National Highway Authority

ISO 9001:2015 Certified

FRIENDLY HIGHWAYS

REQUEST FOR PROPOSAL

For

CONSULTANCY SERVICES FOR FEASIBILITY STUDY & DETAILED DESIGN FOR REALIGNMENT OF MOTORWAY M-2 IN SALT RANGE AREA (APPROX. 10 KM)

Tender No. 6(640)

Pages-1 to 187

July, 2024

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

Dated the _____
Ref No._____

LETTER OF INVITATION (LOI)

To,

All prospective consultants

Gentlemen!

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

General Manager (P&CA)
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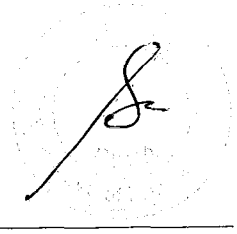
E-mail :gmpca.nha@gmail.com,
Website: www.nha.gov.pk



ATTACHMENTS

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

INSTRUCTIONS TO CONSULTANTS

1. INTRODUCTION

1.1 You are hereby invited to submit a technical and a financial proposal for consulting services required for the assignment named in the attached **Data Sheet** (referred to as "**Data Sheet**" hereafter) annexed with this letter. Your proposal could form the basis for future negotiations and ultimately a Contract between your firm and the Client named in the **Data Sheet**.

1.2 A brief description of the assignment and its objectives are given in the **Data Sheet**. Details are provided in the attached RFP for design services provided in the Documents and will become part of agreement subsequently.

1.3 The assignment shall be implemented in accordance with the phasing specified in the **Data Sheet.**

1.4 The Client has been entrusted the duty to implement the Project as Executing Agency by Government of Pakistan (GoP) and funds for the project shall be arranged by the Client.

1.5 To obtain first-hand information on the assignment and on the local conditions, you are encouraged to pay a visit to the Client before submitting a proposal and attend a pre-proposal conference if specified in the **Data Sheet**. Your representative shall meet the named officials on the date and time specified in the **Data Sheet**. Please ensure that these officials are advised of the visit in advance to allow adequate time for them to make appropriate arrangements. You must fully inform yourself of local conditions and take them into account in preparing your proposal.

1.6 The Client shall provide the inputs specified in the **Data Sheet**, assist the Consultants in obtaining licenses and permits needed to carry out the services, and make available relevant project data and reports.

1.7 Please note that:

i. The cost of preparing the proposal and of negotiating the Contract, including a visit to the Client, are not reimbursable as a direct cost of the Assignment, and

ii. The Client is not bound to accept any of the proposals submitted.

1.8 The names of the invited consultants are given in the **Data Sheet**.

1.9 We wish to remind you that in order to avoid conflicts of interest:

a) Any firm providing goods, works, or services with which you are affiliated or associated is not eligible to participate in bidding for any goods, works, or services (other than the services and any continuation thereof) resulting from or associates with the project of which this assignment forms a part; and

b) Any previous or ongoing participation in relation with the project by your firm, its professional staff, its affiliates or associates under a Contract may result in rejection of your proposal. You should clarify your situation in that respect with the Client before preparing the proposal.

1.10 A firm may submit its proposal for the Assignment either as an independent Consultant or as a Member of a JV Consultants but participation of a firm occurring in more than one proposal for the Assignment is not allowed. In case a firm participates in more than one proposal, all such proposals shall be **disqualified and rejected**. However, this condition does not apply for individual Specialist Sub-consultant(s).

2. DOCUMENTS

2.1 To prepare a proposal, please use the Documents specified in the **Data Sheet**.

2.2 Consultants requiring a clarification of the Documents must notify the Client, in writing, not later than twenty-one (21) days before the proposal submission date. Any request for clarification in writing, or by cable, telex or tele-fax shall be sent to the Client's address specified in the **Data Sheet**. The Client shall respond by cable, telex or tele-fax to such requests and copies of the response shall be sent to all invited Consultants.

2.3 At any time before the submission of proposals, the Client may, for any reason, whether at its own initiative or in response to a clarification requested by an invited consulting firm, modify the Documents by amendment. The amendment shall be sent in writing or by cable, telex or tele-fax to all invited consulting firms and will be binding on them. The Client may at its discretion extend the deadlines for the submission of proposals.

3. PREPARATION OF PROPOSAL

It will consist of two parts – Technical and Financial

3.1 Technical Proposal

3.1.1 The Technical Proposal should be submitted using the format specified and shall include duly signed and stamped forms appended with the RFP. This is a **mandatory requirement** for evaluation of proposals and needs to be filled up carefully.

