



NATIONAL HIGHWAY AUTHORITY

Procurement & Contract Administration Section

28 Mauve Area, G-9/I, Islamabad ☎ 051-9032727, 📠 051-9260419

No. 6(438)/DIR-III(P&CA)/NHA/19/ 197

28th August, 2019

Director General

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

Subject: ANNOUNCEMENT OF EVALUATION REPORT (PPRA RULE-35):
Consultancy Services for Feasibility Study and Detailed Design
for Dualization of Gambila-Kohat (164 Km) Road Section of N-
55

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 Compliance of above referred PPRA Rule-35 for uploading on PPRA website at the earliest, please.

(SAJJAD ALI SHAH)
Director (Consultancy) P&CA

Encl: Evaluation Report along with **Annex-I**

Copy for kind information to:

- Member (Planning), NHA, Islamabad;
- General Manager (P&CA), NHA, Islamabad;
- Director (MIS), NHA, Islamabad;
- Deputy Director (P&CA)-II, NHA, Islamabad.

EVALUATION REPORT

(As Per Rule 35 of PPRA Rules,2004)

1.	Name of Procuring Agency:	National Highway Authority
2.	Method of Procurement:	Single Source procurement (Letter of PAO attached)
3.	Title of Procurement:	Consultancy Services for Feasibility Study and Detailed Design for Dualization of Gambila-Kohat (164 Km) Road Section of N-55
4.	Tender Inquiry No.:	6(438)
5.	PPRA Ref. No. (TSE):	N/A
6.	Date & Time of Bid Closing:	17 th May, 2019 at 1000 hours local time
7.	Date & Time of Bid Opening:	17 th May, 2018 at 1000 hours local time
8.	No of Bids Received:	Single Source based (01 Bid)
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 Cost (EC)* (PKR)	Rule/Regulation/SBD** /Policy/ Basis for Rejection / Acceptance as per Rule 35 of PPRA Rules, 2004.
	Technical (if applicable)	Financial (if applicable)	Total (out of 1000)		
1) M/s NESPAK (Pvt.) Ltd.		Not Applicable		18,859,447	Single source (PPRA Regulations for Consultancy Services-2010: Regulation No 3(D))

*EC is the Evaluated Cost used for evaluation purpose and includes only the cost of competitive component (i.e. Remuneration and Direct Non-Salary Cost) and is exclusive of Provisional Sum, Contingency and Indirect Taxes.

Single Source Bidder: M/s NESPAK (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 procurement was done under Sub-Clause 3-D of PPRA's 'Procurement of Consultancy Services Regulations 2010'. The Contract is being awarded to M/s NESPAK (Pvt.) Ltd. at negotiated cost of Pak. Rs.18,859,447/-.

Signature:..... 

Official Stamp:.....

General Manager (P&CA)
National Highway Authority
Islamabad

**Standard Bidding Documents (SBD).

(PAO Letter)

GOVERNMENT OF PAKISTAN
MINISTRY OF COMMUNICATIONS

F. No. 13(10)/2013-Roads

Dated: 9th ~~February~~ ^{May}, 2017

From: **Hameed Akhtar,**
Director (Roads),
Islamabad

To: **Chairman,**
National Highway Authority,
Islamabad

Subject: CONSULTANCY SERVICES FOR DETAILED DESIGN FOR DUALIZATION OF 164 KM GAMBILA TO KOHAT SECTION OF INDUS HIGHWAY, UP-GRADATION AND IMPROVEMENT OF JAND - KOHAT SECTION OF N-80 (63 KM) AND A NEW LINK FROM JAND TO PINDI GHEB CONNECTING N-90 WITH CPEC

Sir,

Reference is invited to NHA's letter No. 6()/ GM (P&CA)/ NHA/2017/586 dated 20th April, 2017 on the above mentioned subject.

2. The Secretary/ PAO Ministry of Communications granted necessary approval to hire M/s NESPAK (Pvt) Limited for consultancy service for Detailed Design Consultant for captioned projects of NHA on negotiated tendering basis under the provision of Clause 3D(ii)(a) and 42 (d) (ii) of Procurement of Consultancy Regulations 2010 and Public Procurement Rules 2004 respectively.

Yours sincerely,

(Hameed Akhtar)
Tele 051-9202711

C.C

SPS to Secretary Communications

GM (P&CA)	
Director (P&CA)	
UD (P&CA) - II	
AD (P&CA)	
Proc. Specialist	
Diary No.	1194
Date:	11-5-17

10/5
Director (Planning)
Director (E&I)
Director (Design)
Director (P&CA)

PR check
quoted rules
E&I
Director

Diary No. 2059
Dated 20/5/17

National Highway Authority



Annex-I

Criteria

FOR

Bid Evaluation

**Consultancy Services for Feasibility Study
and Detailed Design for Dualization of
Gambila-Kohat (164 Km) Road Section of
N-55**

August, 2019



NATIONAL HIGHWAY AUTHORITY

Procurement & Contract Administration Section 28-Mauve Area, G-9/1,
Islamabad Tel: 9032727, Fax: 9260419, gmpca@nha.gov.pk

Ref: 6(438)/GM(P&CA)/NHA/19/131

13th May, 2019

M/s NESPAK (Pvt.) Ltd.

Address: 2nd Floor, Attaturk Avenue,
Sector G-5/2, **Islamabad-Pakistan.**

Phone: +92-51-2274016, +92-51-9221910-13,

Ext: 211-13

Fax: +92-51-2274016, +92-51-9221914

Email: nespak.htes@gmail.com

Subject: Consultancy Services for Feasibility Study and Detailed Design for Dualization of Gambila - Kohat (164 Km) Road Section of N-55

Ref: (i) Ministry of Communications letter No. 13(10)/2013-Roads dated 9th May 2017;
(ii) Ministry of Communications letter No. 13(10)/2013-Roads dated 6th Dec. 2017;
(iii) GM (Planning) letter No. 2(92)/NHA/Planning Sec/19/358 dated 6th May 2019.

With reference to above referred letters, you are informed that your firm has been accepted for subject Services on Single Source negotiated tendering basis under the provisions of Clause-iii of Rule-42(d) of Public Procurement Rules, 2004 and Regulation-3(D)(ii)(a) of Procurement of Consultancy Regulations, 2010. You, may submit your Proposal (Technical + Financial) as per following schedule in accordance with the Request for Proposal (RFP) document attached herewith:

Date : 17th May, 2019
Time : 1000 Hours
Venue : NHA Auditorium,
2nd Floor, 27-Mauve Area, G-9/1, Islamabad.

2. The complete details regarding the Scope of Work for subject Assignment are provided in the Terms of Reference (TOR) Appendix-A to RFP.

3. Please inform us by **14th May 2019**, in writing through above contact address, that, whether you intend to submit your proposal or otherwise.


(MUHAMMAD AZAM)
Director (P&CA)

Encl: Request for Proposal Document.

Distribution:

- All the Committee members

Copy for information:

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

National Highway Authority



REQUEST FOR PROPOSAL

for

Consultancy Services

for

**Feasibility Study and Detailed Design for Dualization
of Gambila – Kohat (164 Km) Road Section of N-55**

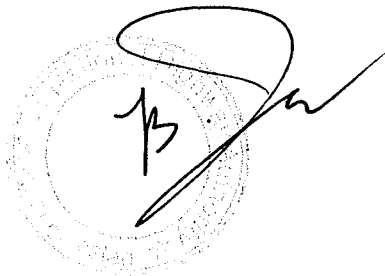
Tender No. 6(438)

Pages (1 to 109)

May, 2019

Table of Contents

DESCRIPTION	PAGE NO.
LETTER OF INVITATION (LOI)	1
ATTACHMENTS	2
TECHNICAL PROPOSAL FORMS	3
FINANCIAL PROPOSAL FORMS	16
APPENDIX A	25
TERMS OF REFERENCE	25
APPENDIX B	67
MAN-MONTH AND ACTIVITY SCHEDULE	67
APPENDIX C	68
CLIENT'S REQUIREMENTS FROM THE CONSULTANTS	68
APPENDIX D	70
PERSONNEL, EQUIPMENT, FACILITIES AND OTHERS SERVICES TO BE PROVIDED BY THE CLIENT	70
APPENDIX E	71
COPY OF MODEL AGREEMENT	71



**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,

M/s NESPAK (Pvt.) Ltd.

