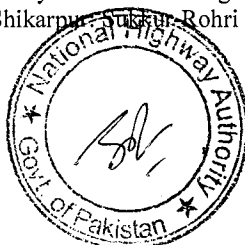
2.2	<p>The words "Twenty one (21)" is deleted in its entirety and replaced with "Five (05)"</p> <p>The address for seeking clarification is:</p> <p>General Manager (P&CA) National Highway Authority 28, Mauve Area, G-9/1, Islamabad E-mail: gmpca.nha@gmail.com</p>
3.1.1	<p>Add following:</p> <p>The proposals should be bound in the hard book binding form to deny the possibility of removal or addition of page(s). All the pages of proposal must be signed and stamped in original by authorized representative of the firm/JV. All the pages must be numbered starting from first page to last. Any proposal found not adhering to these requirements will be rejected at the time opening.</p>
3.1.4	<p>b. Following line in this Para is deleted in its entirety:</p> <p>"You may not associate with the other firms invited for this assignment unless specified in the Data Sheet."</p> <p>d. Proposed key staff shall preferably be permanent employees who are employed with the consultants at least six months prior to submission of Proposal.</p> <p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>The minimum required experience of proposed Key staff is given below:</p>
FOR KEY STAFF	
<p>Sr. Bridge Design Engineer /Team Leader</p>	<p>M.Sc. (Structure Engineering) with minimum 18 years relevant experience in Bridge designing. He must have designed at least two (2) Pre-stressed Concrete Cable Stayed Bridges. He shall also demonstrate skills in Bridge designing for long bridges.</p> <p>He should also have performed as Team Leader for at least two (02) major Highway Design projects.</p>
<p>Structure Engineer</p>	<p>Minimum B.Sc. (Civil Engineering) with minimum fifteen (15) years relevant experience [proven ten (10) years' experience as Structure Engineer on design projects of National Highways including eight (08) years designing experience of major Bridges on highways];</p> <p>-OR-</p>



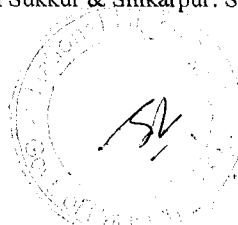
		M.Sc. (Structure Engineering) with minimum thirteen (13) years relevant experience [proven eight (08) years' experience as Structure Engineer on design projects of National Highways including six (06) years designing experience of major Bridges on highways];
	Hydrology/Drainage Engineer	Minimum B.Sc. (Civil Engineering) with minimum fifteen (15) years relevant experience [proven ten (10) years' experience as Hydraulic/ Drainage Engineer on highways design projects]. He should have preferably been involved in design projects of two (02) major bridges on rivers; -OR-
		M.Sc. (Hydraulics Engineering/ Hydrology) with minimum thirteen (13) years relevant experience [proven eight (08) years' experience as Hydraulic/ Drainage Engineer on highways design projects]. He should have preferably been involved in design projects of two (02) major bridges on rivers;
	Traffic/Highway Engineer	Minimum B.Sc. (Civil Engineering/Transportation Engineering) with minimum fifteen (15) years relevant experience [proven ten (10) years' experience as Traffic/Highway Engineer on design projects of major highways]; -OR- M.Sc. (Transportation Engineering) with minimum thirteen (13) years relevant experience [proven eight (08) years' experience as Traffic/Highway Engineer on design projects of major highways];
	Material/Geotechnical Engineer	Minimum B.Sc. (Civil Engg./Geo-tech Engg.) or M.Sc. (Geology) with minimum fifteen (15) years relevant experience [proven twelve (12) years experience as Material/Geotechnical Engineer on major highway and bridge design projects];
	Environmental Specialist	Minimum B.Sc. (Civil Engg. /Environmental Engg.) - or- M.Sc. (Env. Sciences) with minimum fifteen (15) years relevant experience [proven twelve (12) years experience as EIA Expert on Civil Engg. projects]; -OR- M.Sc. (Env. Engg.) with minimum thirteen (13) years relevant experience [proven ten (10) years' experience as EIA Expert on Civil Engg. projects];
	GIS Specialist	Minimum M.Sc. (GIS) with minimum fifteen (15) years relevant experience [proven twelve (12) years experience as GIS Expert on highway design projects].



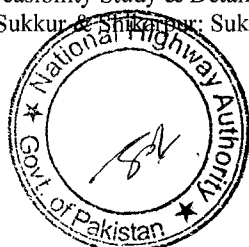
	<p><u>Note: The Consultants are advised to submit updated CV's strictly in compliance with the format of CVs given in Technical Proposal Form A-5. CVs submitted without regard to the said format may score low.</u></p> <p>e. Training is an important feature of this Assignment: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If Yes, details of training are given in TOR</p>
3.2.1	<p>The last line of this Para is deleted in its entirety and replaced with following: The total cost is to be specified in the Form A-17 and accordingly also in Form A-11</p>
3.2.3	<p>Professional liability, insurances (description or reference to appropriate documentation):</p> <p>i. The Consultants shall be responsible for Professional Indemnity Bond of the required amount at their own cost. This bond shall be in the joint name of Consultant and the Client.</p> <p>ii. The Consultants are required to insure their Employees and Professionals for Hospitalization/ Medical, Travel and Accident Cover for the duration of the Contract. The details provided in Para 3.5 of Special Conditions of Contract in Model Contract.</p>
4.1	<p>The number of copies of the Proposal required is:</p> <p>Technical Proposal: One Original and Three copies with CD (soft form of complete Technical Proposal in PDF Form) in sealed envelope.</p> <p>Financial Proposal: One Original with CD (soft form of complete Financial Proposal in PDF as well as MS Word/Excel Forms) in sealed envelope.</p> <p>The address for writing on the proposal is:</p> <p>General Manager (P&CA) National Highway Authority 28, Mauve Area G-9/1 Islamabad Telephone: +92-51-9032727 Facsimile: +92-51-9260419</p>
4.4	<p>The date and time of proposal submission is:</p> <p>Date: 31st August, 2016 Time: 1130 hours Location of Submission : NHA Main Auditorium National Highway Authority 27, Mauve Area G-9/1 Islamabad.</p>



4.5	<p>Validity period of the proposal is: 180 days The bid shall remain valid upto 27th February, 2017.</p> <p>The location for negotiation of proposal is:</p> <p style="text-align: center;">General Manager (P&CA) National Highway Authority 28, Mauve Area G-9/1 Islamabad Telephone: +92-51-9032727 Facsimile: +92-51-9260419</p>																																										
5.2	<p>The evaluation of technical proposal shall be based on following criteria:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Description / Items</th> <th style="text-align: right;">Points</th> </tr> </thead> <tbody> <tr> <td>i. Qualification of the Firm</td> <td style="text-align: right;">125</td> </tr> <tr> <td> a) General Experience (25)</td> <td></td> </tr> <tr> <td> b) Specific Experience of the Firm (100)</td> <td></td> </tr> <tr> <td>ii. Approach & Methodology</td> <td style="text-align: right;">180</td> </tr> <tr> <td> Understanding of Objectives (20)</td> <td></td> </tr> <tr> <td> Quality of Methodology (50)</td> <td></td> </tr> <tr> <td> Innovativeness/Comments on TOR (20)</td> <td></td> </tr> <tr> <td> Work Program (40)</td> <td></td> </tr> <tr> <td> Staffing Schedule (40)</td> <td></td> </tr> <tr> <td> Conciseness, clarity and completeness in proposal presentation (10)</td> <td></td> </tr> <tr> <td>iii. Qualification and Experience of the Key Staff</td> <td style="text-align: right;">550</td> </tr> <tr> <td>iv. Present commitment of the Firm</td> <td style="text-align: right;">025</td> </tr> <tr> <td>v. Past performance of the firm</td> <td style="text-align: right;">120</td> </tr> <tr> <td style="text-align: right;">Total Points:</td> <td style="text-align: right;">1000</td> </tr> <tr> <td>Minimum qualifying technical score:</td> <td style="text-align: right;">700</td> </tr> </tbody> </table> <p>The points earmarked for evaluation sub-criteria (iii) for suitability of Key Staff are:-</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Description / Items</th> <th style="text-align: right;">Points (%)</th> </tr> </thead> <tbody> <tr> <td>i. Academic and General Qualifications</td> <td style="text-align: right;">30</td> </tr> <tr> <td>ii. Professional experience related to the Project</td> <td style="text-align: right;">60</td> </tr> <tr> <td>iii. Status with the firm (Permanent & duration with Firm as per LOI Clause 3.1.4 (d))</td> <td style="text-align: right;">10</td> </tr> <tr> <td style="text-align: right;">Total Points:</td> <td style="text-align: right;">100</td> </tr> </tbody> </table>	Description / Items	Points	i. Qualification of the Firm	125	a) General Experience (25)		b) Specific Experience of the Firm (100)		ii. Approach & Methodology	180	Understanding of Objectives (20)		Quality of Methodology (50)		Innovativeness/Comments on TOR (20)		Work Program (40)		Staffing Schedule (40)		Conciseness, clarity and completeness in proposal presentation (10)		iii. Qualification and Experience of the Key Staff	550	iv. Present commitment of the Firm	025	v. Past performance of the firm	120	Total Points:	1000	Minimum qualifying technical score:	700	Description / Items	Points (%)	i. Academic and General Qualifications	30	ii. Professional experience related to the Project	60	iii. Status with the firm (Permanent & duration with Firm as per LOI Clause 3.1.4 (d))	10	Total Points:	100
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5.3.1	<p>Following is added:</p> <p>The words “three top-ranking qualifying consulting firms” is deleted in its entirety and replaced with the words “qualifying consultants”</p> <p>The date, time, and address of the financial proposal opening are:</p> <p>After evaluation and approval of technical proposals (TO BE INFORMED LATER).</p>																																										



5.3.3	<p>The weights given to the Technical and Financial Proposals are:</p> <p>Technical: 80% Financial: 20%</p>
6.3	<p>Add following at the end of this Para:</p> <p>The final person-months of each expert are subject to adjustment at the stage of contract negotiation in line with demonstrated approaches methodology and need bases.</p>
7.2	<p>The assignment is expected to commence in: November, 2016</p>
8	<p>The Clause is deleted in its entirety.</p>



SUMMARY EVALUATION SHEET FOR FULL TECHNICAL PROPOSALS (QCBS)

EVALUATION CRITERIA		Max. Weight*	Firm 1		Firm 2	
			Rating	Score	Rating	Score
I. Firms Experience		125				
	a) General Experience of the firm	25				
	b) Specific Experience of the firm	100				
II. Approach and Methodology		180				
	a) Understanding of Objectives	20				
	b) Quality of Methodology	50				
	c) Innovativeness / Comments on TOR	20				
	d) Work Program	40				
	e) Staffing Schedule	40				
	f) Conciseness, clarity and completeness in proposal presentation	10				
III. Personnel (Areas of Expertise - Qualification and Competence of Key Staff)		550				
	a. Sr. Bridge Design Engineer/Team Leader	100				
	b. Structure Engineer	75				
	c. Hydrology/Drainage Engineer	75				
	d. Traffic /Highway Engineer	75				
	e. Environmental Specialist	75				
	f. Material/Geotechnical Engineer	75				
	g. GIS Specialist	75				
VI. Present commitment of the firm		25				
VII. Past performance of the consultant in last three assignments		120				
The basis for Past Performance of the consultant is the report from various quarters in NHA particularly Design Section. The Client's satisfaction certificates are also required to be attached for last three completed projects of comparable magnitude. The current commitments are to be assessed as per works in hand by the consultant.						
TOTAL		1000				

Excellent - 100% Very Good - 90-99% Above Average - 80-89% Average - 70-79% Below Average - 1-69% Non-complying - 0%
 Score: Maximum Weight x rating / 100.
 Minimum qualifying score is 70% or 700 marks.



PERSONNEL EVALUATION SHEET

POSITION / AREA OF EXPERTISE	Name	Academic and General Qualification Weight 30%		Project related Experience Weight 60%		Status with the Firm 10%		OVERALL RATING (Sum of Weighted Ratings) (A+B+C)
		Percentage Rating	Weighted Rating (A)	Percentage Rating	Weighted Rating (B)	Percentage Rating	Weighted Rating (C)	
(Show all experts to be evaluated)								
a. Sr. Bridge Design Engineer/ Team Leader								
b. Structure Engineer								
c. Hydrology/Drainage Engineer								
d. Traffic / Highway Engineer								
e. Environment Specialist								
f. Material/Geotechnical Engineer								
g. GIS Specialist								

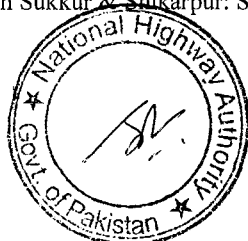
Rating: - Excellent - 100% Very good – 90-99% Above Average – 80-89% Average – 70-79% Below Average – 1-69% Non-complying - 0%

Score: Maximum Weight X rating / 100.

Ph.D. 100% M.Sc. - 90% B.Sc. with additional trainings/ courses relevant to assignment - 80% B.Sc. - 70% Diploma - 60%
 Full time - 100% Part time with previous association - 50% Part time only for this assignment - 0%



TECHNICAL PROPOSAL FORMS



TECHNICAL PROPOSAL SUBMISSION FORM

{Location, Date}

To: [Name and address of Client]

Dear Sirs:

We, the undersigned, offer to provide the consulting services for [**Insert the Project Name**] in accordance with your Request for Proposals dated [Insert Date]. We are hereby submitting our Proposal, which includes this Technical Proposal and a Financial Proposal sealed in a separate envelope.

[{If the Consultant is a joint venture, insert the following: We are submitting our Proposal in a joint venture with: {Insert a list with full name and the legal address of each member, and indicate the lead member}. We have attached a copy {insert: "of our letter of intent to form a joint venture" or, if a JV is already formed, "of the JV agreement"} signed by every participating member, which details the likely legal structure of and the confirmation of joint and severable liability of the members of the said joint venture.

OR

If the Consultant's Proposal includes Sub-consultants, insert the following: We are submitting our Proposal with the following firm(s) as Sub-consultants: {Insert a list with full name and country of each Sub-consultant.}]

We hereby declare that:

- (a) All the information and statements made in this Proposal are true and we accept that any misinterpretation or misrepresentation contained in this Proposal may lead to our disqualification and/or may be sanctioned by the Client.
- (b) Our Proposal shall be valid and remain binding upon us for the period of time specified in the Data Sheet, Clause 4.5.
- (c) We have no conflict of interest in accordance with LOI Clause 1.9.
- (d) We meet the eligibility requirements as stated in Data Sheet Clause 1.8.
- (e) Neither we, nor our JV Partner(s)/sub-consultant(s) or any of the proposed experts prepared the TOR for this consulting assignment.
- (f) Within the time limit stated in the Data Sheet, Clause 4.5, we undertake to negotiate a Contract on the basis of the proposed Key Experts. We accept that the substitution of Key Experts for reasons other than those stated in Letter of Invitation, Clause 6.5 may lead to the termination of Contract negotiations.