3.1.2 For Technical Proposal, the general approach and methodology which you propose for carrying out the services covered in the TOR, including such detailed information as you deem relevant, together with your appreciation of the Project from provided details and –

(a) A detailed overall work program to be provided with timing of the assignment of each expert or other staff member assigned to the project. This will also provide the Client an opportunity to effectively monitor work progress.

(b) Total number of man-months and project duration as per TOR.

(c) Clear description of the responsibilities of each expert staff member within the overall work program.

(d) The Curriculum Vitae (CV) of all Key Staff members and an affidavit that proposed staff shall be available for the assignment during the project duration and their present place of duty must also be specified. The Consultants are advised to suggest such names that shall be available for the Assignment.

(e) The technical proposal shall include duly filled in forms provided with this RFP. The name, background, and professional experience of each expert staff member to be assigned to the project, with particular reference to his experience of work of a nature similar to that of the proposed assignment.

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

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

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

a. The Firm needs to be registered with Pakistan Engineering Council (PEC).

b. If you consider that your firm does not have all the expertise for the assignment you may obtain a full range of experience by associating with other firms or entities. You may also utilize the services of expatriate experts but only to the extent for which the requisite expertise is not available in any Pakistani firm. In case of Joint Venture, the proposal should state clearly partners will be "Jointly and Severally" responsible for performance under the Contract and one (Representative) partner will be responsible for all dealings with the Client on behalf of the Joint Venture. Its "Power of Attorney" on this account is to be enclosed. The representative partner shall retain the responsibility for the performance of obligations and satisfactory completion of the consultancy services. PEC registers a foreign consulting firm for issuing license to provide consultancy services in Pakistan, which is based on formation of JV with the condition that the foreign consulting firm shall provide only that share of consultancy services by the JV for which expertise is not available with Pakistani consulting firms. A copy of JV agreement to be provided at the time of finalizing the contract documents with specific responsibilities and assignments to be looked after by each partner.

c. Subcontracting part of the assignment to the other Consultants is not discouraged and Specialist Sub-Consultants may be included.

d. The key professional staff proposed shall be permanent employees of the firm unless otherwise specified in the **Data Sheet**. The minimum stay with the firm for such persons is Six months. No alternative to key professional staff may be proposed and only one CV may be submitted for each position. The minimum required experience of proposed Key Staff is specified in the **Data Sheet**.

e. The training shall be imparted during the currency of the contract if specified in the **Data Sheet**.

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

3.2 Financial Proposal

3.2.1 The financial proposal should be submitted using the format specified and enclosed with this RFP. This is a mandatory requirement for evaluation of proposals and needs to be filled up carefully. The total cost is to be specified in the Form A-17 and accordingly also in Form A-11.

3.2.2 The financial proposal should list the costs associated with the Assignment. These normally cover remuneration for staff in the field and at headquarters, per diem, housing, transportation for mobilization and demobilization, services and equipment (vehicles, office equipment furniture and supplies), printing of documents, surveys and investigations. These costs should be broken into foreign (if applicable) and local costs. Financial proposal should be prepared using the formats attached as forms A-11 to A-17.

3.2.3 The financial proposal shall also take into account the professional liability as provided under the relevant PEC Byelaws and cost of insurances specified in the **Data Sheet**.

3.2.4 Costs may be expressed in currency (s) listed in the **Data Sheet**.

3.2.5 The evaluation committee will correct any computational errors. When correcting computational errors, in case of discrepancy between a partial amount and the total amount, or between words and figures the formers will prevail. In addition to the above corrections, activities and items described in the Technical Proposals but not priced, in the Financial Proposals shall be assumed to be included in the prices of other activities or items. In case an activity or item is quantified in the Financial Proposal differently from the Technical Proposal, the evaluation committee shall correct the quantification specified in the Financial Proposal so as to make it consistent with that specified in the Technical Proposal.

4. SUBMISSION OF PROPOSALS

4.1 You shall submit one original technical proposal and one original financial proposal and the number of copies of each specified in the **Data Sheet**. Each proposal shall be in a separate envelope indicating original or copy, as appropriate. All technical proposals shall be placed in an envelope clearly marked "Technical Proposal" and the financial proposals in the one marked "Financial Proposal". These two envelops, in turn, shall be sealed in an outer envelope bearing the address and information specified in the **Data Sheet**. The envelope shall be clearly marked, "DO NOT OPEN, EXCEPT IN PRESENCE OF THE EVALUATION COMMITTEE."