Address: 2nd Floor, Attaturk Avenue,
Sector G-5/2, **Islamabad-Pakistan.**

Phone: +92-51-2274016, +92-51-9221910-13, Ext: 211-13

Fax: +92-51-2274016, +92-51-9221914

Email: nespak.htes@gmail.com

Subject: Consultancy Services for Feasibility Study and Detailed Design for Dualization of Gambila – Kohat (164 Km) Road Section of N-55

*Ref: (i) Ministry of Communications letter No. 13(10)/2013-Roads dated 9th May 2017;
(ii) Ministry of Communications letter No. 13(10)/2013-Roads dated 6th Dec. 2017;
(iii) GM (Planning) letter No. 2(92)/NHA/Planning Sec/19/358 dated 6th May 2019.*

With reference to above referred letters, you are informed that your firm has been accepted for subject Services on Single Source negotiated tendering basis under the provisions of Clause-iii of Rule-42(d) of Public Procurement Rules, 2004 and Regulation-3(D)(ii)(a) of Procurement of Consultancy Regulations, 2010. You, may submit your Proposal (Technical + Financial) as per following schedule in accordance with the Request for Proposal (RFP) document attached herewith:

Date	:	17 th May, 2019
Time	:	1000 Hours
Venue	:	NHA Auditorium, 2 nd Floor, 27-Mauve Area, G-9/1, Islamabad.

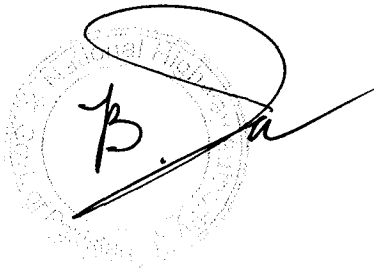
2. The complete details regarding the Scope of Work for subject Assignment are provided in the Terms of Reference (TOR) Appendix-A to RFP.

3. Please inform us by **14th May 2019**, in writing through above contact address, that, whether you intend to submit your proposal or otherwise.

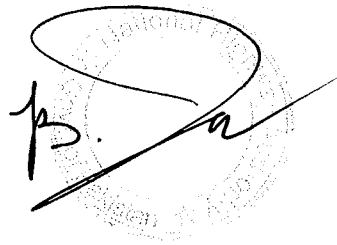
General Manager (P&CA)
Telephone: +92-51-9032727,
Fax: +92-51-9260419
E-mail: gmpca@nha.gov.pk,
Website: www.nha.gov.pk

ATTACHMENTS

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



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.

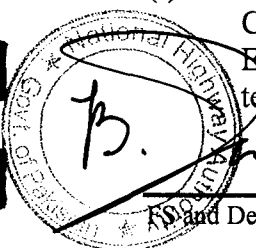
[{If the Consultant is a joint venture, insert the following: We are submitting our Proposal in a joint venture with: {Insert a list with full name and the legal address of each member, and indicate the lead member}. We have attached a copy {insert: "of our letter of intent to form a joint venture" or, 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.
- (h) Our firm/ each member of our JV is not participating in any other proposal for this Assignment.

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: _____

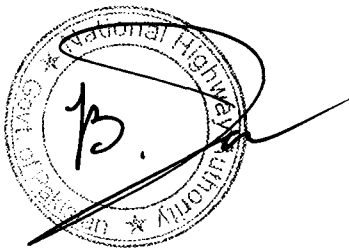
Name of Consultant (company's name or JV's name): _____

In the capacity of: _____

Address: _____

Contact information (phone and e-mail): _____

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



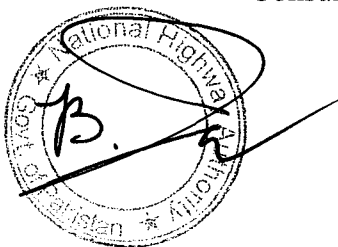
CLIENT'S REFERENCE

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

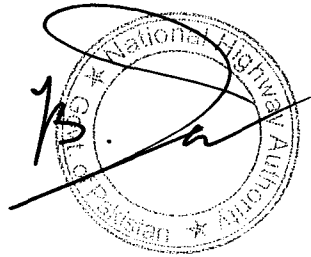
Using in the format below, provide information on each reference assignment for which your firm, either individually as a corporate entity or as one of the major companies within a consortium, was largely contracted.

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 (Month/Year):	Date
		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**



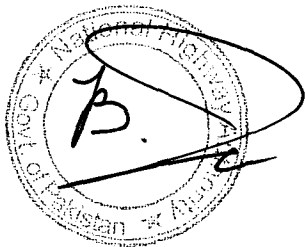
COMMENTS/SUGGESTIONS OF CONSULTANT

On the Terms of Reference (TOR)

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

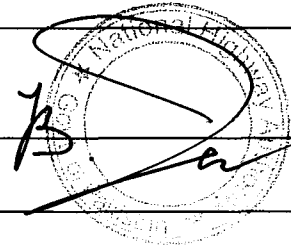
On the data, services and facilities to be provided by the Client specified in the TOR.

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



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)
- 11. Detailed Tasks Assigned on the Project: _____



◆ 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].

◆ Education

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

◆ 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].

◆ Languages

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

◆ 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.

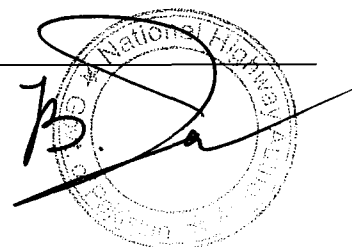
I understand that any willful misstatement described herein may lead to my disqualification or dismissal, if engaged.

Signature of expert or authorized
representative of the firm

Date: _____
Day/Month/Year

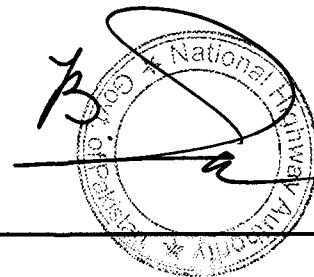
Full name of authorized representative: _____

Note: copy or scanned signatures are not allowed



COMPLETION AND SUBMISSION OF REPORTS AS PER TOR

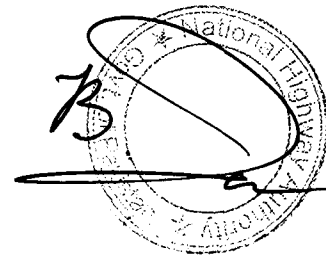
	Reports	Date
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		



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

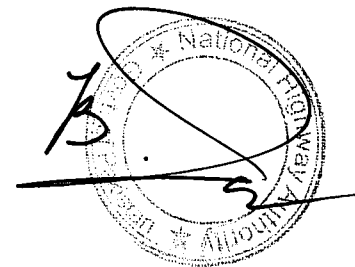
1. Technical/Managerial Staff

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

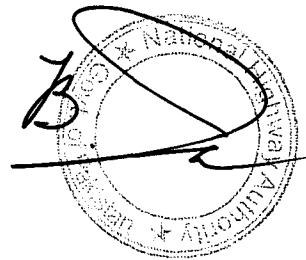
Name	Position	Months (in the form of a Bar Chart)															Number of Months	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		

Full Time: _____

Part Time: _____

Activities Duration _____

Yours faithfully,



Signature _____
(Authorized Representative)

Full Name _____

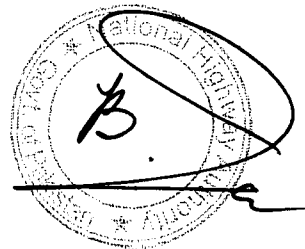
Designation _____

Address _____

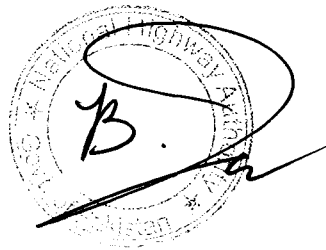
CURRENT COMMITMENTS OF THE FIRM

(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}: _____

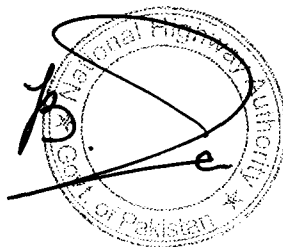
Name and Title of Signatory: _____

In the capacity of: _____

Address: _____

E-mail: _____

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



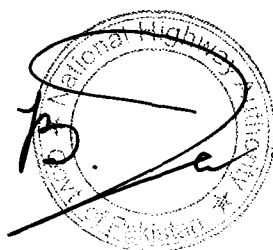
BREAKDOWN OF RATES FOR CONSULTANCY CONTRACT