- (g) Our Proposal is binding upon us and subject to any modifications resulting from the Contract negotiations.

We undertake, if our Proposal is accepted and the Contract is signed, to initiate the Services related to the Assignment not later than the date mentioned in Data Sheet 4.5 (*or the date extended with the written consent of Consultant in case of delay in procurement process*)

We understand that the Client is not bound to accept any or all Proposal(s) that the Client receives.

We remain,

Yours sincerely,

Authorized Signature {In full and initials}: _____

Name and Title of Signatory: _____

Name of Consultant (company's name or JV's name):

In the capacity of: _____

Address: _____

Contact information (phone and e-mail): _____

{For a joint venture, either all members shall sign or only the lead member, in which case the power of attorney to sign on behalf of all members shall be attached}



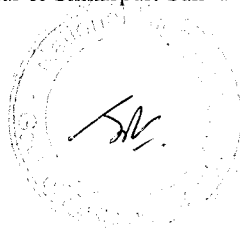
CLIENT'S REFERENCE

**Relevant Services (as per RFP notice) Carried Out in the Last Ten Years
Which Best Illustrate Qualifications**

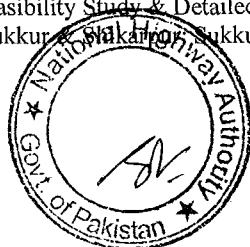
Using in the format below, provide information on each reference assignment for which your firm, either individually as a corporate entity or as one of the major companies within a consortium, was largely contracted.

Assignment Name:		Country:
Location within Country:		Professional Staff Provided by Your Firm:
Name of Client:		No of Staff:
Address:		No of Staff Months:
Start Date (Month/Year):	Completion Date (Month/Year):	Approx. Value of Services (in Current US\$ /Rs.)
Name of Associated Firm (s), if any:		No. of Months of Professional Staff Provided by Associated Firm(s)
Name of Senior Staff (Project Director/Coordinator, Team Leader) involved and functions performed:		
Narrative Description of Project		
Description of Actual Services Provided by Your Staff		

Consultants' Name: _____



APPROACH PAPER ON METHODOLOGY PROPOSED FOR PERFORMING THE
ASSIGNMENT



COMMENTS/SUGGESTIONS OF CONSULTANT

On the Terms of Reference (TOR)

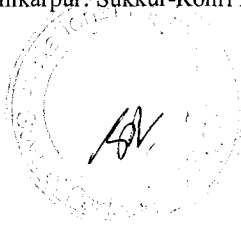
- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

Etc.

On the data, services and facilities to be provided by the Client specified in the TOR.

- 1.
- 2.
- 3.
- 4.
- 5.

Etc.



Form A-5

FORMAT OF CURRICULUM VITAE (CV) FOR PROPOSED KEY STAFF

1. Proposed Position: _____
2. Name of Firm: _____
3. Name of Staff: _____
4. Profession: _____
5. Date of Birth: _____
6. Years with Firm: _____
7. Nationality: _____
8. N.I.C Number: _____
9. Cell Number: _____
10. Membership in Professional Societies: _____
(Membership of PEC is Mandatory)
10. Detailed Tasks Assigned on the Project: _____

11. 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 up to one page].

12. Education

[Summarize college/university and other specialized education of staff member, giving names of institutions, dates attended and degrees obtained].

13. 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, title of positions held and location of assignments. For experience in last ten years, also give types of activities performed and Client references, where appropriate].



14. Languages

[Indicate proficiency in speaking, reading and writing of each language: excellent, good, fair, or poor].

15. Certification

I, the undersigned, certify to the best of my knowledge and belief that

- (i) This CV correctly describes my qualifications and experience
- (ii) I am not a current employee of the Executing or the Implementing Agency
- (iii) In the absence of medical incapacity, I will undertake this assignment for the duration and in terms of the inputs specified for me in Form A-9 provided team mobilization takes place within the validity of this proposal.
- (iv) I was not part of the team who wrote the terms of reference for this consulting services assignment
- (v) I am not currently debarred by any department/organization/ (semi-autonomous / autonomous) bodies or such like institutions in Pakistan.
- (vi) I certify that I have been informed by the firm that it is including my CV in the Proposal for the {name of project and contract}. I confirm that I will be available to carry out the assignment for which my CV has been submitted in accordance with the implementation arrangements and schedule set out in the Proposal.

If CV is signed by the firm's authorized representative:

- (vii) I, as the authorized representative of the firm submitting this Proposal for the {name of project and contract}, certify that I have obtained the consent of the named expert to submit his/her CV, and that s/he will be available to carry out the assignment in accordance with the implementation arrangements and schedule set out in the Proposal, and confirm his/her compliance with paras (i) to (v) above.
- (viii) Latest colored attested photograph stapled attached with the CV.

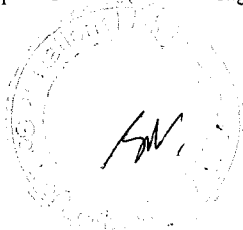
I understand that any willful misstatement described herein may lead to my disqualification or dismissal, if engaged.

Signature of expert or authorized
representative of the firm

Date: _____
Day/Month/Year

Full name of authorized representative: _____

Note: copy or scanned signatures are not allowed



COMPLETION AND SUBMISSION OF REPORTS AS PER TOR

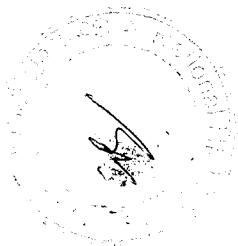
	Reports	Date
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		



COMPOSITION OF THE TEAM PERSONNEL AND THE TASKS TO BE ASSIGNED TO EACH TEAM MEMBER

1. Technical / Managerial Staff

Name	Position	Tasks Assignment	Present location	Name of assignment involved and clients name



WORK PLAN / ACTIVITY SCHEDULE

Items of Work/Activities	Monthly Program from date of assignment (in the form of a Bar Chart)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15



WORK PLAN AND TIME SCHEDULE FOR KEY PERSONNEL

Name	Position	Months (in the form of a Bar Chart)															Number of Months	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		

Full Time: _____
 Part Time: _____

Activities Duration _____

Yours faithfully,

Signature _____
 (Authorized Representative)

Full Name _____
 Designation _____
 Address _____



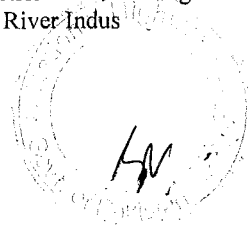
CURRENT COMMITMENTS OF THE FIRM

(List MUST be comprehensive including projects from clients other than NHA as well)

Name of project	Single or JV	Task Assignment	Start date of the project	Expected date of completion



FINANCIAL PROPOSAL FORMS



FINANCIAL PROPOSAL SUBMISSION FORM

{Location, Date}

To: [Name and address of Client]

Dear Sirs:

We, the undersigned, offer to provide the consulting services for **[Insert the Project Name]** in accordance with your Request for Proposal dated [Insert Date] and our Technical Proposal.

Our attached Financial Proposal is for the amount of {Insert amount in words and figures}, including all Federal, Provincial & Local taxes applicable as per law of the land. {Please note that all amounts shall be the same as in Financial Proposal Form A-17}.

Our Financial Proposal shall be binding upon us subject to the modifications resulting from Contract negotiations, up to expiration of the validity period of the Proposal, i.e. before the date indicated in Clause 4.5 of the Data Sheet.

We confirm that we have no condition to state that may have financial implications over and above the amount quoted above.

We understand you are not bound to accept any Proposal you receive.

We remain,

Yours sincerely,

Authorized Signature {In full and initials}: _____

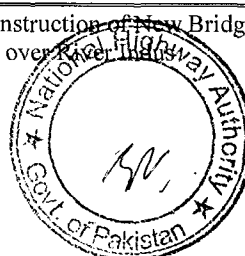
Name and Title of Signatory: _____

In the capacity of: _____

Address: _____

E-mail: _____

{For a joint venture, either all members shall sign or only the lead member/consultant, in which case the power of attorney to sign on behalf of all members shall be attached.}



Form A-12

BREAKDOWN OF RATES FOR CONSULTANCY CONTRACT

Project: _____ Consultant: _____

Name	Position	Basic Salary per Cal. Month	Social Charges (%age of 1)	Overhead (%age of 1+2)	Sub-Total (1+2+3)	Fee (%age of 4)	Rate per Month for project Office	Field Allow. (%age of 1)	Rate per Month for Field Work
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

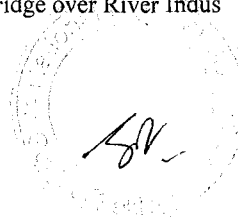
Notes:

- Item No. 1 Basic salary shall include actual gross salary before deduction of taxes. Payroll sheet for each proposed personnel should be submitted at the time of negotiations.
- Item No. 2 Social charges shall include Client's contribution to social security, paid vacation, average sick leave and other standard benefits paid by the company to the employee. Breakdown of proposed percentage charges should be submitted and supported (see Form A-13).
- Item No. 3 Overhead shall include general administration cost, rent, clerical and junior professional staff and business getting expenses, etc. Breakdown of proposed percentage charges for overhead should be submitted and supported (see Form A-14).
- Item No. 5 Fee shall include company profit and share of salary of partners and directors (if not billed individually for the project) or specified in overhead costs of the Company.
- Item No. 7 Normally payable only in case of field work under hard and arduous conditions.
- Note 1 The minimum percentage of item (1) should preferably be 50% of (8).
- Note 2 The consultant is to provide appointment letter and affidavit/undertaking duly signed by each of the individual staff members showing salary rates as above. Further during execution each invoice will also be provided showing that the professionals have been paid their salaries as per basic rates specified therein. Failing to which, the Client will take punitive action against the consultant and shall deduct the deficient amount from his monthly invoice. Moreover, it will be considered as a negative mark on his performance that will be considered for future projects.

Full Name: _____

Signature: _____

Title: _____

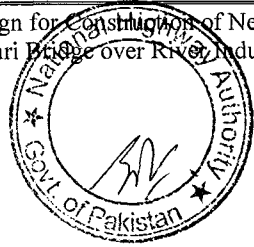


BREAKDOWN OF OVERHEAD COSTS

Sr. No.	Detailed Description	As a %age of Basic Salary and Social Charges

ESTIMATED LOCAL CURRENCY SALARY COSTS/REMUNERATION

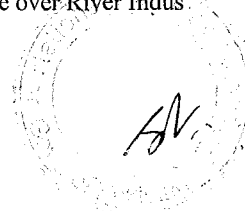
Sr. No.	Position	Name	Staff-Months	Monthly Billing Rate	Total Estimated Amount (Rs.)
I. Professional / Key Staff					
Sub-Total:					



ESTIMATED LOCAL CURRENCY SALARY COSTS/REMUNERATION

Sr. No.	Position	Staff-Months	Monthly Billing Rate	Total Estimated Amount (Rs.)
II. Non-Key / Non-Technical / Support Staff				
Sub-Total:				

Note: The bidder is required to quote the rates of Non Key Staff given in the TOR in above table. The bidder may propose Non-Technical / Support Staff person-months in addition to those given in TOR; however, in such a case tenable reasons must be given in the Technical Proposal Submission Form A-4 "Comments on TOR". The Client's negotiation committee will deliberate on the requirement of additional staff during negotiation meeting. It is also to be noted that the Client is not bound to agree to the reasons given in Form A-4.

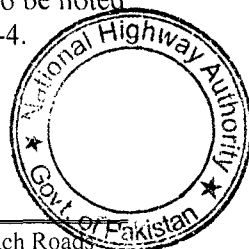


DIRECT (NON-SALARY) COSTS**

Sr. No.	Nomenclature	Unit	Qty	Unit Price (Rs.)	Total Amount (Rs.)
1.	Rent for Office Accommodation	L.S			
2.	Office Utilities Costs	L.S			
3.	Cost / rental of Furniture / Furnishings	L.S			
4.	Cost (rentals) of Office/Other Equipment i. Computers and accessories ii. Photo copy machines iii. Communication equipment iv. Drafting / Engineering equipment v. Surveying instruments (rentals) vi. Transport Vehicles (Rentals) vii. Site visits and Meetings in Islamabad during currency of Project	L.S			
5.	Communication expenses	Per month			
6.	Geotechnical Investigation for Structures	PS			3,500,000
7.	Drafting/ Reproduction of Reports	L.S			
8.	Office / Drafting Supplies	L.S			
9.	Support Staff as needed for Key Professional Staff along with number, charge rate and category for review	L.S			
10.	Aerodynamic Testing (Wind Tunnel Test) accompanying two to three NHA Design Officers for witnessing the test.	PS			30,000,000
11.	Others not covered above to comply with TOR requirement *	L.S			
Total					

* Any additional item/ cost quoted against this line item must have provided solid/ tenable justification(s) detailed in Technical Proposal Submission Form A-4 "Comments on TOR" without indicating financial value therein. The Client's negotiation committee will deliberate on the requirement of additional item/ cost in case such Firm stands top ranked. It is also to be noted by the Consultants that the Client is not bound to agree to the reasons given in Form A-4.

** The Consultants are required to submit Payment voucher of In-Direct Cost.



SUMMARY OF COST

Sr. No.	Description	Amount (Rs.)
1.	Salary Cost / Remuneration	
1(a).	Sales Tax @ 16% on item 1 above which shall be kept as Provisional Sum in the Contract Agreement	
2.	Direct (Non-Salary) Cost	
3.	Grand Total:	

Note: 1- This cost is supposed to be built up in bid price and if anything is left blank it shall be deemed to be included in the cost.

2- The dues and salaries of staff are payable by the consultant in time and not later than 10th of the following month positively. In case of failure to do so Client shall intervene and pay these dues and salaries of the concerned Personnel and recover from the invoice of the consultant at actual charges paid plus 1% of the amount. This will also be accounted for adversely in making assessment of the Consultant in the next evaluation process for selection of consultants with report of such defaults.

3- The grand total is inclusive of all the applicable Federal, Provincial and Local taxes. All these taxes (except the Sales Tax) are required to be built in the quoted rates and not be mentioned separately.

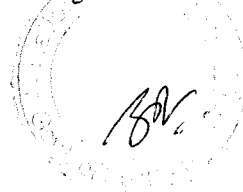
4- Any Omission or arithmetical error made by the Consultants in entering the amount against item 1(a) shall also be rectified during evaluation of the Financial Proposal.