4.2 In the event of any discrepancy between the copies of the proposal, the original shall govern. The original and each copy of the technical and financial proposals shall be prepared in indelible ink and shall be signed by the authorized Consultant's representative. The representative's authorization shall be confirmed by a written power of attorney accompanying the proposals. All pages of the technical and financial proposals shall be initialed by the person or persons signing the proposal.

4.3 The proposal shall contain no interlineations or overwriting except as necessary to correct errors made by the Consultants themselves. Any such corrections shall be initialed by the person or persons signing the proposal.

4.4 The completed technical and financial proposals shall be delivered on or before the time, date, and the location specified in the **Data Sheet**.

4.5 The proposals shall be valid for the number of days stated in the **Data Sheet** from the date of its submission. During this period, you shall keep available the professional staff proposed for the assignment. The Client shall make its best effort to complete negotiations at the location stated in the **Data Sheet** within this period.

5. PROPOSAL EVALUATION

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

5.2 Technical Proposal

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

5.3 Financial Proposal

5.3.1 The financial proposals of technically qualifying Consultants on the basis of evaluation of technical proposals shall be opened in the presence of the representatives of these Consultants, who shall be invited for the occasion and who care to attend. The Client shall inform the date, time and address for opening of financial proposals as specified in the **Data Sheet**. The total cost and major components of each proposal shall be publicly announced to the attending representatives of the firms.

5.3.2 The evaluation committee shall determine whether the financial proposals are complete and without computational errors. The lowest financial proposal (Fm) among all shall be given a financial score: Sf of 1000 points. The financial scores of the proposals shall be computed as follows:

$$Sf = (1000 \times Fm)/F$$

(F = amount of specific financial proposal)

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

$$S = St \times T\,\% + Sf \times P\%$$

6. NEGOTIATION

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

6.2 Negotiations normally take from two to five days. The aim is to reach agreement on all points and initial a draft contract by the conclusion of negotiations.

6.3 Negotiations shall commence with a discussion of your technical proposal. The proposed methodology, work plan, staffing and any suggestions you may have made to improve the TOR. Agreement shall then be reached on the final TOR, the staffing, and the bar charts, which shall indicate activities, staff, and periods in the field and in the home office, staff months, logistics and reporting.

6.4 Changes agreed upon shall then be reflected in the financial proposal, using proposed unit rates (no negotiation of the staff month rates).

6.5 Having selected Consultants on the basis of, among other things, an evaluation of proposed key professional staff, the Client expects to negotiate a contract on the basis of the staff named in the proposal. Prior to contract negotiations, the Client shall require assurances that the staff members will be actually available. The Client shall not consider substitutions of key staff except in cases of un-expected delays in the starting date or incapacity of key professional staff for reasons of health.

6.6 The negotiations shall be concluded with a review of the draft form of the contract. The Client and the Consultants shall finalize the contract to conclude negotiations. If negotiations fail, the Client shall invite the Consultants that received the second highest score in ranking to Contract negotiations. The procedure will continue with the third in case the negotiation process is not successful with the second ranked consultants.

7. AWARD OF CONTRACT

7.1 The contract shall be awarded after successful negotiations with the selected Consultants and approved by the competent authority. Upon successful completion of negotiations/ initialing of the draft contract, the Client shall promptly inform the other Consultants that their proposals have not been selected.

7.2 The selected Consultant is expected to commence the assignment on the date and at the location specified in the **Data Sheet**.

8. CONFIRMATION OF RECEIPT

8.1 Please inform the Client by telex/facsimile courier or any other means:

i. That you received the letter of invitation;

ii. Whether you will submit a proposal; and

iii. If you plan to submit a proposal, when and how you will transmit it.