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:

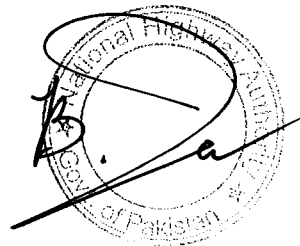
- Item No. 1 Basic salary shall include actual gross salary before deduction of taxes. Payroll sheet for each proposed personnel should be submitted at the time of negotiations.
- Item No. 2 Social charges shall include Client's contribution to social security, paid vacation, average sick leave and other 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: _____

ESTIMATED LOCAL CURRENCY SALARY COSTS/REMUNERATION

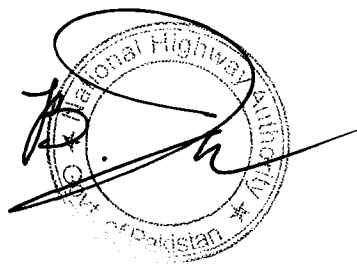
Sr. No.	Position	Name	Staff-Months	Monthly Billing Rate	Total Estimated Amount (Rs.)
I. Professional / Key Staff					
Sub-Total:					



ESTIMATED LOCAL CURRENCY SALARY COSTS/REMUNERATION

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

Note: The bidders are required to quote the rates of Non Key/Support Staff given in the TOR in above table. The bidder(s) may propose Non Key/ 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 viii. Three days traffic count	L.S			
5.	Communication expenses	Per Month	4.0		
6.	Drafting/ Reproduction of Reports	L.S			
7.	Professional Liability Cost/ Premium (this is to be paid by the firm from its overhead and here amount payable is only to be mentioned)				
8.	Office/ Drafting Supplies	L.S			
9.	Soil & Material Investigation Report	L.S			
10.	Others not covered above to comply with TOR requirement*				
Total					

* Any additional item/ cost quoted against this line item must be supported by solid/ tenable justification(s) detailed in Technical Proposal Submission Form A-4 "Comments on TOR". The negotiation committee of the Client may negotiate this cost on the basis of justification provided in the form A-4. Moreover, if no justification is given or Client does not agree to the justifications, the Client in both the cases **shall not** include this cost in the total cost offered by the Consultants for this assignment, particularly in case any amount against this line item is deemed to have been covered in other pay items.



SUMMARY OF COST

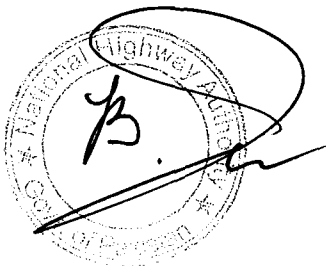
Sr. No.	Description	Amount (Rs.)
1.	Salary Cost/Remuneration	
2.	Direct (Non-Salary) Cost	
3.	Sub Total (1+2):	
4.	Sales Tax @ 16% on item S.No.3 above which shall be kept as Provisional Sum in the Contract Agreement	Not Applicable till final decision of the Court of Law ⁽³⁾
5.	Grand Total:	

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 Consultants in the next evaluation process for selection of consultants with report of such defaults.

3- Relevant documents are attached at the end of RFP.

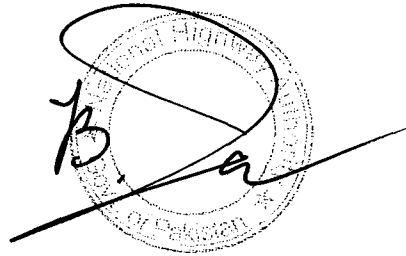
4- The grand total is inclusive of all the applicable Federal, Provincial and Local taxes. All these taxes (except the Sales Tax) are required to be built in the quoted rates and not be mentioned separately.



APPENDIX-A

TERMS OF REFERENCE

(TOR)



CHAPTER NO. 1

INTRODUCTION

1.1 BACKGROUND

NHA has to secure delivery of efficient, reliable, safe and environment friendly national highway network with a view to improve quality of life in Pakistan. NHA looks after all of Pakistan's major inter-provincial road links. National Highways represent main transport corridor linking ports to major population centers and to neighboring countries.

The Indus Highway is a 1,264 km long highway that runs along the Indus River connecting the port city of Karachi with the northwestern city of Peshawar via Dera Ghazi Khan. It is part of Pakistan's National Highways network and is maintained and operated by Pakistan's National Highway Authority. The Indus highway (N-55) being the second largest highway is an alternate North-South link after N-5. N-55 travelling along the Indus river a distance of 491 kilometers of Sindh, and 360 kilometers in Punjab, it reaches D.I. Khan. Further stretching 396 kilometers in KPK, connecting D.I. Khan, Bannu and Kohat, almost all southern KPK, it reaches Peshawar, making a short cut of about 400 kilometers as compared to N-5.

The Indus Highway (N-55) is a main road which lies along the western bank of the Indus River and runs nearly the entire length of Pakistan from north to south. It complements N- 5 in north-south bound traffic traveling medium to long distance.

In recent years, the Indus Highway has been unable to cope with the increasing traffic volume and larger size of vehicles sufficiently due to the lack of road capacity and deterioration of the road surface. As a result, traffic has become excessively concentrated on N-5, causing frequent traffic jams. The project road is part of program to relieve the traffic on Indus highway.

In order to address above said problems, National Highway Authority developed program for up-gradation/improvement of Indus Highway (N-55) for being the major trade route of country on western bank of Indus River. In this connection, N-55 (Indus highway) is already under up-gradation phase and has already been upgraded to four lane highway on various sections. It is proposal to improve / upgrade the Indus Highway (N-55) from Sarai Gambila to Kohat as the N-55 section from DI Khan to Gaandi Chowk has already been dualized.

1.2 A NEED ASSESMENT

The scope of project is dualization and improvement of existing Indus Highway (N-55) from Sarai Gambila to Kohat (N-80 ~ Rawalpindi ~ Jand ~ Kohat Road). The



project road starts from Sara Gambila passes through Topai, Ambiri Kala, Lawagarh, Krapa, Lachi, Mandoori and connects Rawalpindi ~ Jand ~ Kohat Road (N-80). The project road is crossing the River Koram at Topai and also crossing some tributaries of river Koram at few locations.

The project has gain significance due to inauguration of China Pakistan Economic corridor project (CPEC). The CPEC (western alignment) traversing between Islamabad and DI Khan connects N-55 near Yarak, D.I. Khan and N-55 section, Yarak ~ Kohat & Peshawar will also connect with CPEC (western corridor).

1.3 PROJECT DEFINITION

The scope of project is dualization and improvement of existing Indus Highway (N-55) from Sarai Gambila to Kohat (N-80, Rawalpindi ~ Jand ~ Kohat Road). Length of project road is approximately 128 Km from Sarai Gambila to Kohat (N-80).

In this regard, NHA intends to hire Design Consultant for Detailed Design for Dualization & Improvement of Indus Highway (N-55) Sarai Gambila - Kohat. Consultants shall propose bypass option for populated towns i.e. Lachi, Krapa etc. for Employer approval. Existing Culvert / bridges / flyovers shall also be considered for extension during detailed design.

1.4 PROJECT OBJECTIVES

Objective of the project is to enhance the mobility for the underdeveloped area of district Karak, ultimately KPK province and play a vital role for the development of deprived population. The project road is major section of Indus highway (N-55) as the Indus Highway (N-55) being important trade route of country and runs along the Indus River connecting the port city of Karachi with the northwestern city of Peshawar via Dera Ghazi Khan; hence making project road as integral trade route part of the country. It will provide the commuters of the area with fast access to the markets. Besides that, it will also reduce the travel times and hence will improve the overall socio-economic development of country.

The project provides major tangible and intangible benefits which include:

- i. Vehicle Operating Cost will be at its minimum.
- ii. It will provide an efficient, time saving and congestion free access.
- iii. Massive impact of the project on Land use will surely help in the progress of area and local people, as employment and business will be generated in vicinity by the implementation of the project.