APPENDIX-A

TERMS OF REFERENCE

(TOR)



CHAPTER NO.1 INTRODUCTION

1.1 BACKGROUND:

The city of Sukkur is the third largest city of Sindh province, situated on the west bank of river Indus. It is located at an altitude of 220 feet (67 m) from sea level, having terrestrial coordinates 68°52' East and 27°42' North. It is also the narrowest point of the lower river Indus course. Sukkur is connected directly with adjacent city of Rohri through a combination of Bridges. One of them is the Lansdowne Bridge which is about 127 years old. Marvel of the 19th century engineering, the longest rigid girder bridge in the world, at that time, begun in 1887. It was designed by Sir Alexander Meadows, manufactured in London by M/s Westwood, Baillie and erected by F.E. Robertson, and Hecquet. The Indus Valley State Railway had reached Sukkur in 1879 and the stream ferry transported eight wagons at a time across the Indus between Rohri and Sukkur. The exercise was cumbersome and time consuming. The solution came in shape of Lansdowne, inaugurated the Bridge on March the 25th 1889, it is now 127 years old and still providing service. Time has come to preserve it and declare it a national Heritage.

The Honorable MNA Syed Khursheed Ahmed Shah; Leader of Opposition, made a request to the Honorable Prime Minister of Pakistan Mian Muhammad Nawaz Sharif that the life span of the 127 years old Bridge is almost over, but the Bridge's average daily traffic is on rise. The bridge is not in a condition to bear an increasing load, which is beyond its capacity and it is feared, it may pave way to some unpleasant incident. Therefore, there is a dire need of the construction of a new bridge in the area to shift the burden of the ongoing traffic on immediate basis, keeping in view the public safety concerns.

1.2 NEED ASSESSMENT:

The old existing bridge serving the traffic has crossed its design life; therefore, risk of its breakdown is higher as there is also a rise in traffic crossing the bridge on daily basis. In order to avoid any unpleasant incident and to keep the areas of Sukkur and Rohri connected socially and economically, it is the need of the hour that a bridge in replacement of old Lansdowne Bridge should be constructed. The proposed bridge is required to be constructed to serve the traffic moving to and going from Sukkur and Rohri which is currently moving through old Lansdowne Bridge.

1.3 PROJECT DEFINITION:

The Consultant will propose the suitable location and type of bridge. The Consultant will present the most feasible options for location and type of bridge to NHA and after getting approval from the authorities, will process for design.

The number of lanes will be proposed by Consultant based on traffic study in the area. Approach Roads will also be designed by Consultant. Design will be carried out as per Standards of NHA mentioned in detail in Chapter No.03 of TOR.



1.4 PROJECT OBJECTIVES:

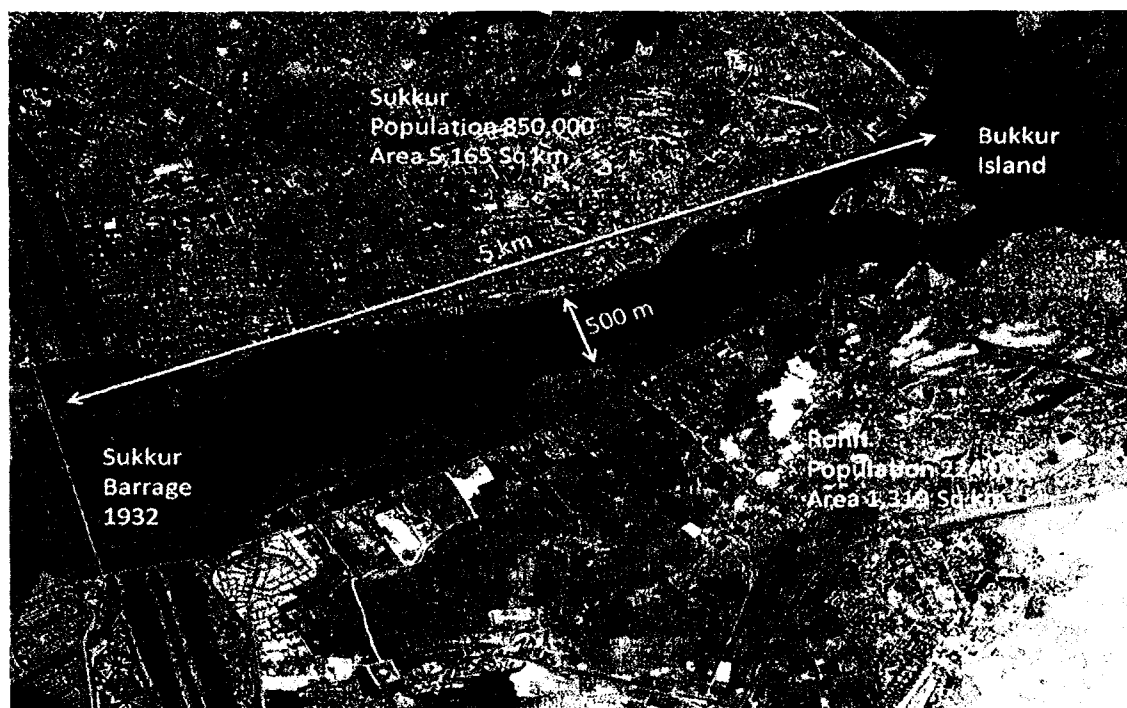
- To accommodate the needs of increased traffic on old bridge and to save the public from any unpleasant incident due to increase in traffic and age of bridge as well as to save old Lansdowne bridge as a national heritage.
- The planned bridge will largely contribute to the economic and social development of the area and state of art structure.
- It will bring more population into the stream of benefits, which in turn will change the social complexion of people around the facility.
- Apart from the usual economic benefits of saving in time, this proposed bridge will transform the entire pattern of transportation in the surrounding areas resulting in uplift of economic condition of local community.
- This proposed bridge will bring about further revolution in road transport and time saving journey for passengers. It will also contribute to ensure smooth and efficient movement of trade, goods and traffic.



CHAPTER NO. 2 DESCRIPTION OF PROJECT

2.1 LOCATION OF PROJECT:

The project is located in Sindh province and the proposed alignment for the new bridge is about 1.5 km downstream of existing Lansdowne Bridge where river Indus is at its narrowest regime; just 500m average in contrast to 15 km khadir in normal flow of run. However, the Consultants will submit the most suitable/feasible option for location of bridge and will get approval from NHA prior to proceeding to detailed design. Location Map of proposed bridge is attached below:



2.2 PROJECT WORKS:

The area upstream of proposed bridge is of historic importance due to presence of multi religion historical monuments like Temple, Gurdawara and Shrines. The construction of RCC Bridge and piling works at narrow section will create afflux on u/s which can endanger the population and important archeological sites such as Sadhu Bela, Tomb of Hazrat Khizer in island form and graves of 7 sisters on left bank. Therefore, it is proposed that bridge may be designed as *cable stayed bridge. Such structure reduces afflux to almost zero and no river training works are required.

The design consultants will carry out the detailed feasibility study for the proposed bridge with a comprehensive technical and financial analysis of feasible location of the bridge as well as feasible design/type of bridge including proposed option by NHA i.e. cable stayed bridge keeping in view the important features of the area.

*Proposed type of bridge is not final by NHA. Consultants will propose options for location and type of bridge and get approval from NHA.

This study will also focus on number of lanes in the light of detailed traffic study. The consultant will study complete area and suggest suitable design/type of bridge and will recommend the best economical option most suited to local conditions (All options will be presented to NHA and approval of location and type of bridge will be obtained).

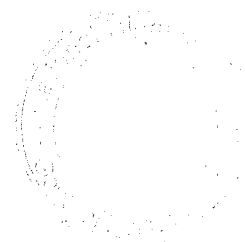
Recommendations of the Environmental Impact Assessment (EIA) study shall be incorporated in the design.

2.3 TIME OF START:

The services shall be commenced immediately after signing of the Contract Agreement by both the Parties.

2.4 TIME PERIOD:

The services specified in the TOR shall be completed and all relevant reports submitted in the form and format acceptable to the Client, within **four (04) months** from the date of Commencement.



CHAPTER NO. 3 SCOPE OF WORK

DETAILED SCOPE OF WORK COVERING DESIGN PARAMETERS:

The Scope of Work for the Present Terms of Reference comprises of following but not limited to:

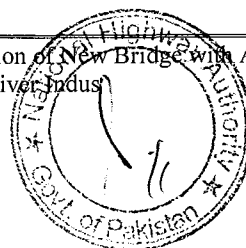
Stage I

- ◆ Comments on Terms of Reference at pre-proposal meeting
- ◆ Data Collection/Co-ordination with local Departments, including Irrigation Department.
- ◆ Desk study and Reconnaissance visit
- ◆ Alignment options and recommended alignment with type of bridge
- ◆ Satellite image of entire corridor with recommended option duly marked on it.
- ◆ Traffic survey and Axle load survey or collection of data from nearby weigh stations
- ◆ Presentation of bridge alignment along with conceptual plan of the bridge for approval from NHA
- ◆ Feasibility Study

Note: Stage II and Stage III will be undertaken after the approval of Stage I.

Stage II

- ◆ Detailed topographic survey.
- ◆ Detailed soil investigation survey on the proposed alignment
- ◆ Identification of quarry sites and construction material survey
- ◆ Geotechnical Investigation survey for bridges and structures
- ◆ Geometric Design of alignment
- ◆ Road furniture design including traffic signs and gantries
- ◆ Hydrology & Hydraulic Studies
- ◆ Hydraulic Model Study
- ◆ Structure Designs
- ◆ Horticulture and Landscaping of intersections
- ◆ Pavement Design with surface and subsurface drainage
- ◆ Provision of ducts/crossing of future utilities like OFC, pipelines etc
- ◆ Highway/Bridge Safety Audits by third party to be decided by NHA.



Stage - III

- ◆ Tender Documents, BOQ, Engineer's Estimate PC-1
- ◆ Stakeout of design alignment after approval for ground validation.
- ◆ Utility folders and Land acquisition plans using imageries, cadastral maps on GIS
- ◆ Fixation of ROW markers when required by the Client.
- ◆ Training of NHA Engineers in field and at Consultants' head-office premises.
- ◆ Preparation/revisions of PC-1

CORRECTNESS OF DESIGN & CO-ORDINATION ENGINEER

The Consultants is entrusted with the Scope of Work outlined above. It is required that the Consultants should undertake the job in a professional manner to the best of his ability and resources. NHA as Client may offer comments through in-house review.

Any comments offered by the Client do not absolve the Consultants from its obligation to develop correct and cost effective engineering solutions for the Projects. NHA reserves the right to take punitive actions as required at appropriate forum even during construction stage.

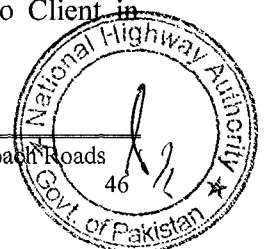
The Consultants is required to deploy a qualified co-ordination engineer for the first six months at the Project site. He will have an experience of 15 years. In case of any design ambiguities, he will liaison with the Design engineer for correcting deficiencies. His boarding and lodging shall be the responsibility of the Design Consultants. It is obligation of the Consultants to provide complete support to the Construction team even if its services are not hired for supervision of the project.

Task 1:	Data Collection & Co-ordination with local/Irrigation Departments
Approximate Duration:	10 days
Outcome:	Consultants get hold of relevant information, SOP Maps, Satellite imageries and liaison with local department/police

1.1 Data Collection & Co-ordination with local/ irrigation departments

Immediately after commencement of the Services, the Consultants will get procession of the relevant maps, reports and imageries for the detailed design of the Project. After the Completion of the design, SOP maps and imageries shall be returned back to the Client in Original and undamaged. In case any authorization is required by the concerned office for delivering the required information, same shall be provided by NHA in the form of Authority letter. The Consultants should inform the local police and administration before conducting all types of filed surveys. Before planning the field reconnaissance, the Consultants should co-ordinate meeting with the local city development / Highway Department to know any future plans for city expansion etc.

Construction of Bridge affects the free board of existing structures upstream (Due to afflux). Consultants shall coordinate with local irrigation office to get the required impact established in terms of raising, strengthening the marginal bunds (if any). Computation of costs to Client in deliberation with Irrigation shall be responsibility of the Consultants.



Task 2:	Reconnaissance Visit and Alignment Report
Approximate Duration:	20 days
Outcome:	Consultants shall submit an Alignment report as per requirements of the Model Study Report. Consultants should submit Inception Report Approval of alignment in presentation to the Client

2.1 Reconnaissance Visit with Identification of Alignment Alternatives

After the completion of the Task 1, the Consultants shall carry out the desk study of required alignment and bridge location, using maps and imageries. Same shall then be investigated in the field reconnaissance. The site visits shall be carried out by a senior highway engineer and Senior Structural Engineer of not less than 15 years of experience. Coordinated meetings with local departments shall be done and minutes recorded (same shall be made part of the Alignment report).

During the reconnaissance visit, particular requirements of project shall be identified that will be addressed in the detailed design. Other requirement of Task-2 is the submission of Inception Report. Inception Report should elaborate the methodologies for detail design for requirements spelled out in the TOR and observations made in the site visit.

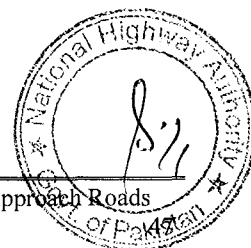
After submission of Alignment report and Inception report, the Consultants will give its presentation to the Competent Authority in NHA Auditorium for approval of alignment and Bridge type with merits and demerits.

In the reconnaissance visit, Consultants should record some Geographic Co-ordinates of physical features on ground using GPS (Dual Frequency high accuracy). It shall be used in geo-referencing/ortho-rectification of the satellite imageries.

At the reconnaissance stage social, economic and environmental aspects shall be considered. The resulting information will form part of the recommendations for adoption of a particular corridor.

Data from various sources shall be collected at this stage:

- ◆ Topographic Maps
- ◆ Geological reports available if any (from local departments, adjacent projects)
- ◆ Use of Satellite imagery
- ◆ Soil survey maps (Soil survey of Pakistan)



Task 3:	Detailed Topographic Survey
Approximate Duration:	45 days
Outcome:	Consultants will get approval of Topographic survey Program Submit survey Report Submit Draft and Final Topographic Plans

3.1 Detailed Topographic Survey (Pre-requisites)

Topographic survey forms the basis for the detailed design. Poor quality of survey work produces not only incorrect designs but also results in post construction problems with variations in cost and claims. It will be ensured by NHA that the Survey work is of top most order.

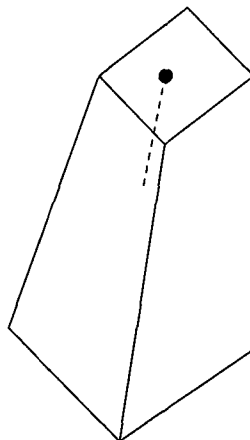
As per recent "Surveying & Mapping Act 2014" The Survey company must comply with the requirement of the Act. Copy of the Act is available on the Internet.