	Terrain	:	60 km/hr
Road Width	No. of Travel Lanes	:	02 Lane (Additional)
	Lane Width	:	3.65 m each
	Main Carriageway	:	Proposed by the design consultant in light of detail design.
	Inner Shoulder	:	1 meters
	Outer Shoulder	:	3 meters
	Minor Bridges	:	Numerous
	Major Bridge	:	01 No on Indus River
Design Life of Pavement		:	10 Years
Design Life of Structure		:	25 Years (Culverts)
		:	50 Years (Bridges / Flyovers)
Ancillary Works		:	Fixing of Kerbstones, NJ Barrier, Road Sinage

Detailed Design will be carried out as per NHA standards mentioned in detail in Chapter no 03 of TOR. Detailed Design shall comprise of:

- Feasibility Study
- Topographic Survey
- Traffic Count Survey
- Hydrology Study
- Preparation of Tender Drawings, design documents, BOQ and construction drawings
- Land Acquisition
- Economic and Social Indicator
- Preparation of PC-1

However, details of scope of work and design standards are elaborated in Chapter No 03 of TOR.

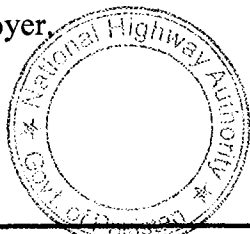
2.3 COMMENCEMENT OF SERVICES

The Consultants shall commence the services immediately upon signing of the Contract Agreement, or such other time period as the Parties may agree in writing.

2.4 TIME PERIOD

The period of completion of services shall be **four (4) months** from commencement of services or such other period as the Parties may agree in writing, the Consultants shall submit all the Reports mentioned in TOR in the form and format acceptable to the Employer.

ASD



CHAPTER NO. 3

SCOPE OF WORK & DELIVERABLES

1. Design Standards

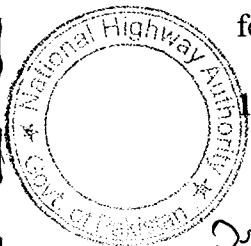
The consultant is required to provide the consultancy services by following the codes & standards suggested as under:

Geometric Design	As per Latest published version of "A Policy on Geometric Design of Highway and Streets" by AASHTO. All relevant AASHTO standards will govern, and 'roller coaster' profile is not acceptable at all.
Pavement Design	As per latest published version of "AASHTO Guide for Design of Pavement Structures".
Roadside Design	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. As per Latest published version of "AASHTO Roadside Design Guide"
Structural Design	As per Latest published version of "AASHTO Guide Specifications for LRFD Seismic Bridge Design" along with West Pakistan Code of Practice for Highway Bridges and Seismic Zone Mapping of Pakistan
Drainage Design	As per Latest published version of "Highway Drainage Guidelines" by AASHTO.
Engineer's Estimate	As per prevailing CSR of NHA.
Bidding Documents	As per requirements of Pakistan Engineering Council.

The consultant is required to coordinate closely with NHA while carrying out services required under this TOR so that NHA remains aware of the up to date progress. Major tasks in scope of work are explained in the following paragraphs and do not necessarily represent logical sequence of activities. However, NHA desires that feasibility study and PC-I be prepared and submitted on priority.

1.1. COLLECTION OF REQUIREMENTS AND AVAILABLE DATA

The consultant will mobilize to get possession of relevant available data required for preparing the design of the Project. The consultant will also

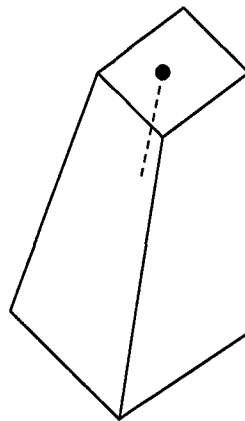


collect requirements (if any) of concerned departments and stakeholders through extensive and close coordination.

1.2. TOPOGRAPHIC SURVEY

As per “Surveying & Mapping Act 2014”, the Survey company must comply with the requirement of the Act. It is therefore recommended that consultant should use the latest technology for the topographic surveys, which include at least four (4) GPSDF for establishment of high accuracy control points (as per required plan, specified herein). In case the consultant does not have the requisite number of GPSDF, it is advised to hire services of professional survey companies having the required expertise. A network of control points along the corridor will be developed involving at least four (4) instruments.

Before mobilizing to site for Survey, the Consultant may like to submit detailed topographic survey program to



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.

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

1.2.1. Survey Monuments

Besides start and at the end, it is required that Monuments will be fixed in the traverse line at an interval of about 300 to 400 meters. These will be fixed at such locations that these are least susceptible to disturbance and damage and do not pose a threat to traffic on existing roads/tracks etc.



1.2.2. Control for Traverse

Projection: UTM
Datum: WGS84
Vertical Datum: MSL

1.2.3. Horizontal Control

Minimum four (4) DGPS Primary Controls at start and End of the Project or as many as may be required such that the distance between these points will not be more than 10 kms. Minimum observation time will be at least ten (10) hours or as required for each of these points. These points will 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.

Primary Controls

DGPS Primary Controls will be established at a maximum distance of 2.5 kms with one base and one rover using leapfrog method, by applying adjustments to create network. Minimum observation time will be at least two (2) hours for each of these points. At every 5 kms one additional DGPS point with two (2) hours observation (to form an inter-visible pair) will be established, which may be used for Total station if needed for topographic survey.

Secondary Controls

DGPS Secondary Controls will be established at a maximum distance of 333 meters with one base and two rover at alternate sides of Alignment (to form triangular network) using leap frog method, by applying adjustments to create network. Minimum observation time will be at least 45 minutes for each of these points.

1.2.4. Vertical Control

Vertical Control will 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 will be used. The maximum distance between the two successive reading points will 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.

1.2.5. Monuments for Horizontal and Vertical Controls

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



points as per NHA Specifications.

1.2.6. Topographic survey (scale 1:1,000); 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) will be taken to create a topographic map in the scale of 1:1,000 and 1:100 H:V scale
- b. The Consultant is required to observe 10 cross-section across the River Khadir, Bank to Bank. Three cross-sections at the Bridge Site (one center-line and other two adjacent to centerline up and down stream of the bridge. The BM for upon which the Model study survey was done should be incorporated in the traverse/ level circuit.

1.2.7. Centerline Points (stake) and Measurement of elevation of route stake

- a. The distance between the centerline points will be 50m in general, in case of the pond the stake is fixed on the bank of the inclination and waterline. In case there is any major variation in the strata, the cross-section interval may be reduced accordingly.
- 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 will be measured. For the places where the topography is changed and bridge pier and abutment, more stakes will be established.
- f. For the culverts, the chainage and elevation of the crossing point will be measured; the longitudinal section of the water channel 100m upstream and downstream of the crossing point will 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 (100m 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-pressure pole(tower) around the route within 100m, and the power line's lowest elevation on the crossing point
- i. The stake's elevation will 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 will be measured

1.2.8. Cross Section Points

- a. The interval for cross section of the embankment should not exceed 50m for the straight line sections and curve sections with radius larger than 5,000m. At curves having radius less than 5000 m, the cross sections will be measured at preferably 25m interval.
- b. The cross section will be measured upto 100m width. If 100m space is not available, then the same should be restricted to building line.
- c. For the alignment sections with proposed retaining wall, the cross section will be measured at 5m interval
- d. 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

1.2.9. Interchanges (1:1,000) Map

Extraction of features will be done & points will be taken beyond the ROW of 100m 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 250 m.

1.2.10. Riverine Survey for Crossing Canals - Short Bridge

Measure the center longitudinal section of the canal from 100m upstream to 50m downstream, and measure the cross section of the canal at 10m interval which is perpendicular to the axis of river. The canal edges must be taken recorded along with all break points to clearly define the canal shape.

1.2.11. Survey for Crossing Water Channels/ Nullas

Measure the center longitudinal section of the water Channel/ Nullas



from 100m upstream to 50m downstream, and measure the cross section of the water channel/ nullas at 10m interval, which is perpendicular to their axis. Minimum 5 points will 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 will not be more than 5m for wider water Channels/ Nullas.

1.2.12. Mapping (Unit of Measurement)

Metric units will be used throughout.