It is therefore recommended that Consultants should use the latest technology for the topographic surveys, which include at least four GNSS GPS for establishment of high accuracy control points. In case the Consultants do not have the requisite number of equipment, he is advised to hire services of professional survey companies having the required expertise. The GNSS shall be simultaneously used on permanent Bench Marks as well as BMs established for the Projects (Start and End).

Before mobilizing to site for Survey, the Consultants shall submit to the Client detailed topographic survey program with actual human resources *planned to be deployed*. The Consultants shall specify *the time line of survey program*. Total number of equipment with models and calibration certificates not more than 6 months old shall be produced. The name and qualifications of surveyors shall also be submitted. NHA reserves the right interview the surveyor if required. Upon request, the Consultants should change the surveyor. *If Consultants wants to outsource the Survey work, it will be mandatory to take prior approval of the Client*. NHA will ensure that the survey firm is not black listed and has sufficient resources and compliance of Surveying and Mapping ACT 2014.

3.1.1 Survey Monuments

The type and dimensions of Survey monuments to be installed at site is shown here. Besides start and at the end, it is required that these markers shall be fixed in the traverse line at an interval of about 1-2 Km with intermediate markers at 300 m interval. These



Permanent Ground Monument made of Concrete 1:4:8 with 75 mm steel nail embedded at center. Using spray paint and a stencil, the monument number shall be painted.

The size of monument shall be 150 mm square at top and 300 mm square at bottom. The height of monument shall be 900 mm. Out of which 750mm shall be buried in the ground.

shall be fixed at such locations that these are least susceptible to disturbance and damage. The Consultants shall fill out a Performa for each traverse station as attached in Annexure II. A GNSS Network to be established is shown in **Annexure-II**.

3.1.2 Control for Traverse

Projection: UTM or other with the approval of Client
Datum: WGS84
Vertical Datum: MSL

3.1.3 Horizontal Control Precise Primary Controls (ITRF CONTROLS)

Minimum four; one base and three reference GNSS stations network as stipulated shall be developed along the alignment. Minimum observation time shall be at least ten (10) hours for each of these points. Each station shall be referenced simultaneously with three stations. These points shall be validated/verified with International Fixed Stations in WGS84/ITRF reference frames for an average ambiguity resolution of 50% or better for a reliable network solution.

3.1.4 Primary Controls

GNSS Primary Controls shall be established at a maximum distance of 1-2 km as per network specified in annexure. Minimum observation time shall be at least two (8) hours for each of these points simultaneously.

3.1.5 Secondary Controls

DGPS Secondary Controls shall be established at a maximum distance of around 300 meters using rovers and lesser observation time. Minimum observation time shall be at least 45 minutes for each of these points.

3.1.6 Vertical Control

Vertical Control shall be established using MSL from first order SOP Bench Marks with double run leveling. Digital level with an accuracy of 0.3 mm or less and single section 2m/3m staff or invar staff with change plate on bottom shall be used. The maximum distance between the two successive reading points shall not be more than 50m. All horizontal control points are connected with monuments made for Horizontal primary and secondary controls with double run level to control the height as mentioned above.

3.1.7 Monuments for Horizontal and Vertical Controls

The monuments for controls shall be as per NHA specifications. The ITRF Controls, Primary Controls shall be tied with two permanent points as per NHA Specifications.

3.1.8 Topographic survey (scale 1:1000); including on ground features, buildings, Utilities and Crossing Roads

- a. Topographic Survey will be performed within the ROW Limits. At important control section, if the large-scale structures are proposed to be built on the sections, the survey range can be extended reasonably if necessary. Enough Spot Levels (points) shall be taken to create a topographic map in the scale of 1:1000.

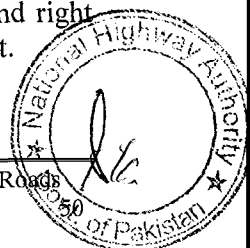


3.1.9 Centerline Points (stake) and Measurement of elevation of route stake

- a. The distance between the centerline points shall be 25m in general, in case of the pond the stake is fixed on the bank of the inclination and waterline.
- b. The distance between the stakes is 5m-8m on the section of roads which have retaining walls.
- c. The distance between the stakes is 10m on the interchange slip road whose radius is less than 60m.
- d. The distance between the stakes is 5m for the 10m before and after the chainage of the abutment for a total distance of 20m.
- e. Minimum three longitudinal sections (parallel to Alignment) including the center axis, the left and right edge lines of the bridge shall be measured. For the places where the topography is changed and bridge pier and abutment, more stakes shall be established.
- f. For the culverts, the chainage and elevation of the crossing point shall be measured; the longitudinal section of the water channel 50m upstream and downstream of the crossing point shall also be measured.
- g. The stakes are placed on the edges of the crossed roads. The stakes should be fixed on the crossing points. There is also a need to collect the coordinates, elevation, angle, width and road level of the crossing points (50m around the crossing point). The coordinates, elevation, and angle of left, middle and right lines of the important crossed roads should be collected (100m around the crossing point).
- h. The position of 10KV high-tension pole (tower) around the route within 100m, and the power line's lowest elevation on the crossing point
- i. The stake's elevation shall be measured one by one.
- j. It is necessary to establish more stakes in case there is any pipeline or building crossing the alignment; the height difference between the bottom elevation of such pipeline or building and the ground shall be measured

3.1.10 Cross section Points

- a. The cross section should be measured one by one.
- b. The cross section of the embankment should be measured at 25m interval for the straight line sections and curve sections with radius larger than 5000m. At curves having radius less than $R=5000$ m, the cross sections shall be measured at 20m interval.
- c. The cross section shall be measured to the ROW limit.
- d. For the alignment sections with proposed retaining wall, the cross section shall be measured at 5m interval.
- e. For the bridge pier, the measuring range of the cross section is 10m at both left and right sides of the center; for the bridge abutment, the measuring range is till the ROW limit.



3.1.11 Interchanges (1:1000) Map

Extraction of features shall be done & points shall be taken beyond the ROW of 100 m and inside the minimum Region defined for Interchanges to create 1:1000 map. The minimum length of existing road to be included in topographic survey (for interchange ramps merging) should not be less than 350 m.

3.1.12 Riverine Survey for Crossing Rivers - Long Bridge

Model study is required to be carried out at Nandipur Punjab Irrigation department. The Consultants shall formulate terms of reference of the Study. The riverine survey requirements about 10 Km up-stream or three river bents, and downstream upto the Barrage shall be surveyed for high bank to high bank.

3.1.13 Survey for Crossing Water Channels

Measure the center longitudinal section of the water Channel from 100m upstream to 50m downstream, and measure the cross section of the water channel at 10 m interval, which is perpendicular to their axis. Minimum 5 points shall be taken at each taken at each cross section to correctly depict the top and bottom of the sloping bank, width of bank and center of channel. The distance between the cross section points shall not be more than 5m for wider water channels.

3.1.14 Survey corridor

The detailed topographic survey in normal circumstances shall be carried out in a corridor of 100 m. At locations of crossing rivers the detail of survey extent is given in respective sections.

3.1.15 Mapping (Unit of Measurement)

Metric units shall be used throughout.

3.1.16 Scale

Besides soft copy, mapping of drawings shall be plotted to a scale of 1:1000.

3.1.17 Details to be shown

Buildings/Structures

1. The plinth line of all permanent buildings.
2. Construction type of building (whether brick (B), semi-concrete (SC), concrete (C), double storey (D) etc.).
3. Ruins or partially demolished buildings or foundations – by the wall and masonry visible at the time of the survey.
4. Names and type of usage of all buildings, schools etc.
5. Buildings under construction.

Roads, Tracks and Footpaths

1. Kerb line or edge of surfacing to carriageways, and along the edge line markings
2. Tracks
3. Pedestrian bridges and footpaths
4. Traffic islands (similar to kerb line)
5. Destination of road for junctions level
6. Bridges (over railway, river, etc)
7. Levels over railway line in case of at grade or grade separated crossings
8. In case of power transmission lines crossing alignment, level of electric wire with respect to survey control shall be recorded.

Industrial

1. Name and type of industry, Boundary wall and building structure inside
2. Tanks (indicate type of material stored e.g. fuel, gas, water, etc.)
3. Sewage disposal works details
4. Chimneys (substantial)

Road Furniture (In case of existing road)

1. km post (value to be noted)
2. Bus stop facilities
3. Traffic signal posts and controllers
5. Guardrails
6. Road signs

Boundary Features

1. Fences
2. Gates
3. Boundary stones located/used for fieldwork
4. Walls
5. Burial grounds
6. Historical areas

Railways

1. Gauge faces of railway running rails with elevations of rail top
2. Level crossings
3. Platforms
4. Bridges (over road, river, etc.)



5. Station building
6. Telegraph poles (indicate the reference numbers)

Survey

1. Survey Department Trigonometric Stations
2. Permanent Ground Markers (IP's, RM's, TBM's, etc)
3. Survey Department Benchmarks used (Indicate reference number and level)

Woods, Trees & Recreation Areas

1. Playing field
2. Land-use and vegetation, etc
3. In case of trees in the survey corridor, the surveyor has to assign a code defining the girth of the tree. Trees with varying girth as specified in the CSR for payment shall be in respective layers.

Slopes and Earthworks

1. Cutting and embankments with any protection work done
2. Terraced slopes
3. Borrow pits / Quarries
4. Retaining wall
5. Rock outcrops
6. Mining tips
7. Indicate date of survey if on-going earthworks is present and mark the affected area

Services and Utilities

1. Transformers (boundary fences only)
2. Electricity sub-stations and switch boxes (boundary fences only)
3. Pylon lines (indicate levels at lowest point at sag and at pylon towers)
4. Pylon bases
5. Pylon reference numbers and voltage of transmission
6. Radio, TV station masts or towers
7. Telecom poles
8. Electricity poles
9. Water mains pipes and stop valves (Indicate diameter of pipe)
10. Manholes (circular and square)



Water & Drainage

1. Lakes
2. Ponds or mining pools
3. Reservoirs
4. Rivers (name to be indicated)
5. Streams
6. Ditches (width to be indicated)
7. Canals
8. Wells (diameter or width to be indicated)
9. Swamps
10. Lined drains (width, depth and type to be indicate)
11. Water towers
12. Culverts
13. Waterfalls
14. Jetties (if any)
15. The top of banks of all water features over 1.0 meter wide shall be detailed and the bottom of banks as indicated by the water level at the time of the survey. The direction of flow of all river, streams and watercourses shall be indicated.
16. Slopes with height greater than 1.0 meter of too sharp gradient to be shown by contours, including river and stream banks are to be shown on conventional markings and the top and bottom of slopes are to be shown as dotted lines.
17. Slope conventions shall be drawn as near as possible to indicate the actual shape of the slope face, i.e., all berms and terraces shall be detailed.

Any other features not listed, which are requested by the Client shall also be shown

3.1.19 Bridge details

The bridge details shall be shown on a separate drawing for each bridge. The bridge observations in form of coordinates shall include the following:-

- a) The coordinates and levels of the four corners of the bridge (points shall be on the adjacent road surface), the two edges of the piers, abutment and wing walls.
- b) The coordinates and levels of the bridge deck to the intermediate piers (if any) of the bridge.
- c) The clearance details in case of adjacent railway bridges.
- d) Skew angle of the bridge from its centerline.
- e) Length, width and type of construction of bridge.
- f) The type and location of services adjacent to the bridge.



- g) The coordinates and levels of the centerline and the road on the bridge at approximate intervals of 5 m.
- h) The cross-sectional clearance envelope at the two sides of an overpass ridge (with respect to the road centerline passing underneath) showing all the relevant levels, offsets and skew angle.

Culvert details

Details of each culvert are to be shown on the survey plans and a separate sheet (annexure-c) tabulation of the following information is to be submitted with the plans:-

- a) Type of culvert and diameter.
- b) Chainage of culvert at the road centerline.
- c) Skew angle of the culvert from the centerline.
- d) Length of culvert from each side of the centerline.
- e) Invert levels of the inlet and outlet.
- f) A sketch of the inlet and outlet structures including all visible dimensions to a scale of 1:200.

For major culverts (dia.>2.0m) the outlet structures are to be properly measured enough points shall be recorded so that the culvert can be modeled in CAD.

In case alignment runs along the existing road, sufficient points should be taken across the existing road to fully define the cross-section. Below are **minimum** points shown for the existing road way cross-section. For the existing carriageway, the width of carriageway, inner and outer shoulders should be clearly identified and coded.

Existing Road/embankment



3.1.20 Details of junctions and existing roads

The Surveyor shall survey all junctions to enable the designer to design the junction properly. A corridor width of 70m and shall be taken for a distance of not less than 150 meters up and down the proposed intersection of the road or as required by the Client.

All paved roads, main roads and footpaths or tracks having the width greater than 2m shall have a minimum of two (2) points defining both edges of the carriageways. Consecutive points along the road feature shall not exceed 20m in rural areas and 10m in urban or built-up areas. More points are generally needed to define curved feature such as slip roads, islands, etc.

Levels of the road centerline shall be recorded for paved roads having widths greater than 6.0m. The main destination of the road from the junction shall be recorded by the Surveyor.

Where necessary to survey along an existing road, the Surveyor shall follow the marked changes along the centerline. In addition to the road edges consecutive points along the edges of the carriageway (i.e. along the edge line marking on both sides) shall be picked up and shall not exceed 10 m. More points are generally to define super-elevation changes at curve sections

3.2 Digital Ground Models (DGM)

The product of the filed survey data, after processing shall be DGM. The accuracy of DGM shall depend upon the accuracy of the digital data collected in the field. Before processing the data, it is important to run the data filtration. All data points with incorrect x, y or z values shall be removed. It is also important as well to properly identify the break lines like road, nullah edge with natural faults. Void areas like buildings shall also be marked. The topography shall be fully labeled for every object recorded.

All survey feature lines will herein be referred as 'strings'. The data shall be presented by the Surveyor in a form suitable for input to the software to be used for generation of DGM. Using the recorded data in x,y,z format on data logger, the ground surface over the required area shall be simulated by strings of coordinated information along characteristic lines on the terrain. The models shall consist of three dimensional (3D) contour strings.

The existing road surface over the required area shall be simulated by 3D strings of coordinated information along characteristic lines on the existing carriageway. Any other strings that do not affect the accuracy of the ground surface may be assigned a null level.

The Surveyor shall obtain prior approval from the Client for any strings that are to be digitized but that do not absolve the Surveyor from the subsequent accuracy and definition of the model.

TIN (Triangular irregular network) shall be developed by using software. Using TIN, Contour generation shall be done. Since the NHA uses Eagle Point for vetting, same shall be used by the Consultants.

3.3 Grid

The coordinates of the DGM shall be referred to the grid system as described in the Section 3.1.2. The coordinates of the DGM shall be in Easting, Northing and elevations.