1.2.13. Scale

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

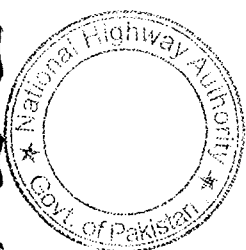
1.2.14. Details to be Shown

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 will be recorded.



A handwritten signature or mark, possibly a stylized 'U' or 'L', located below the stamp.

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.
3. Survey Department Benchmarks used (Indicate reference number and level).



U

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 will 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 (if any).
6. Mining tips (if any).
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 1.0m wide will 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 will 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 will be drawn as near as possible to indicate the actual shape of the slope face, i.e., all berms and terraces will be detailed.

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

1.2.15. Bridge details

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

- a) The coordinates and levels of the four corners of the bridge (points will 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) Length, width and type of construction of bridge.
- d) The type and location of services adjacent to the bridge.
- e) The coordinates and levels of the centerline and the road on the bridge at approximate intervals of 5 m.



6

- f) 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.

1.2.16. Culvert details

Details of each culvert are to be shown on the survey plans and a separate sheet with 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 will be recorded so that the culvert can be modeled in CAD.

1.2.17. Existing Road/embankment

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 roadway cross-section. For the existing carriageway, the width of carriageway, inner and outer shoulders should be clearly identified and coded.



1.2.18. Details of junctions and existing roads

The Surveyor will survey all junctions to enable the designer to design the junction properly. A corridor width of 100m will 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 will have a minimum of two (2) points defining both edges of the carriageways. Consecutive points along the road feature will 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 will be recorded for paved roads having widths greater than 6.0m. The main destination of the road from the junction will be recorded by the Surveyor.

Where necessary to survey along an existing road, the Surveyor will 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) will be picked up and will not exceed 10m. More points are generally to define super-elevation changes at curve sections.

1.2.19. Digital Ground Models (DGM)

The product of the field survey data, after processing will be DGM. The accuracy of DGM will 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 will 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 will also be marked. The topography will be fully labeled for every object recorded.

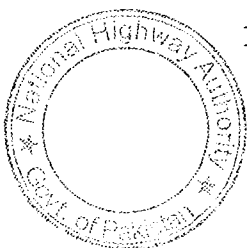
All survey feature lines will herein be referred as 'strings'. The data will be presented by the Surveyor in a form suitable for input to the software to be used for generation of DGM. Using the recorded data in x, y, z format on data logger, the ground surface over the required area will be simulated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

The existing road surface over the required area will 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 will 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) will be developed by using software. Using TIN, Contour generation will be done.

1.2.20. Grid

The coordinates of the DGM will be in Easting, Northing and elevations.



A handwritten signature or mark, possibly a stylized 'U' or 'Q', located below the text of section 1.2.20.

1.2.21. String Labeling

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

1.2.22. Property Model

This model will 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 will be appended to in the AutoCAD format. Such information will be used by the Surveyor when preparing Land Utility folders at the end.

1.2.23. Contours

After digital data collection of survey points at site, the contour generation will be done by using computer software. The interval will 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. Contours will be shown by continuous lines with a thicker line for every fifth contour (Prominent Contour). Contour and spot heights will be differentiated from other detail. The value of each contour will 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.

1.2.24. Longitudinal Profile and Cross-Section

The longitudinal profile plan will be plotted in A1/A3 size (as instructed 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 will be plotted in A1 size to a scale of 1:100 both horizontal and vertical with



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25 m interval. The plan will show the chainage interval as specified and the existing ground profile and all the existing features.

1.2.25. Field Books and Record

All field books and computer data must be properly kept and will record truthfully all the survey work carried out. The Surveyor will do all workings in proper books, adequately in good style and according to best practice. All field books will be done in ink. Unsatisfactory works and errors will be struck off and there will 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 will 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 will be certified by the qualified surveyor.

Deliverable: The Consultant will carry out survey activities and accordingly submit the required number of copies of Topographic Survey Report along with Plans on 1:1,000 scale for main carriageway and 1:5,000 for interchanges/junctions and Digital Ground Model on completion of all survey works. Each control will be shown in the report in photograph along with coordinates thereof and location map/diagram. Calibration certificates (not more than 6 months old) of equipment used in surveying will also be made part of report. The names of surveyors will also be submitted. Each & every page of the submission must be signed and stamped by the consultant.

1.3. TRAFFIC SURVEY

The consultant will carry out Classified Traffic Counts, Intersection turning movement counts, O&D Survey, Travel Time Survey, Tyre Pressure Survey etc. on existing roads crossing the alignment to get an estimate of current traffic volumes. Generated / diverted traffic volumes will be worked out.

Deliverable: A comprehensive Report will be submitted which will not only form basis for economic analysis (for PC-I) but also for pavement design.

1.4. SOIL & MATERIAL INVESTIGATION

Soil & Material Investigation will be done to ascertain the index and engineering properties of soil & rock encountered. The consultant 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. As per fixed horizontal and vertical alignment, identify the areas of deep cuts and



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high fills. Study precise geometry of the roadway structures and develop design requirements. Field investigations will be carried out in three main areas:

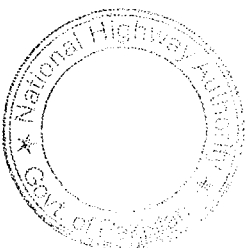
- Investigation along the length of the proposed alignment and to determine the pavement support potential offered by the subgrade soils;
- Investigation to determine the source and quantity of naturally-occurring construction materials;
- Examine specific sites such as deep cuts, retaining walls and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

Following table presents the guidelines for the quantity of roadway pits or borings and required testing. The values given are tentative investigation requirements and the 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	
Embankment	2-10	Uniform	500	1/3 of embankment of refusal
		Rolling	400	
		Hilly	200	
Embankment	>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	
Cut	2-10	Uniform	800	1.0 below subgrade
		Rolling	400	
		Hilly	200	
Cut	>10	Uniform	600	1.0 below subgrade
		Rolling	300	
		Hilly	150	

Tentative 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



1.4.1. Material Investigation

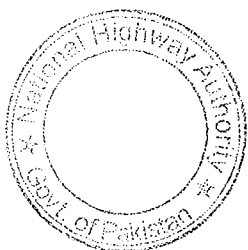
Every effort should be made to locate sufficient quantities of naturally occurring construction materials at regular intervals along the alignment and as close to the alignment as possible. In case of potential quarry sites, test borings are likely to be necessary to confirm the quantity and quality 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. Guidelines for testing requirements of materials are as under:

Test	Test Requirement				
	Fine Aggregate		Coarse Aggregate		Water
	Asphalt Concrete	P.C. Concrete	Subbase/ 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					•
Marwill Test				•	
Stripping Test				•	

Water is required for 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.

1.4.2. 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* will include field strength, moisture content, bedding state if applicable discontinuities and state of weathering. *Material Characteristics* will cover Color,



Composition, and grading. Particle shape, soil name and soil group. Both Unified and AASHTO classification will be used.

Deliverable: Detailed Soil & Material Investigation Report will be submitted as per requirements explained in preceding paragraphs.

1.5. PAVEMENT DESIGN

The consultant will carry out pavement design by using latest published version of AASHTO Pavement Design Guide and verify the design by mechanistic analysis using Shell and Asphalt Institute (AI) Models. Pavement will be designed for a period of 10 years and subsequent overlay requirement for next 10 years.

Deliverable: Pavement Design Report, complete in all respects also containing details of embankment design as well as drainage design. All calculations will be attached in the report.

1.6. HYDROLOGY & HYDRAULIC STUDY

1.6.1. Objective

The objective of the hydrological and hydraulic study is to mathematically/ numerically model the project area to design cross drainage structures and road embankment height to protect it from future floods. The major objectives are:

- Establishment of Waterway.
- Marking extents of the catchments' area along with its characteristics.
- Calculating Maximum Peak Flood Discharge based on meteorological data.
- Marking of flood plains and High Flood Levels.
- Location of Cross Drainage structures.
- Hydraulic Design of Cross Drainage structures (Type, sizes / geometry and Energy dissipaters for erosion control etc.)
- Calculating Scour Depth for bridges.

1.6.2. Scope of Work / Activities

The consultant will adopt mathematical modeling approach using industry-standard software for the hydrological and hydraulic assessment that will incorporate following activities:

a. Reconnaissance Survey

The field survey will include geo-tagged photographs of the existing cross drainage structures, measurement of structure



sizes; evaluation of structural condition, general soil evaluation and land use in the area. In case there is track alignment, all possible locations of water crossings will be identified with water marks and width of waterway.

b. Meteorological Analysis

The meteorological analysis will be based on maximum available record (preferably more than 30 years) from all the surrounding observatories. The analysis must include:

- Review and analysis of historic Rainfall and Peak Storm events.
- Use of statistical methods to evaluate meteorological and hydrometric records and determining best data best fitting on either of Gumbel Max, Weibull or Log Pearson 3 distributions.
- Calculation of return periods for 25 years, 50 years, 100 years.
- Instead of using meteorological station data far away from the road, the consultant will use spatial analysis (for meteorological models) for finding out design storm value in the study area / watershed derived from the surrounding observatories.
- Selecting and calculating design storm for hydrological model

c. Watershed Delineation

The activity includes delineation of watershed affecting road and evaluating physiography and topography of the catchment / watershed-area. The watershed delineation will be carried out using industry standard tools e.g. ArcHydro, Topaz, WMS and DHI MIKE suite etc. The digital elevation model (DEM) for watershed delineation will be of at least 30-meter resolution or better. Satellite imagery and any available topographic survey will be used for stream / river correction in the DEM.

d. Soil and Land Use

The hydrological soil type and land use will be assessed in the catchment to evaluate Loss, routing and roughness. The hydrological soil type and land use may be marked using satellite imagery and classification methods available in GIS with spot site verification.



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e. Surface Runoff Model

The surface runoff for all ungauged basins will be calculated using tools like “Hydrological Modeling System” (HEC-HMS) and Watershed Modeling System (WMS) for large basins and for small TR-20 can be used. The model will be prepared using GIS techniques / software like HEC-GeoHMS and WMS etc. The preparation will include complete sub-basin characterization like basin area, slope, roughness and lag-time etc. The preferred method is as follows:

- Land use marked according to Anderson method / Land use type
- Loss Method = SCS Curve No.
- Roughness = Manning’s “n”
- Transform SCS Unit Hydrograph
- CN curve numbers estimated from Land use
- Muskingum-Cunge or dynamic for routing
- Streams sections estimated from DEM

The hydrological model will be integrated into hydraulic model based on field survey and judgment, stream and cross drainage structures identification through imagery and marking streams through GIS methods.

The consultant may also take into consideration future catchment changes likely to influence flooding risk.

f. Hydraulic Analysis

The calculated storm flows will be modeled through or around road structures using 1D models like HEC-RAS, HY-8, MIKE 11 and SWMM etc. The culverts in general will be designed using HY-8 based on data prepared through “Watershed Modeling System” and field survey. The bridges and mapping of flood plains will be carried out through 1D hydraulic models like HEC-RAS or MIKE 11. The hydraulic model will be prepared using GIS techniques like HEC-GeoRAS, WMS or MIKE 11.

The hydraulic model results will be used for assessment of flood impact and analysis of alternatives for its mitigation. The hydraulic structures will be designed taking into account standard design criteria for highways.



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Design AEP						Check Flood
Functional classification and structure type	50% (2-yr)	20% (5-yr)	10% (10-yr)	4% (25-yr)	2% (50-yr)	1% (100-yr)
Freeways (main lanes):						
Culverts					•	•
Bridges ⁺					•	•
Principal arterials:						
Culverts			•	•	•	•
Small bridges ⁺			•	•	•	•
Major river crossings ⁺					•	•
Minor arterials and collectors (including frontage roads):						
Culverts		•	•	•		•
Small bridges ⁺			•	•	•	•
Major river crossings ⁺				•	•	•
Storm drain systems on controlled access highways (main lanes):						
Inlets, drain pipe, and roadside ditches			•			
Inlets for depressed roadways*					•	
Storm drain systems on other highways and frontage roads:						
Inlets, drain pipe, and roadside ditches	•	•	•			
Inlets for depressed roadways*				•	•	
+ The 0.5% (200-yr) and 0.2% (500-yr) AEP events should be calculated for scour computations.						

All structures must be evaluated to the 1% Annual Exceedance Probability (AEP) flood event or 100 year return period. Selecting a design flood is a matter of judgment; it requires balancing the flood risk with budgetary constraints. The designer should design a facility that will operate:

- Efficiently for floods smaller than the design flood.
- Adequately for the design flood.
- Acceptably for greater floods.

Deliverable:

The Hydrology & Hydraulic Study Report will be submitted by the consultant which must include but not necessarily limited to the following. The report must be self-explanatory in nature and organized in an intelligible manner. Each & every page of the report must be signed by the concerned specialist/expert and stamped by consulting firm:



- a. Executive Summary.
- b. Reconnaissance survey report.
- c. Detailed flowchart of whole analysis process along with description of tools used at different stages. The flowchart must be supported by comprehensive explanation.
- d. Geo-tagged pictures marked on satellite imagery with respect to catchments.
- e. Detail watershed delineation and analysis.
- f. Meteorological analysis.
- g. Soil and land use classification.
- h. Surface runoff model results.
- i. 1D hydraulic model results for design.
- j. Hydraulic design of structures.
- k. Embankment height according to HFL.

1.7. STRUCTURAL DESIGN

The consultant will carry out detailed design of all the structures and accordingly prepare drawings. For design of structures, codes/standards specified in earlier section of the TOR will be followed.

Deliverable: Structural Design Report along with detailed calculations and drawings. The report must be self-explanatory in all respects and should contain complete references to relevant parts of Codes and Standards employed. All input files used in Structural Analysis will also be made a part of the Report.

1.8. LAND ACQUISITION & UTILITY FOLDER

The consultant will submit ROW plans showing the alignment in order to facilitate any acquisition of land. The Consultant will also prepare estimate for acquiring any land and removal/compensation of any structures and utilities, particularly in built up areas. However, the project shall be designed keeping in view the available space and in case of extreme necessity, the acquisition or structure compensation option shall be explored.

Deliverable: Land Acquisition & Utilities Folder along with estimated cost thereof, trees to be removed along with their sizes and locations, streams/water bodies and railway lines to be crossed etc.



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1.9. CONSTRUCTION MACHINERY REPORT

A detailed report on construction resources will 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 will be stated. Computations and assumptions for productions will be attached in the report. The cost of any equipment to be imported will be reflected in the foreign currency portions of the cost estimates and PC-I.

1.10. FEASIBILITY STUDY

The consultant will prepare and submit a comprehensive feasibility study report of the project.

1.11. FORMULATION OF PC-I

The Consultant will formulate PC-I for construction and then submit requisite copies to NHA. If acquisition of land or structures is involved then PC-I for land will also be prepared and requisite number of copies submitted to NHA.

1.12. ENVIRONMENTAL IMPACT ASSESSMENT (EIA) STUDY

The consultant will carry out EIA Study as per requirements of concerned Environmental Protection Agency (EPA) and then submit a report to NHA. The consultant will be required to conduct public hearing and obtain NOC of report from concerned EPA.

1.13. RIGHT OF WAY MARKERS

If a Provisional Sum is allocated in the non-salary cost, then consultant will be required to install ROW markers as per site requirements and up to satisfaction of NHA.

1.14. TENDER DOCUMENTS

Tender Documents shall comprise of the following: -

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)



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- Forms and Appendices. The consultant will be required to submit complete take-off sheets in editable format for "C" factor along with bidding document.

Volume-II

- General Specifications.

Volume-III

- Particular Specifications, Special Provisions and Bills of Quantities.