3.4 String Labeling

The ground features including break lines shall be labeled with the exact description shown under AUTOCAD LAYER NAME. Any additional labels may be considered and the Surveyor shall submit the list for approval prior to their usage in the DGM.

3.5 Property Model

This model shall be stimulated by a series of 3D null level strings and text strings and includes the following:-

- a) Strings of land lots (null level strings)
- b) Land use and type (Text Strings)



Attributes to land type and use shall be appended to in the AutoCAD format. Such information shall be used by the Surveyor when preparing Land Utility folders at the end.

3.6 Contours

After digital data collection of survey points at site, the contour generation shall be done by using computer software. The interval shall be 1 m. The smoothness factor to be defined in the software should be such that it should not distort the ground contour representation. The contours should be well labeled.

During data collection, break lines on the ground should be very well picked that affects the contour generation.

If in the project, where steep slopes are likely to be encountered, the surveyor is required to use the laser equipped total stations that does not require and prism to record the co-ordinates.

Contours shall be shown by continuous lines with a thicker line for every fifth contour (Prominent Contour). Contour and spot heights shall be differentiated from other detail. The value of each contour shall be indicated along the contours at intervals not exceeding 200 mm and / or the edges of the Mapping area.

Where because of undergrowth, on-going earthworks, swampy areas, or other obstructions, the ground surface is obscured, or access is restricted, and provided the Client prior agreement is obtained, contour can be shown by broken lines to indicate that their accuracy cannot be guaranteed.

3.7 Longitudinal Profile and Cross-Section

The longitudinal profile plan shall be plotted in A1/A3 size (as requested by Client) to a scale of 1:1000 Horizontal and 1:100 Vertical with chainage interval of 25 m unless otherwise specified or instructed by the Client. The cross sectional plan of the existing road shall be plotted in A1 size to a scale of 1:200 both horizontal and vertical with 25 m interval. The plan shall show the chainage interval as specified and the existing ground profile and all the existing features.

3.8 Original Drawings & Preliminary Copies

Preliminary copies shall be submitted in the form of stable based paper. Every sheet of the drawings shall be marked as preliminary copy, until the final approved copy which shall be marked as "Final Tender Drawings". Each drawing shall be stamped and signed by the Designer.

3.9 Soft Submission of Data and Drawings

The Surveyor shall supply the digital ground model data, All Drawings, Reports suitable for input to the computer specification acceptable to Client. The data shall be supplied as specified below in order to preference:

The CD-R and hard copy shall be supplied with an index scheduling the contents and referencing and shall remain the property of the Client.

3.10 Field Books and Record

All field books and computer data must be properly kept and shall record truthfully all the survey



work carried out. The Surveyor shall do all workings in proper books, adequately in good style and according to best practice. All field books shall be done in ink. Unsatisfactory works and errors shall be struck off and there shall be no superimposed writing or erasure.

Client's Representative may check the field books now and then to ensure that a high standard of work is maintained. He may request the Surveyor to carry out some spot checks if he has reasonable doubt on the accuracy of the survey work. The Surveyor shall comply with such requests unless he can prove to the client's representative for his satisfaction that such checks are unnecessary.

All field books and computer data shall be certified by the qualified surveyor.

The Surveyor shall submit the required number of copies of Final Survey Report on completion of all survey works in a format as approved by the client. All photographs for all the copies shall be original copies and any diagrams or plans presented together with the report shall be in a clean and neat form and in scanned soft format.

3.11 Road Design Standards

Following design standards and Codes Shall be followed:

The project will be four lane divided carriageway with:

Carriageway Width	7.3 m (Two lanes each of 3.65 m) for approach roads
Bridge	4-lane (Each lane as per Carriageway Width Specifications)
Shoulder Width	Inner 1m (if applicable) for dual carriageway Outer 3 m- 2.5 m paved 0.5 m rounding
Cross fall normal	Carriageway 2% Shoulder 4%
Median	Varies as per requirement. Minimum NJ Barrier on Bridge
Maximum Super elevation	6%
Geometric Design Standards	"A Policy on Geometric Design of Highway & Streets 2003"
Classification of Highway	Suburban Highway
Design Speed	90 Kph
Design Vehicle	6- Axle Trailer (1.22+222)
Maximum Grade	3%
Minimum Grade	0.5% in cut and 0.3 % in fill
Drainage	Curb and Gutter and Chutes for controlled drainage

3.11.1 Other Design Parameters

S. No.	Design element	Unit	Standard
1.	Design speed	KPH	90
2.	Min. stopping sight distance	m	202-285
3.	Max rate of super elevation.	%	6
5.	Horizontal curvature		
	i) Absolute min. radius.	m	755
	ii) Radius above which no Super elevation is required	m	2200

S. No.	Design element	Unit	Standard
6.	Road formation width	m	23.3 minimum
10.	Max. grade	%	3
11	Min. grade.	In fill 0.3% In cut 0.5%	
12.	Rate of vertical curvature:		
	i) 'K' value for crest curves:		
	Stopping sight distance.	K/%A	102-202
	Passing sight distance.	K/%A	670
	ii) 'K' value for Sag curves:	K/%A	50-73
13.	(a) Fill Slopes:	H:V	2:1
	(b) Cut Slopes:		
	(i) 1.5 m-3.0 m cut	H:V	
	(iii) 0-1.5 m cut	H:V	
14.	Min. vertical clearance over road	m	5.2
15	Min. vertical clearance over railway line.	m	6.5
16.	Right of way.	m	80

Above standards are derived from "A Policy on Geometric Design of Highway & Streets 2003". Any Design element not mentioned above should conform to the same design guide for Rural Arterial standard.

3.11.2 Standards for Structures

Codes and Standards:

For analysis and design of structures following codes, standards and loads will be adopted.

- **AASHTO-(LRFD): - Current Edition**
For analysis and design for all loads and load combinations. All load factors have to be of AASHTO.
- **Pakistan Highway Code of practice for Bridges 1967: -**
For vehicular loads, their spacing
- **PBC: -**
For seismic zoning in addition to the revised seismic risk map of Pakistan.
- **ASTM & AASHTO:-**
For material specifications & testing
- **ACI: -**
For analysis, design and detailing, only in case such details are not specified in AASHTO.

Vehicles live load

West Pakistan Code of Practice for Highway Bridges 1967 (WPCHB) specifies more severe loads to be considered in combination with other loads such as dead load etc.
As follows:

- **Class AA loading:**

The 70-Ton tracked military vehicle to be placed in accordance with WPCHB to give maximum stresses.

- **Class A loading:**

The 54.5 Ton train of trailers (with different axle loads) to be placed in accordance with WPCHB to give maximum stresses.

- **Check Deck Slab for Punching Shear:**

The Compressive Strength of Deck Concrete should not be less than 4000 Psi and the thickness of Deck slab should not be less than 200 mm.

Other loads

- **Side walk live load**

A load of 5 KN/m² (100 psf) of walkway between side barrier/railing and shoulder, applied continuously or discontinuously over both lengths and width of structure in order to produce maximum stresses in the member under consideration.

- **Horizontal live load on railing/posts of side barrier**

These depend upon the configuration of the railing/posts/ barrier system. The position and the magnitude of the horizontal loads are taken according to Article 2.7 of AASHTO.

- **Impact load**

Impact loading on the bridge superstructure is taken in accordance with AASHTO.

- **Wind loads**

Wind loads are taken in accordance with the provision of AASHTO.

- **Seismic design**

Earthquake forces are calculated according to AASHTO, keeping in view the recent earthquake of October 8, 2005, the earth quake zones will be considered accordingly.

3.11.3 Existing Structures

Consultants shall carry out detailed inspection of existing structures and based on condition of the structure shall recommend retention of existing structures or replacement. Where existing structures are retained, design for widening/ extension of existing structures shall be carried out to commensurate with NHA standards for X-section of the road and structures. Condition Survey Report, along with two photographs of each existing structure will be submitted.

3.11.4. Roadside Design Standards

Roadside design pertains to the design of area between the outside shoulder edge and ROW limits. It involves safe design of features like embankment slopes, cut slopes, roadside clearances, roadside drainage slopes, design of road signs and luminaire with breakaway supports, roadside barriers and bridge railings etc. The AASHTO Road Side Design Guide Jan, 1996 shall be followed.

3.11.5. Structural Analysis of New Bridges

Structural Analysis shall preferably be performed using standard international software. All input files shall be provided in the design report.

Task 4:	Structural Analysis
Approximate Duration:	20 Days
Outcome:	Bridge Design Report

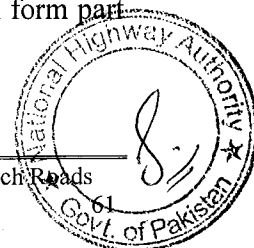
4.1 Structural Analysis of New Bridges

Structural Analysis shall preferably be performed using standard international software. All input files shall be provided in the design report.
Bridge Design Report:

- (i) Project-specific design criteria regarding serviceability and safety, applicability of the design standards regarding design loads and materials.
- (ii) Definitions and magnitude of loads such as: Wind, seismic, and vehicular loads
- (iii) Modeling and analysis assumption, such as geometry and boundary conditions, load case definitions, load combinations and force envelopes.
- (iv) Gravity, wind and seismic load paths
- (v) Design of foundation and soil-structure interaction modeling based on geotechnical data
- (vi) Deflections, movements and joint articulations
- (vii) Dynamic characteristics, and vibrations
- (viii) Undertaking Aerodynamic Stability Testing of Bridge like Wind Tunnel testing in case of Cable Stayed Bridges/Suspension Bridges.
- (ix) Design of all components of bridge, including main members of superstructure, cables, substructure, foundation their forces and their sizes, and their limit states for ultimate, fatigue and service.

River Training Works

Guide Banks, spurs and protection works as specified in the Model study report will be designed for high flood discharge and flow pattern determined by design calculations and hydraulic model study. Detail Drawings of the River training works will form part of Hydraulic Report and Tender Package.



Task 5:	Aerodynamic Testing (In case of long bridge)
Approximate Duration:	20 Days
Outcome:	Aerodynamic Testing Results & Report

5.1. Aerodynamic Stability in case of Large Span Bridges

The adequacy of the bridge structure to withstand the dynamic effects of wind, together with other coincident loadings, shall be verified in accordance with the appropriate parts of the applicable Code. Provision shall be made for wind tunnel testing to accurately simulate the wind effects for the following wind conditions:

Vortex-induced Oscillations: These are oscillations of limited amplitude excited by the periodic cross-wind forces arising from the shedding of vortices alternatively from the upper and lower surfaces of the bridge superstructure.

Turbulence response due to forces and moments developed by wind on bridge superstructure in frequency bands encompassing one or more natural frequencies of the structure.

Galloping and Stall Flutter – galloping instabilities arising on certain shapes of deck cross-section because of the characteristics of the variation of the wind drag, lift and pitching moments with angle of incidence or time; and

Classical flutter – this involves coupling (i.e. interaction) between the vertical bending and torsional oscillations

Task 6:	Traffic & Axle Load Survey
Approximate Duration:	20 Days
Outcome:	Classified Traffic Surveys after approval of Client. Submit Traffic & Axle load survey report

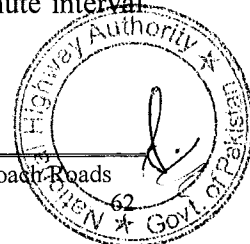
6.1 Traffic Count

Traffic count forms the basis for capacity analysis, pavement design and economic analysis etc. The Consultants is required to carry out classified traffic counts at required locations along the project and on the connected network to develop an understanding of traffic pattern. The study will also entail the estimation of diversion and generated traffic. The Consultants shall submit in Inception report, detailed program of traffic count along with locations, duration and repetitions. Same shall be exercised after the approval of the Client.

The classified traffic count shall include following classifications:

- | | |
|-------------------------|---|
| - Non motorized traffic | Animal drawn, bicycle |
| - Motorized traffic | M/cycle, Car/Pickup/Jeep, Minibus/wagon,
Bus, 2-Axle, 3- Axle, 4-Axle, 5-Axle, 6-Axle
Tractor trolley |

The traffic count shall be done with hourly classification. In peak hour, 15 minute interval count shall be done to ascertain PHF.



6.2 Journey Time

For with and without Project scenario, the journey time survey of various classes of vehicles in peak hours and off peak hours shall be done. It shall be used in economic analysis

6.3 Origin & Destination Survey

If required, the O&D Survey shall be carried out to identify the traffic like to be diverted to the Bypass.

6.4 Axle Load Survey

The Consultants shall undertake axle load survey using portable weighing machine. The Consultants shall confirm in its technical proposal the availability of such equipment (ownership / rental basis). Sufficient samples of all axle groups shall be weighed. In addition to axle load, tyre pressure shall also be measured. Data shall be annexed in the final report and used in the pavement design.

6.5 Underpass/Cattle Creep Survey

Using satellite imageries, field survey and site consultation, Consultants shall identify exact number & locations of the underpass/cattle creep survey to be provided for convenience of local residents.

6.6 Traffic Diversion Plans

Traffic Diversion Plans shall be provided for the following situations:

- a. At toll plazas
- b. At Intersections and interchanges
- c. In urban areas including methodology for separating the local and through traffic.
- d. On at-grade railway crossings.
- e. At places where underground construction like construction of box culverts and underpasses, proper traffic diversion plans shall be provided.
- f. At places where overhead bridge construction is likely to take place, proper traffic diversion plans shall be provided.

Consultants shall fully define the methodology for construction sequence, diverting traffic and maintaining the diversion roads.



Task 7:	Soil & Material Investigation Report
Approximate Duration:	45 Days
Outcome:	Soil and Material Investigation Report

7.1 Soil & Material Investigation

Soil & Material is shall be done to ascertain the index and engineering properties of soil & rock encountered. The Consultants is required to seek, interpret and evaluate subsurface and surface data in order to predict the behavior of the soils and materials along, and adjacent to, the alignment. The resulting information should be presented in a logical and intelligible manner so that it can be used correctly and efficiently by the non-specialist.

The Consultants is required to carry out following steps:

- ◆ Determine needs of the design
- ◆ Carry out complete ground investigations
- ◆ Carry out complete laboratory testing
- ◆ Evaluate results for final design

As per fixed horizontal and vertical alignment, identify the areas of deep cuts and high fills. Study precise geometry of the roadway structures and develop design requirements. Field investigations shall be carried out in three main areas.

- Investigation along the length of the proposed alignment and to determine the pavement support potential offered by the subgrade soils
- Investigation to determine the source and quantity of naturally-occurring construction materials
- Examine specific sites such as deep cuts, retaining walls and culverts etc.

Following table shows the guidelines for the quantity of roadway pits or borings and testing required for the Final Design Report. The values given are average investigation requirements for normal highway work and that actual scope will depend upon the complexity of the problem.