Volume-IV (Tender Drawings)

Drawings including at least, but not necessarily limited to, the following details:

- Title Sheet.
- Sheet Index.
- Key & Location Plan with Coordinates and alignment with stationing.
- Location plan showing/demonstrating existing number of lanes and right of way along the project length.
- Location plan showing/demonstrating proposed number of lanes and right of way along the project length after upgradation.
- Soil investigation linear plan. Pits of soil investigations will also be marked.
- A plan showing major quarry sites/ borrow area sites including mass diagram showing cut and fill along the alignment.
- Sheet of Legends & Symbols.
- Traverse, Bench Mark and Design alignment data including curve data.
- Typical Cross-Sections with locations of applications showing Pavement Design for main carriageway, interchanges, and toll plaza (if any) approach roads, and road network (if any) within service areas.
- Detailed Design along with proposed locations of toll plazas, weigh stations etc.
- Cross-sections generated at an interval not exceeding 50m.
- Super-elevation details and Linear Plan.
- Road Furniture (Guard rails, Pavement Markings & Traffic signs etc). Proposed Location of traffic signs and gantries etc., along the alignment must be shown on the drawings.
- Retaining walls (if any) with location tables.
- Intersection Details.



- Drainage plan for surface runoff and urban areas.
- Plan and Profile Drawings.
- Structural Drawings for: new structures and, if applicable, old/existing structures requiring rehabilitation/reconstruction etc.
- Proposed Landscaping & Horticulture as per best international practices and experiences on similar projects, wherever required.
- Roadside Design.
- Proposed Design for Lighting as per best international practices with tailoring considerations to suit local conditions.
- Highway Drainage design.
- Requirement of Traffic Control Devices, Work Zone Safety, and “Maintenance & Protection of Traffic (MPT) Plans”. MPT shall be for the following situations:
 - a) Where any existing road intersection will be affected during project execution.
 - b) In urban areas including methodology for separating the local and through traffic.
 - c) At places where underground construction like construction of box culverts and underpasses is involved.
 - d) At places where overhead bridge construction is proposed.
- Design for provision of ducts/crossing of future utilities like OFC, pipelines etc.
- Detailed design along with location tables of U-turns, side drains, service road, median barrier etc. (if these elements are present in detailed design), as per international standards and best safety practices.
- Detail of design exceptions, assessment of risks associated with exceptions, and risk management measures.

Technical Specifications

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

Bill of Quantities

Consultant shall prepare comprehensive Bill of Quantities to be calculated to reasonable accuracy encompassing all the items of work, properly cross referenced to the Technical Specifications. Standard format of Bill of Quantities shall be adopted. BOQ must be submitted along with editable soft copy of take-off sheets.



Engineer's Estimate

Consultant will prepare Engineer's Estimate of project by using latest Composite Schedule of Rates. For items not specified in NHA CSR, rate analysis will be provided based upon market price. The consultant will be required to submit the take-off sheets in soft format along with Engineer's Estimate in order to enable its review/vetting.

2. PRESENTATION

The Consultant will give detailed presentation on any aspect of the project as, when, and where required/ directed by NHA. At the end of design, the consultant will make a presentation including but not limited to following details:

1. Description of road alignment.
2. Description of design criteria and functional requirements.
3. Important components of project like major bridges, flyovers etc.
4. Important parameters of sub-soil investigation like CBR, Pile Capacity and General Soil Classification etc.
5. Important hydraulic parameters used in the design of bridges over rivers/ canals.
6. Results of traffic studies.
7. Location of quarry sites.
8. Traffic management plans.
9. Description of specialized equipment and machinery required for the construction.
10. Description of methodology and codes for design including details of computer models.
11. A plan showing major quarry sites/ borrow area sites including mass diagram showing cut and full along the alignment will be presented.
12. Any other points, which the consultant may like to highlight, should be included.

3. SUBMISSION OF DOCUMENTS

All the Reports associated with each Task will be submitted in a timely manner after necessary quality. Each & every page of all submissions made by the consultant must be signed and stamped failing which the document may not be considered for approval or acceptance. All pages and sheets must be properly numbered.

Deliverables may be reviewed by NHA. Consultant will give consideration to review comments and observations; however, any review will not absolve the consultant from contractual responsibility for correctness, safety, soundness, and economy of design including Engineer's Estimate.



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After finalization of draft submissions in the light of review comments, if any, five (05) hard copies of final version of each deliverable will be submitted to NHA along with Soft Copy except PC-I for which requisite number of copies will be submitted as per requirement of NHA or Planning Commission. If requested by NHA, Consultant will provide two additional sets of all documents/reports to the Client at a later stage at no extra cost.

After finalization of all submissions, 05 nos. DVDs containing all documents/ drawings/ reports/ analysis sheets/ software files in soft editable format, properly indexed/ catalogued, will be submitted to NHA. This will be a mandatory requirement failing which contract close-out will remain in abeyance.

4. PERFORMANCE RATING

The performance and deliverables of the consultant may be evaluated by NHA on basis of multiple factors including but not necessarily limited to quality of submissions, compliance with requirements, responsiveness, diligence, efficiency, consideration of economy, scope management, schedule management, cost management, risk management, and above all the level of faithfulness as an adviser. Performance rating will broadly be made in the following manner:

Rating	Description
A+	Excellent
A	Good
B	Requiring improvement
Poor	Poor

NHA reserves the right to develop a detailed breakdown/matrix for implementing above mentioned ratings. In addition to this, it is highlighted that NHA Code (Revised 2005) authorizes NHA to exercise appropriate actions against consultant in case of errors in design.

5. FUTURE ASSISTANCE

The consultant will be required to provide professional assistance in addressing any future audit observations, inquiries, investigations, litigation, or any other reasonable requirement related to the services carried out and solutions proposed under this TOR.



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6. MODE OF PAYMENT

S. No.	Description	Percentage of A*
1.	Topographic Survey Report along with Plans	10%
2.	Traffic Survey Report	10%
3.	Soil & Material Investigation Report	Lump Sum
4.	Pavement Design Report	5%
5.	Hydrology & Hydraulic Study Report	10%
6.	Structural Design Report	10%
7.	Land Acquisition & Utility Folders	5%
8.	Construction Machinery Report	5%
9.	Feasibility Study Report	10%
10.	PC-I	10%
11.	EIA Study Report and NOC	10%
12.	Tender Documents and Engineer's Estimate etc.	15%
Total:		100%

Notes:

- *A is to be determined by excluding all above Lump Sum amounts from Contract Price.
- Upon checking the report that it is in line with the TOR, 50% payment shall be released. 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.
- Draft version of submissions may be reviewed by NHA and observations, if any, communicated to Consultants for consideration. Final version of each submission will be rated as 'A+', 'A', 'B', or 'Poor' by NHA and payment will accordingly be made by ensuring that requisite number of hard copies along with soft copy have been received by NHA within contract time.



7. MINIMUM PERSONNEL PROPOSED BY THE CLIENT

S. No.	Position	Nos.	Months	Person Months ¹
A. KEY PERSONNEL				
1.	Team Leader/ Sr. Highway Engineer	01	4	4
2.	Hydrology and Drainage Engineer	01	2	2
3.	Pavement Specialist	01	2	2
4.	Structure Engineer	01	3	3
5.	Environmental Engineer	01	1	1
6.	Material Engineer	01	2	2
7.	Quantity Surveyor	01	3	3
	Sub-Total (A):	09	-	17
B. NON KEY PERSONNEL				
8.	CAD Operator	01	3	3
9.	Computer Operator	01	4	4
10.	Surveyors	02	4	8
	Sub-Total (B):	04	-	15
	Total (A + B):	13	-	32

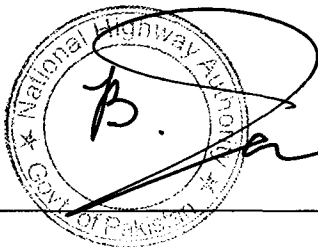
* *Pavement Specialist will also carry out traffic studies and surveys.*



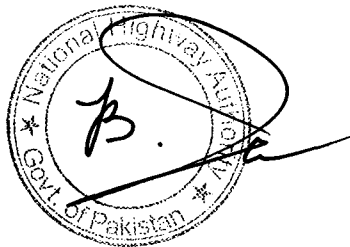
¹The proposed person-months are as per Client's assessment; if the consultant has reservation/opinion/suggestion regarding proposed person-months it may convey same in writing during Pre-Proposal Meeting or even after Pre-Proposal Meeting but before the last date for seeking clarification, for review and decision of NHA which will be communicated to all the prospective bidders.