Roadway type	Height (m)	Terrain type	Spacing (m)	Depth (m)
Embankment	<2	Uniform	1000	1.0
		Rolling	500	
		Hilly	250	
	2-10	Uniform	500	1/3 of embankment of refusal
		Rolling	400	
		Hilly	200	
>10	Uniform	600	2/3 of embankment of refusal	
	Rolling	300		
	Hilly	150		
Cut	<2	Uniform	1000	1.0 below subgrade
		Rolling	500	
		Hilly	250	
		Uniform	800	1.0 below subgrade

	2-10	Rolling Hilly	400 200	1.0 below subgrade
	>10	Uniform Rolling Hilly	600 300 150	

Guidelines for testing requirements are given below:

Test	TEST REQUIREMENT		FREQUENCY	
	EMBANKMENT	SUBGRADE	ALIGNMENT	BORROW AREA
Gradation	•	•	1 per km	1 per boring/ pit
Moisture Content	•	•	1 per km	1 per boring/ pit
Classification	•	•	1 per km	1 per boring/ pit
Moisture Density	•	•	2 per 5 km	1 per borrow area
CBR	-	•	1 per 1 km	1 per borrow area

For testing of materials, following codes and standards shall be followed:

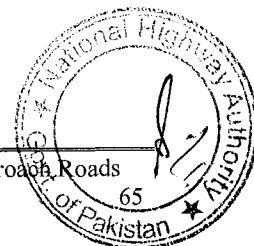
- a) ASTM - American Society for Testing & Materials.
- b) AASHTO - American Association of State Highway and Transportation Officials.

7.2 Material Investigation

Every effort should be made to locate sufficient quantities of naturally occurring construction materials at regular intervals along the alignment and as close to the alignment as possible. In case of potential quarry sites, test borings are likely to be necessary to confirm the quantity and quality of material available. Bulk samples for quality testing may be obtained from adjoining bedrock outcrops provided that the samples obtained from such sources are truly representative. Test results from any nearby operational quarries should also be included.

Considerable amount of water is likely to be required for the proper compaction of earthworks, and water points will be necessary at frequent intervals along the alignment. An assessment should be made of the likely sources of water from any existing wells and from the geological formations underlying the route. Samples for tests to assess the suitability of water for concrete will be necessary.

Following table shows guidelines for the testing requirements for aggregates and water.



Test	Test Requirement					
	Fine Aggregate		Coarse Aggregate			Water
	Asphalt Concrete	P.C. Concrete	Sub-base/Base	Asphalt Concrete	P.C. Concrete	
Gradation	•	•	•	•	•	
Atterberg Limits	•		•	•		
Sulphate Soundness	•	•	•	•	•	
Loss by Abrasion			•	•	•	
Organic Impurities		•				
Sand Equivalent		•	•	•		
Soluble Sulphates		•			•	
Soluble Chlorides		•			•	
Friable Particles		•	•	•	•	
Thin & Elongated Particles			•	•	•	
Fineness Modulus		•		•		
Water Quality						•
Marshall Test				•		
Stripping Test				•		

7.3 Soil Classification

Soil description is necessary for all test pits and boring logs. The descriptions should be standardized so that the main characteristics are given in the same order i.e. *Mass Characteristics* shall include field strength, moisture content, bedding state if applicable discontinuities and state of weathering. *Material Characteristics* shall cover Colour, Composition, and grading. Particle shape, soil name and soil group. Both Unified and AASHTO classification shall be used.

Task 8:	Environmental Impact Assessment
Approximate Duration:	120 Days
Outcome:	EIA Report submission and obtaining NOC from PEPA

8.1 EIA

As per Pakistan EIA Rules, Consultants is required to carry out the EIA Study for the Project. It involves collection of required data from site, formulation of Report, getting it reviewed from NHA EALS Section. Submission of EIA Report to EPA Punjab, addressing their requirements, to their entire satisfaction (Including submission fee). Conducting the Field hearing and obtaining NOC for NHA.

For EIA, Consultants shall directly coordinate with GM (EALS) office. The Consultancy fee against the EIA shall be verified and Processed by the office of GM (EALS).

Task 9:	Geotechnical Investigations for structures
Approximate Duration:	45 Days
Outcome:	Geotechnical Investigation Report

9.1 Geotechnical Investigation for Structures

The Consultants shall appoint, after the approval of the Client, a "Nominated Specialist Contractor" to perform geotechnical investigations including field and laboratory testing, for which a provisional sum of Rs. 3.5 million (maximum) has been kept, not less than (5x 60m for main bridge). After the formulation of exact scope of work for sub-surface investigations based on reconnaissance survey by the Consultants and subsequent approval of NHA, at least three **sealed** quotations from reputed Geo-tech firms shall be called by the Consultants and submitted to NHA for nomination of selected contractor, where after work shall commence on site based upon a formal agreement between the Consultants and contractor (including quantities, rates and work schedule). The Client would pay the fee for this work agreed between both parties directly to the nominated specialist contractor after certification of work by the concerned Deputy Director (Maintenance) NHA and invoiced by the Consultants. The Consultants will supervise the sub-soil investigation work to be carried out by Geotechnical Firm.

Sub-surface investigations consisting of boreholes / drill holes / test pits of required depth, supplemented by field and laboratory testing to accurately assess the engineering properties of the underlying soil strata for detailed design of foundations, substructures and roads shall be undertaken. A separate report will be prepared to this effect and will be submitted to NHA for approval. Original lab reports shall be attached in the soil report along with colored photographs.

Bore logs shall be included in the Soil Investigation Report along with the laboratory results. Testing of samples collected from site shall be carried out in a reputed laboratory, under strict quality control and adherence to relevant ASTM procedures / standards. Depth of boring shall be decided by the geological formation at site and the type of foundations proposed for the structures. Standard penetration tests shall be started from the ground surface and carried out in accordance with ASTM D1586 Penetration Test and Split Barrel sampling of soils. Where clayey



soils are encountered, undisturbed samples shall be obtained in accordance with ASTM thin-walled sampling of soils.

The site investigation to be undertaken shall consist of the following: -

- ◆ Deep Machine boring to a maximum depth of sixty (60) m below ground level and associated field-tests for River Bridge Piles and 30 m for other structures.
- ◆ Trial Pits to a maximum depth of 3 meters.
- ◆ Hand auger holes to a maximum depth of 7.5 meters.
- ◆ Separate BOQ shall be prepared by the Consultants with all required tests for deep boring. It is required to carry out grain size analysis at required scour depth.
- ◆ Submission of proper site investigation report comprising all relevant notes and pertinent information required by this Specification together with laboratory test results. The above scope of work may be varied or deleted depending on the findings as the investigation proceeds. All Sections in this Specification and the Bill of Quantities, which are related to work or materials that are not required, shall be deemed not to apply.

Task 10:	Pavement Design Report
Approximate Duration:	15 Days
Outcome:	Pavement Design Report

10.1 Pavement Design Report

After the traffic count and projections for designed life of 10 years are done, the soil investigations data is available; the pavement design shall be done. The Consultants shall get the basic design from AASHTO Pavement design guide-93, but final pavement design shall be done using empirical-mechanistic method. Asphalt Institute & Shell Model shall be used. Axle Load data and tyre pressure data collected under Para 7.1.3 shall be used. Kenlayer analysis software shall be used. Non-linear elastic approach shall be employed. All calculations shall be attached in the report.

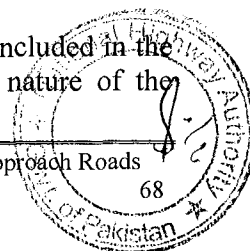
Flexible, Rigid and Composite Pavement shall be evaluated and cost comparison shall also be carried out.

Task 11:	Hydrologic Study
Approximate Duration:	25 Days
Outcome:	Hydrologic Report

12.1 Hydrology & Hydraulic Study

The hydrologic analysis performed on Project shall be compiled in a hydrologic report. The Report shall consist of two sections; a data section, where the hydrological background information shall be recorded. Other part shall be an analysis section, where the design computations shall be recorded.

The following items shall be used as a checklist of the data that shall be included in the hydrological report. The comprehensiveness of the report shall depend upon the nature of the



valley, or flood plain to be traversed, the cost of proposed drainage structures, and class of highway.

11.1.1 Hydrological Data

Data shall comprise of following items:

1. Topographic Maps

Maps are required to show the proposed highway alignment in relation to the drainage characteristics of the area being traversed. The available maps in this regard are Survey of Pakistan maps of 1:50000 scale. Proper catchment areas shall be marked for rivers & nullas. Same shall be made part of the reports.

2. Satellite Imagery

The satellite imagery shall be used for upstream and down stream to identify the land use and drainage characteristics. Photographs shall be taken for all crossings whose design flow exceeds 20 m³/s. Same shall be made part of the report. These photographs shall be of sufficient quality to enable the engineer to estimate channel roughness characteristics, nature & extent of vegetation cover, and land use. These pictures may be placed in the text or referenced in the text and compiled at the end of the Report.

3. Land Use

Using the topographic maps, satellite imagery and site visits, the engineer shall comment on the nature of the land use in the affected water sheds. Similarly engineer shall comment on the nature of vegetation and soil characteristics of the basins. Individual types of land use, vegetation, and soil classifications shall be indicated as percentages of basin area. The extent of anticipated changes within any of these areas shall also be indicated.

4. Water Use

Engineer shall comment on the use of the water within the affected drainage basins. If reservoirs are within the watersheds, the operational procedures of these reservoirs shall be described. Condition of bunds of reservoir if made by locals shall also be commented upon.

5. Rainfall Data

Rainfall data for the Project area, obtained from Meteorological department shall be made part of the report. The data shall consist of a brief description, the length of record, the accuracy, and the source (if other than Met department). Data collection shall be responsibility of the Consultants including paying any required fee from any source.

6. River Discharge Data

In case a major river is encountered, its maximum discharge shall be obtained from the relevant department. The Consultants has to confirm the maximum discharge. The Govt. of Sindh should be contacted for the collection of the Flood Data.

7. High Water Marks

Often high water marks can be used to estimate peak flows within a basin. Whenever possible the Engineer shall prepare a brief flood history. This statement shall include the dates of occurrence of the flooding and the elevations of high water marks. If possible photographs of such marks shall be included in the report.

11.1.2 Hydrologic Analysis

Hydrologic analysis shall comprise of following steps:

1. Drainage Area

This exercise is done usually on the topographic maps. A field inspection of drainage basins is highly desired. If available, DEM model with satellite imagery can be used to simulate the drainage pattern of the area. In the field inspection, hydrologist shall record manmade features, such as agriculture terraces and dikes, which will intercept all of the runoff from the drainage area. These may include roadway/railway embankments. Once the boundaries of the contributing areas have been established, they shall be delineated on a base map and the areas determined. This is commonly using a scanned map in CAD software.

2. Watershed Parameters

Drainage basin characteristics shall be determined in the field or from available maps. The list of parameters below is based on the information needed by the various models used in the hydrological analysis. Some parameters will be inserted directly into a particular formula and others will be used in comparing one watershed to another for use in transferring data.

- a. Basin Length
- b. Basin Slope
- c. Percent Impervious
- d. Infiltration
- e. Detention Depression Storage
- f. Drainage Basin Roughness coefficient
- g. Channel or conduit slope
- h. Channel or Conduit Cross-section
- i. Channel or Conduit Roughness

3. Flood Models

Listed below are several methods for use in estimating peak runoff from drainage areas.

- j. Rational Equation: To be used for areas less than 50 ha
- k. Gumbel Distribution: Areas greater than 100 ha with gauging station data at the site

- l. Indirect Estimates: Areas greater than 100 ha with gauging station data from neighboring watersheds.
- m. Regression Equation: Areas greater than 100 ha with rainfall data.
Whether on of above methods or any other method is chosen to estimate the watershed runoff, the Engineer shall include in the hydrology report a copy of sample computation and any reference used.

The recurrence intervals for use with hydrologic computation shall be as follows:

Expressway	100 years (1 percent)
Arterials	50 years (2 percent)
Collectors	50 years (2 percent)

4. Rainfall Intensity

The rainfall intensity value used in the Rational Equation is based on the amount of rainfall that occurs, the time it takes for that rainfall to occur, and the recurrence interval associated with each design class. Statistical approach shall be used to develop IDF curves. Detailed calculations and IDF curves shall be made part of the Report.

Task 12:	Stakeout of Design Alignment
Approximate Duration:	20 Days
Outcome:	Approval from Central Design Cell

12.1 Stake of Alignment on Ground

After the Design drawings are approved, the Consultants shall be asked to stake the alignment on ground. The Centreline markers shall be fixed on ground at 25 m interval. A 1.5m long “Bamboo stick” with orange colour cloth 1m x 0.5 m shall be fixed at each point. The alignment including river training works shall be shown to the NHA CDC, HQ. Hydraulic Expert shall approve the Bridge placement, while Client Representative shall verify Road alignment on ground.

Task 13:	Land Acquisition & Utility Folders
Approximate Duration:	20 Days
Outcome:	Land Acquisition & Utility Folders

12.1.1 Land Acquisition And Utility Infrastructure Report

The Consultants shall identify land and property falling in the right of way (ROW) to be acquired, if available. The Consultants shall submit ROW plans showing the alignment with 5 copies thereof to NHA to facilitate timely action for acquisition of land to define the right of way. ROW permanent markers shall be set up by the Consultants, upon request. The Consultants shall also prepare estimate for acquiring any additional and removal of structures and utilities, particularly in the built up areas. Folders shall be submitted in soft format in CAD with reference to grid coordinates.

Task 14:	Construction Machinery Report
Approximate Duration:	20 Days
Outcome:	Construction Machinery Report

14.1 Construction Machinery Report

A detailed report on construction resource shall be prepared. It will include, based on the construction duration, the amount and type of construction machinery required. Based on the Construction plan developed in Primavera/Microsoft Project, the resource allocation/ the Cash flow required shall be stated. Computations and assumptions for productions shall be attached in the report. The cost of any equipment required to be imported shall be reflected in the foreign currency portions of the cost estimates and PC-I.

Task 15:	Formulation of PC-I
Approximate Duration:	10 Days
Outcome:	Submission of PC-I

15.1 Formulation of PC-I

The Consultants shall update and improve the PC-I for the project road sections including economic analysis on prescribed Performa of PC-I by Planning Commission.

Separate PC-I for land acquisition shall be prepared and submitted.

Task 16:	Tender Documents
Approximate Duration:	20 Days
Outcome:	Submission of Tender Documents

16.1 Tender Documents

TENDER DOCUMENTS

Tender Documents shall comprise of the following:-

- a. Volume-I
 - Instructions to Bidders.
 - Conditions of Contract (Part-I) (General Conditions)
 - Conditions of Contract (Part-II), (Conditions of Particular Application).
 - Conditions of Contract (Part-III), (Supplementary Conditions)
 - Forms and Appendices
- b. Volume-II
 - General Specifications.



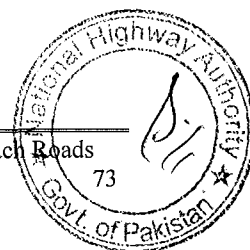
c. **Volume-III**

- Particular Specifications, Special Provisions and Bills of Quantities.

d. **Volume-IV**

- Drawings as per the following detail:
- Title Sheet
- Sheet Index
- Key & Location Plan with Co-ordinates and alignment with stationing. Pits of soil investigations shall also be marked.
- Sheet of Legends & Symbols
- Traverse, Bench Mark and Design alignment data including curve data
- Typical Cross-Sections with locations of applications
- Super-elevation details and Linear Plan
- Road Furniture Details (Guard rails, Pavement Markings & Traffic signs etc)
- For Road furniture, location tables
- Retaining walls with location tables
- Soil investigation linear plan
- Intersection Details
- Drainage plan for surface runoff and urban areas
- Mass Haul Diagram
- Plan and Profile Drawings
- General Notes for Structural Drawings
- Drawings for Small drainage structures
- Drawings for Large structures
- Drawings earth retaining structures
- Landscaping details
- Miscellaneous Details/ Ancillary Works including training works.
- Detail drawing folders of Utilities/Infrastructure for Land Acquisition and removal of all utilities/ infrastructure etc., having all the requisite information.
- Drawings related to Environmental Mitigation Measures
- Detailed design calculations for all the relevant structures (Excel sheets, models, hard copies)

NHA has standardised Volume-I (Part-I) and Volume-II. Consultants shall study and adopt these documents after careful scrutiny and modification whereas required.



e. **Contract Conditions (Legal Part)**

NHA has prepared Standard Tender Documents sections on instructions to Bidders. Conditions of Contract, Bid Forms etc. and has used them for similar project in the past. Consultants shall study these standardised contract conditions and amend them in accordance with the requirements of this project. The Special Conditions of Contract can be added pertaining to the project as supplement to the General Conditions of Contract.

f. **Technical Specifications**

The Consultants shall study the NHA Specifications and prepare particular specification for the project for specified items not covered in the General Specifications.

g. **Bill of Quantities**

Consultants shall prepare comprehensive Bill of Quantities to be calculated to accuracy of $\pm 5\%$ encompassing all the items of work, properly cross referenced to the Technical Specifications. Standard format of Bill of Quantities shall be adopted.

h. **Construction Drawings**

The Consultants shall prepare construction drawings (Contract Plans) in a clear, concise and uniform manner in Digital Format using AutoCad. The drawings shall be A1/A3 size. Scale for horizontal alignment shall be 1:1000 and for vertical shall be 1:100. All drawings shall be signed in original. For draft submissions, the Consultants shall stamp on every page Draft 1,2, until final submission is made. On final submission, the stamp "Final Tender Drawings" shall be printed on every page with signatures. At the end of drawings a jacket containing CD shall be placed, in which the soft copy of drawings with all drawings in AutoCAD format. For every drawing shall be made ready in layout mode. Not fulfilling these requirements will result in returning of drawings as un-acceptable.

j. **Engineer's Estimate**

Consultants shall prepare the Engineer's Estimate of the project based on the detailed design, drawings and final Bill of Quantities, using NHA Schedule of Rates (2014). For items not specified in NHA CSR, rate analysis shall be provided based upon market price.

Note: Consultants is required to provide all the submissions with each and every paper properly signed and stamped.

16.4 **Final Presentation**

Consultants at the end of design shall make a final presentation with following details. At the end of Presentation, on box containing all documents and drawings shall be handed over for record section.

Important Features of Presentation:

- 1) Consultants will describe the selected road alignment, merits, demerits, land acquisition and other impediments (if any).
- 2) Consultants will highlight important components of project like major bridges, flyovers, interchanges etc.
- 3) Important parameters of sub-soil investigation like CBR, Pile Capacity and General Soil Classification etc.
- 4) Consultants will also highlight the environmental impact of the road construction on the road influence areas.
- 5) Important hydraulic parameters used in the design of bridges over rivers/ canals.
- 6) Results of traffic study and axle load survey.
- 7) Location of quarry sites
- 8) Consultants shall clearly explain the traffic management plans.
- 9) Complete description of design criteria and functional requirements.
- 10) Description of specialised equipment and machinery required for the construction.
- 11) Description of methodology/ codes for pavement and structural design including details of computer models.
- 12) For Structural Design, Summary of results of computer output (especially maximum and minimum forces for all elements) in tabulated form shall be presented.
- 13) A plan showing major quarry sites/ borrow area sites including mass diagram showing cut and full along the finally selected alignment shall be presented.

Any other points, which the Consultants may like to highlight, should be included.

16.4 Submission of Documents

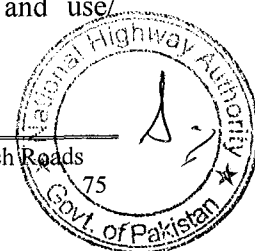
All the Reports associated with each Task shall be submitted as stated in respective sections. **In the technical proposal, consultants shall develop a Work programme Task wise with submission dates. Failing to provide the same, the proposal shall not be evaluated.**

All documents/ drawings shall be subject to review and checking by NHA's Experts. Consultants will incorporate any comments/ modifications made by the Experts (if agreed, The Responsibility for correctness of design lies with the Consultants).

Consultants will provide two additional sets of the tender documents and reports to the Client at a later stage at no extra cost to the Client. Additional number of sets (if required) shall be provided at a cost of Rs.5,000/- per set.

16.4 Provision Of Data On Compact Discs

The Consultants shall submit complete set of documents and drawings listed above on three (03) digital CD-ROMs. Files (Word, Excel, AutoCad, Graphical Images, Photographs, Software Models etc.) shall be properly indexed/ catalogued for record purposes and use/ reproduction at a later stage by NHA.



16.5 Performance of the Consultants

The Consultants shall attend the pre-bid meeting and his performance with reference to the queries of the contractors shall be evaluated and recorded by GM (P&CA) & GM (Design).

- a. During the construction phase, the design review shall finally reveal the performance status recorded by the Design Section.
- b. Finally the performance of the Consultants shall be evaluated based on the performance status recorded by the Design Section.

The performance rating shall be made in the following manner:-

- | | |
|------------|-----------------------|
| i. • A+ | Excellent |
| ii. • A | Good |
| iii. • B | Requiring improvement |
| iv. • Poor | Poor |
- c. "B" performance rating without subsequent improvement shall drop the Consultants performance to the stage "Poor". If "Poor" persists in two consecutive stages, the Design section shall propose penalty and P&CA shall implement the recommendation in the light of legality of the matter.

Mode of Payment:

“A” is the Contract amount, excluding the Provisional Sums

S.No	Activity	Percentage of “A”
1.	Task 1 & 2	10%
2.	Task 3	10%
3.	Task 4	10%
4.	Task 5	Provisional Sum
5.	Task 6	10%
6.	Task 7	5%
7.	Task 8	10%
8.	Task 9	Provisional Sum
9.	Task 10	5%
10.	Task 11	5%
11.	Task 12	5%
12.	Task 13	5%
13.	Task 14	5%
14.	Task 15	5%
15.	Task 16	15%

Upon submission of Reports, 50% payment shall be released if the report is acceptable to the client. Remaining shall be released upon acceptable quality is ensured. Upon initial submission, a checklist correlating to TOR requirement shall be attached and checked for requirement spelled out.

Final payment shall not be cleared until formality of Clause 16.4 is ensured and Consultants gives an undertaking that all drawings in editable format and reports in word and excel format is submitted.



Annexure-I**DELIVERABLES (Breakdown)**

All the Reports associated with each Task shall be submitted as stated in respective sections. In the technical proposal, Consultants shall develop a Work Program Task wise with submission dates. Failing to provide the same, the proposal shall not be evaluated. However list of documents to be submitted by the Consultants is hereunder:

STAGE-I (FEASIBILITY STAGE):

- | | | |
|-------|---|-----------------------|
| (i) | Inception Report | 03 Hard+ 01soft copy |
| (ii) | Various options of alignment | 03Hard +01 soft copy |
| (iii) | Recommended alignment. | |
| (iv) | Satellite image of entire corridor with recommended Option
duly marked on it | |
| (v) | Presentation of recommended alignment with merits and
demerits for approval by NHA | |
| (vi) | Draft Feasibility Report | 03 Hard+ 01soft copy |
| (vii) | Final Feasibility Report | 15 Hard + 01soft copy |

Note: Stage II and Stage III will be undertaken after the approval of Stage I. The soft copy will also be submitted in the format compatible with document i.e. Word, Excel, CAD, etc. One copy in PDF must be provided along with.

STAGE-II (DETAILED DESIGN):

- | | | |
|--------|---|--------------------------|
| (i) | Topographic Survey Report | (04) Hard + 01 Soft copy |
| (ii) | Materials Report including Geotechnical Investigations
report of bridges | (04) Hard + 01 Soft copy |
| (iii) | Hydraulic and Hydrology Report | (04) Hard + 01 Soft copy |
| (iv) | Pavement Design Report | (04) Hard + 01 Soft copy |
| (v) | Aerodynamic Testing Report (In case of long Bridge) | (04) Hard + 01 Soft copy |
| (v) | Preliminary Structural Design Report and Drawings | (04) Hard + 01 Soft copy |
| (vi) | Highway Safety Audit Report | (04) Hard + 01 Soft copy |
| (vii) | Land Acquisition &Utility Folders | (04) Hard + 01 Soft copy |
| (viii) | ROW Plans showing the alignment and total area to be
acquired | (03) Hard + 01 soft copy |
| (ix) | Construction Machinery Report | (03) Hard + 01 soft copy |
| (x) | Report on remedial measures of landslides /scouring | (03) Hard + 01 soft copy |

STAGE-III

(i)	Final Design Report(including drawings & detailed Structural/Pavement calculations)	10 Hard + 01 Soft copy
(ii)	Traffic Management Plans	10 Hard + 01 Soft copy
(iii)	Tender Documents (Volume I-IV) ,(Volume I~III : PDF file & Volume IV : PDF + CAD file)	15 Hard + 01 Soft copy
(iv)	Engineer's Estimate	15 Hard + 01 Soft copy
(v)	BOQ Quantity Breakdown Calculation Report	01 Hard + 01 soft copy
(vi)	PC-I Performa	80 Hard + 01 Soft copy
(vii)	C-factor along with back up calculations	05 Hard + 01 soft copy

Note: In addition, the Consultants should perform following actions and incorporate in their submissions:-

- i. Alignments (All possible options) marked on SOP sheets should be submitted at the outset of the project along with Inception Report.
- ii. Consultants will get approval of location/concept of Bridges from NHA Design Section before embarking on detailed structural designs.

All documents/ drawings shall be subject to review and checking by Design Review consultants. Consultants will incorporate any comments/ modifications made by the Design Review consultants (if agreed, the responsibility for correctness of design lies with the Consultants).

Consultants will provide two additional sets of the tender documents and reports to the Client at a later stage at no extra cost to the Client. Additional number of sets (if required) shall be provided at a cost of Rs. 5,000/- per set.

PROVISION OF DATA ON COMPACT DISCS:

The Consultants shall submit complete set of documents and drawings listed above on three (03) digital CD-ROMs. Files (Word, Excel, AutoCAD, Graphical Images, and Photographs etc.) shall be properly indexed/ cataloged for record purposes and use/ reproduction at a later stage by NHA.



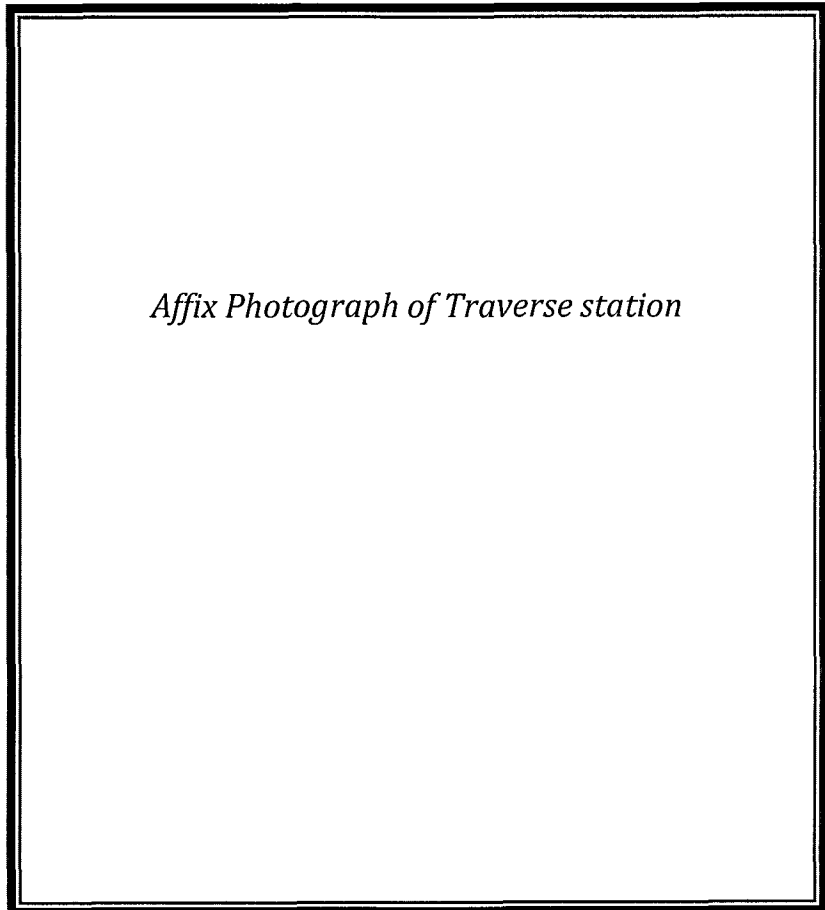
INFORMATION FOR FIXED TRAVERSE STATIONS

Name of Traverse Stations: _____

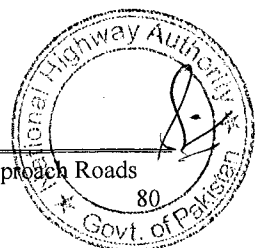
Northing: _____

Easting: _____

Elevation: _____



Sketch of the fixed traverse stations with reference to permanent features



Annexure-III

S.No.	Position	Man	Months	Total Man months
KEY PERSONNEL				
Expatriate Personnel				
1.	Sr. Bridge Design Engineer / Team Leader	1	4	4
National Personnel				
1.	Structure Engineer	1	4	4
2.	Hydrology/ Drainage Engineer	1	2	2
3.	Traffic/Highway Engineer	1	1	1
4.	Environment Specialist	1	3	3
5.	Geo-Technical/Material Engineer	1	2	2
6.	Quantity Surveyor	1	1	1
7.	Chief Surveyor	1	4	4
8.	GIS Specialist	1	1	1
NON KEY STAFF				
1.	CAD Operator	2	2	4
2.	Computer Operators	2	4	8
3.	Surveyors	3	1	3
4.	Survey Helpers	5	1	5
5.	Office Assistants	2	4	8



CHAPTER NO. 5

ENVIRONMENTAL IMPACT ASSESSMENT OF ROADS/HIGHWAYS PROJECTS

1. Need For Environmental Impact Assessment (EIA):

Highway projects are generally undertaken to improve the economic and social welfare of the people. At the same time, they may also create an adverse impact on the surrounding environment. People and property in the direct path of the road works are affected. The environmental and social impact of highway projects include damage to sensitive ecosystems, soil erosion, changes to drainage pattern and thereby groundwater, interference with animal and plant life, loss of productive agricultural lands, resettlement of people, disruption of local economic activities, demographic changes, accelerated urbanization and increase in air pollution. Highway development and operation should, therefore, be planned with careful consideration of the environmental impact. To minimize these adverse effects that may be created by highway development projects, the techniques of EIA become necessary. Identification and assessment of potential environmental impact should be an integral part of the project cycle it should commence early in the planning process to enable a full consideration of alternatives and to avoid later delays and complications.