8. QUALIFICATION AND EXPERIENCE CRITERIA FOR KEY PERSONNEL

Position	Qualification and Experience Criteria
Team Leader/ Senior Highway Engineer	<p>Minimum B.Sc. (Civil Engineering) with minimum twenty (20) years' relevant experience [proven fifteen (15) years' design experience as Highway/ Geometric Design Engineer on National Highways Projects];</p> <p>-OR-</p> <p>M.Sc. (Transportation Engineering) with minimum eighteen (18) years relevant experience [proven thirteen (13) years' design experience as Highway/ Geometric Design Engineer on National Highways Projects].</p> <p>He/she must also have performed as Team Leader for at least three (03) major Highway Design Projects.</p>
Hydrology & Drainage Engineer	<p>Minimum B.Sc. (Civil Engineering) with minimum twenty (20) years relevant experience [proven eighteen (18) years' design experience as Hydrology & Drainage Engineer on major Highway and Bridge Projects];</p> <p>-OR-</p> <p>M.Sc. (Hydrology/ Drainage/ Hydraulic Engineering) with minimum eighteen (18) years relevant experience [proven sixteen (16) years' design experience as Hydrology & Drainage Engineer on major Highway and Bridge Projects];</p>
Pavement Specialist	<p>Minimum B.Sc. (Civil Engineering) with minimum twenty (20) years' relevant experience [proven fifteen (15) years' design experience as Pavement Specialist on major Highway Projects];</p> <p>-OR-</p> <p>M.Sc. (Traffic Engg./ Transportation Engg./ Highway Engg.) with minimum eighteen (18) years' relevant experience [proven thirteen (13) years' design experience as Pavement Specialist on major Highway Projects].</p>
Structural Engineer	<p>Minimum B.Sc. (Civil Engineering) with minimum twenty (20) years' relevant experience (proven fifteen (15) years' design experience as Structure Engineer on National Highways Projects);</p> <p>-OR-</p> <p>M.Sc. (Structural Engineering) with minimum eighteen (18) years relevant experience [proven thirteen (13) years' design experience as Structure Engineer on National Highways</p>



Position	Qualification and Experience Criteria
	Projects];
Environmental Engineer	<p>Minimum B.Sc. (Civil Engineering/ Environmental Engineering) or M.Sc. (Environmental Sciences) with minimum fifteen (15) years' relevant experience [proven ten (10) years' experience as Environmental Engineer on mega Civil Engineering preferably Highway Projects];</p> <p>-OR-</p> <p>M.Sc. (Civil Engineering/ Environmental Engineering) with minimum thirteen (13) years' relevant experience [proven eight (08) years' experience as Environmental Engineer on mega Civil Engineering preferably Highway Projects];</p>
Material Engineer	<p>Minimum B.Sc. (Civil Engineering)/ M.Sc. (Geology) with minimum twenty (20) years' relevant experience [proven fifteen (15) years' experience as Material Engineer on highway and bridge design projects];</p> <p>-OR-</p> <p>M.Sc. (Civil Engineering) having Soil Mechanics as major subject with minimum eighteen (18) years' relevant experience [proven thirteen (13) years' experience as Material Engineer on highway and bridge design projects];</p>
Quantity Surveyor	<p>DAE (Civil); preferably having Bachelor's in Civil Engineering;</p> <p>In case of DAE having minimum eighteen (18) years post-qualification experience in Highway Sector which includes proven ten (10) years' experience as Quantity Surveyor on Highway Projects;</p> <p>-OR-</p> <p>In case of Bachelor's Degree having minimum fifteen (15) years post-qualification experience in Highway Sector including seven (7) years' experience as Quantity Surveyor on Highway Projects;</p>



CHAPTER NO.4

ENVIRONMENTAL IMPACT ASSESSMENT OF ROADS/ HIGHWAYS PROJECTS

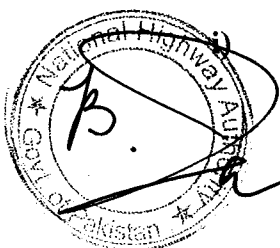
1. Need for Environmental Impact Assessment (EIA)

Highway projects are generally undertaken to improve the economic and social welfare of the people. At the same time, they may also create adverse impacts 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:

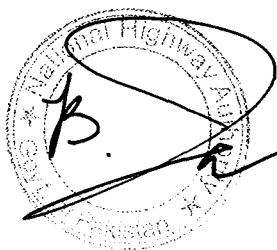
- Establishing the environmental baseline in the study area and identifying any significant environmental issue;
- Assessing these impacts and providing for the requisite avoidance, mitigation and compensation measures;
- Integrating the identified environmental issues in the project planning and design;
- 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 Climate Change, 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 EIA of projects.



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 Categorization.** The Consultants should categorize the project (category A or B and IEE or EIA) as per Environmental Protection Act and guidelines & procedures derived therein and as per donor agencies Environmental Safeguards and Policies which ever are applicable.
- 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.

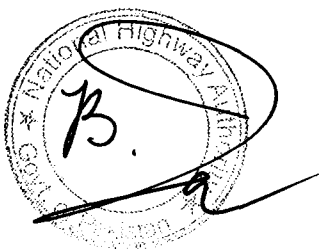
i) **AMBIENT AIR QUALITY:**

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).

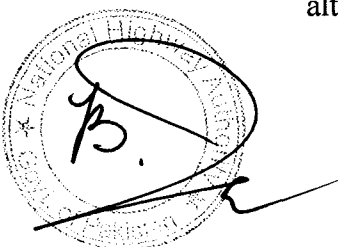
iii) WATER QUALITY:

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 20oC, 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.

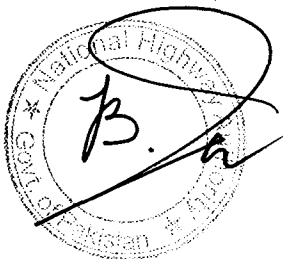
For each alternative, the environmental cost and benefits should be quantified to the possible extent, and economic values should be attached where feasible. The basis for the selection of alternative proposal for the project design must be stated.

- viii) (A) **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.
- (B) **Grievance Redress Mechanism (GRM).** An effective, feasible and project Specific GRM will be proposed with all required details.

- 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 EMP cost plus monitoring cost together will be minimum 1% of total project cost so that these can be implemented in true letter & spirit at later stages. Same cost will be given in PC-1 for EMP. This cost will be part of Bill of Quantities as separate item. 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, environmentally sound camp sites & borrow pits identification, mapping and characterization, 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

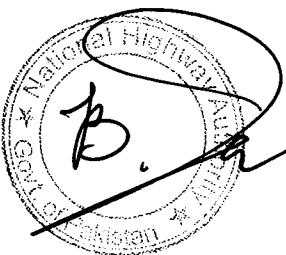


recommend mitigation measures for any unexpected impact or where the impact level exceeds the limits. The plan should ensure compliance with legal and community obligations including safety on construction sites. Consultants should monitor the rehabilitation of borrow areas and the restoration construction 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.

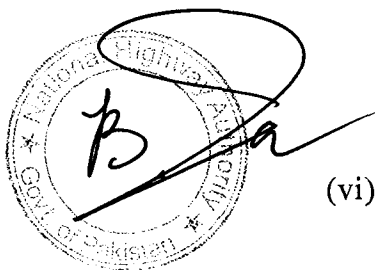
The title page of the report should specify the report name, project name, highway length, scaled maps and / or colored photographs, date of the report, Consultants company name, address, phone numbers, e-mail and logos.



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 Management & 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) It will be the responsibility of EIA Consultant to arrange joint visit (Consultant and Environment NHA HQ team) to the field before finalization of EIA Report.
- (iii) After incorporating the comments from NHA, bureau of Environmental Protection/Provincial EPAs and donor agencies Consultants should finalize the report.
- (iv) Consultants required submitting two hard copies and one soft copy of final EIA report to NHA.
- (v) 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, estimates & sources of water & powers usage, estimates of liquid & solid waste generation for the project construction and number of labor force (employees) required for the project construction and operation phases.
- (vi) 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 fulfilling all codal requirements. Further to this publishing of advertisements regarding public hearing and

preparation of presentations, banners, sitting arrangements and all other will be responsibility of the Consultant.

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.	20%
(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.	30%
(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 four (04) months from the Date of Commencement of Services.

Non Compliance: If Consultants fails to comply NHA's instruction and is not able to obtain NOC from concerned EPA in minimum defined period in law; 50% of total cost will be deducted whatsoever be the reasons.