2. In view of the above, an EIA will be carried out for the Environmental aspects of all stages of the projects i.e. preconstruction, construction and post construction with the following objectives:

- Establishing the environmental baseline in the study area and identifying any significant environmental issue;
- Assessing these impacts and providing for the requisite avoidance, mitigation and compensation measures;
- Integrating the identified environmental issues in the project planning and design;
- Developing appropriate management plans for implementing, monitoring and reporting of the environmental mitigation and enhancement measures suggested;

The EIA studies and reporting requirements to be undertaken this TOR must conform to the guidelines and regulations issued by the Pakistan Environmental Protection Agency (Pak EPA), Ministry of Environment, Govt. of Pakistan (GOP) which comprise mainly of the Pakistan Environmental Protection Act 1997, its implementing regulations, the EIA Guidelines and Review of IEE and EIA Regulations, 2000. These guidelines include the amendments and subsequent rules for the IEE and EIA of projects.

- i) **Regulations and Standards.** Describe the pertinent legislation, regulations and standards, and environmental policies that are relevant and applicable to the proposed project, and identify the appropriate authority jurisdictions that will specifically apply to the project.
- ii) **Project Introduction.** The Consultants should categorize the project (category A or B and IEE or EIA) but may not be limited to the general information, rationale of the project, description of the project, and any revised alignment.
- iii) **Project Description.** The Consultants should provide a brief history of the project, a detailed location and maps with scales (km) of the projects with any alignment

(starting point to end point). In the project description the Consultants should also highlight but not limited to bridges information, project components, scope and schedule of operation and construction, construction camps, and construction materials.

- iv) **Description of Environment.** Assemble, evaluate and present baseline data on the relevant environmental characteristics of the project area. In addition to general information, the Consultants should provide methodology for preparing the essential environmental data. The data should emphasize but may not be limited to the information about Physical Environment which could include, meteorology and climate, geology and soil, seismology, air and water quality, noise, topography and drainage patterns, hydrology and/or hydraulic regime, surface and ground water and land use. Ecological Resources should discuss about forests/flora/vegetation profile, crop and horticulture activities, and fauna/wild life and local livestock species (should specify mammals, birds, fish, reptiles and insects), protected and/or endangered wildlife species. Social and Cultural Resources may discuss about the methodology of surveys, settlement pattern, political and administrative setup, population and communities, socioeconomic conditions, protective and sensitive areas, archaeological and cultural sites, health and facilities, educational facilities, industrial/commercial activities, physical and cultural heritage, utilities, railway links or alignment, tourism facilities and potentials and others. Availability of Resources for Construction should also highlight about borrow soils, construction material, water and power availability and any other resources. Hazard vulnerability-identify vulnerability of area to flooding, hurricanes, storm surge, and earthquakes. Characterize the extent and quality of the available data, indicating significant information, deficiencies and any uncertainties associated with the prediction of impacts.
- v) **Environmental Impacts and Mitigation Measures.** Identify any negative positive, direct, indirect, short term and long term impacts of the project, during pre-construction/design, construction and operation phases. Identify any information gaps and evaluate their importance for decision-making. The Consultants must recommend appropriate mitigation and rehabilitation measures for the environmental damage and other impacts identified for specific road corridors, and how they would be implemented with regards to: coordination between highway design and environmental issues, ambient air, water and noise quality, water resources, drainage, mineral resources, flora and fauna, social and cultural environment, historical sites. The Consultants should attempt to identify creative measures that would also have positive social implications, such as participatory tree planting that would also serve as job creation for affected communities. Consultants should identify biological environment, and must discuss about national parks, game reserves and endangered species. Consultants should also identify the impacts and mitigation measures for topography, social / cultural issues, land acquisition and resettlement, community development, borrow open pits, waste disposal, geology and soil, surface and ground water, hydrologic regime, traffic flow, wastage of fertile humus layer, utilities issue and poverty alleviation etc.

However, report should not be limited to the above mentioned constituents of the environmental impacts and their mitigation measures. The consultants should be more creative according to the specified project alignment. It should also include maps, figures and photographs when necessary.

In order to assess environmental impacts and recommend various mitigation measures to minimize the environmental impacts, identify and develop data.

vi) Development of Environmental Data. Identify EPA NEQS and guidelines and analyze following parameters to develop base line environmental data of the project:

- Ambient air quality.
- Noise levels.
- Water.
- Biological environment.
- Socio economic profiles,

i) AMBIENT AIR QUALITY:

Consultants should monitor the ambient air quality along the selected road site.

The parameters need to be monitored include Ozone (O₃) Carbon monoxide (CO) Sulphur dioxide (SO₂), Nitrogen dioxide (NO₂), and particulate matter (PM₁₀). Acceptable standard analysis methodology should be selected to measure the NEQS parameters.

Air quality data will be collected over a 24-hour period at all the sampling points (a reasonable number of sampling and their analysis should depend upon the road length and other environmental factors which should provide a reasonable image of air quality).

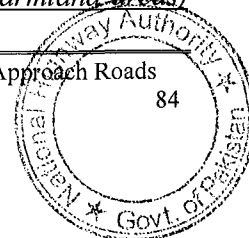
High pollutant concentrations spots should be selected for sampling to assess 'worst-case' scenarios, and measurements will be made in areas with extensive ribbon development and schools/hospitals where traffic will be expected to be a little heavier.

ii) NOISE LEVELS:

Roadside noise level measurements should be taken at a distance of ~ 6 m from the edge of the highway (corresponding roughly to 7.5 m from source vehicles). The noise parameter should be measured for 24 hours at various locations of the specified site. The permissible limit of noise is 85 dBA prescribed by the NEQS for motor vehicles. The NEQS do not prescribe a noise level limit for receptors. (a reasonable number of sampling and their analysis should depend upon the road length and other environmental factors which should provide a reasonable image of noise pollution).

iii) WATER QUALITY:

During field investigations, water samples from various sources in the vicinity of the proposed sections should be analyzed for important parameters with respect to human consumption. Although, NEQS include 32 water criteria pollutants for effluents and 16 NEQS for gaseous emissions, NHA prefer and recommend basic water quality analysis which may include but not limited to pH, turbidity, alkalinity, TDS, TSS, 5 day BOD at 20°C, COD, OD, total hardness, chloride, sodium nitrates, lead, mercury, arsenic, cadmium, total toxic metals, phenolic compounds as phenols, pesticides / herbicides / fungicides (in farmland areas)



and E-coli. (a reasonable number of sampling and their analysis should depend upon the road length, other environmental factors which should provide a reasonable representation of water quality).

Consultants **must identify** standard and recognized laboratories. Consultants should also provide Analytical Laboratory Reports along with methodologies and analytical techniques used for each parameter. The analysis reports must include information, address and contact persons of analytical laboratories.

- vii) **Analysis of Alternatives.** Describe the alternatives examined for the proposed project that would achieve the same objective including the "no change in alignment". Distinguish the most environmentally friendly alternatives. In case of minor impacts, which can be successfully mitigated within the ROW and without change in alignment, there will be no need for the analysis of alternative. In all other cases, and especially in the case of major or critical issues, a systematic comparison will be undertaken of the proposed design, site technology and operational alternatives in terms of:

Their potential environmental and social impacts;
 Capital and recurrent costs;
 Suitability under local conditions; and
 Institutional, training and monitoring requirements.

For each alternative, the environmental cost and benefits should be quantified to the possible extent, and economic values should be attached where feasible. The basis for the selection of alternative proposal for the project design must be stated.

- viii) **Public Consultation, Involvement and Disclosure.** During the field surveys the Consultants will organize workshops and formal public consultation sessions at province level to identify main stakeholder, their categories, their views on the existing condition of the project, volume of traffic concern's stemming from the impact of improvement works, as well as safety related issues. If possible, Consultants will assist in inter-agency coordination, and public/NGO participation.

- ix) **Environmental Management Plan (EMP).** Identify and prepare EMP including an implementation schedule and supervision program with associated costs and contracting procedures for the execution of environmental mitigation and social issues for pre-construction, design, construction and implementation phases. The Consultants should describe the objectives of EMP and key environmental and social components, role of functionaries, and road safety. The key components of EMP should emphasize but not limited to:

alignment and shoulder width options, road side safety, structural recommendations, topography, geology and soil, seismic activities, flood hazards, camp sites, borrow pits, archaeological sites, land acquisition and resettlement, local communities their social and cultural heritage, archaeological sites, waste disposal, air and water quality including ground and surface water, noise, flora including roadside vegetation cutting and plantation, fauna including wildlife, endangered species and their protection, traffic management, utilities, use of fertile humus soil recommendation of environmental protection sign boards, and health risk of workers. EMP should identify the training and workshops programs.

- x) **Environmental Monitoring Plan.** Identify the critical issues requiring monitoring to ensure compliance to mitigation and environmental management plans and to measure and monitor the environmental impacts during construction and operation. The objectives of the plan are to monitor the actual impact of the works on the project corridor's physical, biological and socio-economic receptors within the corridor. This will indicate the adequacy of the EIA. The monitoring plan should recommend mitigation measures for any unexpected impact or where the impact level exceeds the limits. The plan should ensure compliance with legal and community obligations including safety on construction sites. Consultants should monitor the rehabilitation of borrow areas and the restoration construction campsites according to EMP report. The monitoring plan should ensure the safe disposal of excess construction materials. Consultants should also evaluate the effectiveness of the mitigation measures proposed in the EMP and recommend improvements if necessary. Apart from regular compliance checks the Consultants should generate a tabular matrix for air, water and noise analysis, asphalt plant emissions, soil erosion and contamination, plantation, safety and traffic rules compliance for construction and operation phases.

Environmental Monitoring Plan will list the procedure through which mitigation measures proposed in EIA will be implemented. It will also include environmental parameter need monitoring, frequency and responsibilities of key players. In case of disagreement with local communities or stakeholders, grievances addressable mechanism shall be part of plan. The management plan will develop the institutional requirement and type of training to enhance the capabilities of staff. The total environmental mitigation, Monitoring, equipment and training cost shall also be included.

- xi) **Economic Assessment.** This section should include the overall cost estimate in relation to the project benefits, environmental costs and total cost of the proposed project. The Consultants should address the cost analysis of training, monitoring activities, environmental analysis and activities, resettlement, land and property acquisition, and mitigation measures.
- xii) **Role of Functionaries and Government Agencies Involvement.** This section should include role of all the functionaries and variable involvement of government agencies or authorities for the project accomplishment.
- xiii) **Recommendation and Conclusions.** An adequate summary should emphasize on the project description and environment, environmental impacts and mitigation measures, alternatives, socio-cultural and socio economics, public consultation and the resulting issues and recommendations, environmental management and monitoring plans, economic assessment, recommendation and conclusions.
- xiv) **Submission of Reports.** The report should be prepared and presented in strict conformity to IEE/EIA regulations, 2000 and Guidelines for preparation and submission of IEE/EIA 1997 issued under the Pakistan Environmental Protection Act, 1997.

The title page of the report should specify the report name, project name, highway length, scaled maps and / or colored photographs, date of the report, consultant company name, address, phone numbers, e-mail and logos.

The reports should include acronyms list and a copy right certificate in the name of NHA. The reports should include all the key articles but not limited to the executive summary, introduction, description of the project, policy, all legal and administrative framework, description of the project environment, alternative analysis, environmental impacts and mitigation measures, public consultation and resettlement action plan, inter-agency and public/ NGO consultation process, environmental monitoring plans, economic assessment, conclusions and recommendations.

All figures, maps, appendices, tables, photographs, matrices and list of references should be chronologically organized and each page should be numbered.

- (i) Initially Consultants should submit two draft copies of the report to NHA
- (ii) After incorporating the comments from NHA, bureau of Environmental Protection/Provincial EPAs and donor agencies Consultants should finalize the report.
- (iii) Consultants required submitting two hard copies and one soft copy of final EIA report to NHA.
- (iv) Must fill and attach the application form for Environmental approval under Sec (12) of Pakistan Environmental Protection Agency (PEPA) Act 1997 (PEPA- Review of IEE and EIA-Schedule IV regulations, 2000). The form requires information of the description, Location, objective, alternative alignment, topography and land use of the project. In addition it also required information about the land acquisition in acres, environmental quality standard (NEQS) analyzed and measured, source of powers for the project construction and number of labour force (employees) required for the project construction and operation phases.
- (v) The prepared Environmental Impact Assessment (EIA) report will be submitted to the concerned EPA for formal concurrence and will be disclosed to the public, stake holders etc.

*Ten hard copies and two electronic copies (format on CD) of the report are to be submitted should be labeled properly.

Public Hearing:

It will be the responsibility of the Consultants to obtain NOC from the respective EPA, and to prepare documents and presentations for EPA as and when required by EPA with due intimation to NHA.

Consultants Fee for Services:

The payments to the Consultants for EIA shall be made in the following manner:

Sr. No.	Description	% of A'
(i)	Inception Report for services (within first 7 days of commencement).	10%
(ii)	Submission of draft EIA/IEE report.	30%
(iii)	Submission of final EIA/IEE report (ten hard and two soft copies) to concerned EPA.	20%

(iv)	Submission of final EIA/IEE report after attending all observation and comments of EPA.	20%
(v)	Obtain NOC from concerned EPA including public hearing aspects.	20%
	Total:	100%

Where A' is the total payable amount in respect of EIA Study.

Consulting Service Period:

Consultants shall submit the final report within Three (03) months from the date of Commencement of Services.