DATA SHEET

LOI Clause No.	DESCRIPTION OF CLAUSE
1.1	The name of Assignment is: **"Consultancy Services for Feasibility Study & Detailed Design for Realignment of Motorway M-2 in Salt Range Area (Approx. 10 km)."** The Client's Name is: **National Highway Authority**
1.2	The description and the objectives of the assignment are: **As per TOR**
1.3	Phasing of the Assignment (if any): **Nil** The Consultant shall commence the assignment upon signing of Contract Agreement between NHA and the successful Consultant.
1.5	Pre-Proposal Conference: **Yes** ___√___ **No** _____ The name(s) and address(es) of the Official(s) is (are): **General Manager (P&CA)** National Highway Authority 28, Mauve Area, G-9/1 Islamabad Date, Time and Venue for Pre-Proposal Conference: **Date: 24th July, 2024** **Time: 1100 hours** **Venue: General Manager (P&CA)** National Highway Authority 28, Mauve Area, G-9/1 Islamabad.
1.6	The Client shall provide the following inputs: **As per TOR and Appendix E.**
1.7	Following sub-clauses are added: iii. Form A-4 is meant for comments on provision contained in RFP and Terms of Reference (TOR) and unless the observations are noted in this particular form, anything written elsewhere on this account including financial implications, if any, shall be considered of no consequence in the evaluation process. iv. Consultants may form a Joint Venture (JV) to qualify for the Assignment in such case the contract will be signed between the Client and all members of the JV on the prescribed Form included in Appendix F (copy of Model Agreement) subject to the ranking and successful negotiations. To promote the consultancy industry in the country, 50 marks (out of 1000 for Evaluation) are allocated for Transfer of Knowledge in the form of association (sub-consultant) with a new/ less experienced firm by sharing upto 7.5% of Assignment with them. v. Except as the Client may otherwise agree, no changes shall be made in the Key

	Personnel during the Contract period. If, for any reason beyond the reasonable control of the Consultants, it becomes necessary to replace any of the Key Personnel, then the Consultants at the written instructions of Client shall provide as a replacement with equivalent or better qualification. vi. The Consultants shall clear all payable dues and salaries of its staff 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 on behalf of the Consultants and recover from the invoice of the Consultants the actual charges paid plus a penalty of 1% of this amount. This will also be accounted adversely in making assessment of the Consultants in the next evaluation process, if such defaults are reported by any section of the NHA. vii. The payment to the sub-consultant shall be the responsibility of the Lead firm as per the agreed services. Detail/Proof of the payment to the sub-consultant will be submitted along with the relevant invoice (s).
1.8	The Invited Consultants/ **Eligible Consultants** are: Any firm meeting the following requirements: **Eligibility of Consultants:** **(I)** Technical Proposal: i. For Single Entity, Valid Registration Certificate of Pakistan Engineering Council with Project Profile Code of 1215 (ii) *(Highways/ Bridges/Tunnels as applicable)*. In case of JV, experts proposed by each consultant should have relevant project profile code of 1215 (ii.) (Highways/ Bridges/Tunnels) as applicable. In case of formation of JV with foreign consultant in such case foreign consulting firms shall make JV in accordance with Byelaw 6(2) and Byelaw 9 of the Pakistan Engineering Council (Conduct and Practice of Consulting Engineers) Bye-Laws 1986. Failure to provide Registration Certificate (license) of the firms/ Relevant registration documents/receipts (in case of foreign consulting firm) (each member in case of JV) by the PEC will entitle the Client to reject proposal. ii. All JV partners/firms must be registered and on Active Taxpayer list (ATL) of Federal Board of Revenue (FBR). Proof along with valid NTN No. shall be provided. iii. In case of JV members, Letter of Intent to form JV on each firm's letter head is required in original *(scanned copy is not acceptable). The specimen is attached at* ***Annexure-A*** iv. TECHNICAL PROPOSAL FORMS A-1 to A-10 duly completed as per Instructions to Consultants/ Data Sheet and requirements of TOR (To be attached with Technical Proposal except Form A-4, which can be submitted with or without comments) v. Lists of facilities available with the Consultant to perform their functions effectively (software, hardware, etc.). In case of JV, the same will be provided by the lead firm only. **(II)** Financial Proposal: i. FINANCIAL PROPOSAL FORMS A-11 to A-17 and PROPOSAL SECURING DECLARATION duly completed as per Instructions to Consultants/ Data Sheet and requirements of TOR (To be attached with Financial Proposal). *Scanned financial proposal shall be* ***rejected.*** ii. While engaging in Public Procurement contracts worth Rs. 50 million and above, each Consultant (lead and their JV Members) shall provide duly filled Performa of

	"Declaration of Ultimate Beneficial Owners Information for Public Procurement Contracts", in their Financial Proposals, which is attached as Annexure-I at the end of this RFP. **(III)** The proposals (technical + financial) should be bound in hard book binding form to deny the possibility of removal or addition of page(s). All the pages of proposals must be signed and stamped in original by authorized representative of the firm/JV. All the pages must be numbered starting from first page to last. At the time of proposal submission/ opening, page numbering, signing and stamping of proposals will be checked by Committee Members. If any minor discrepancy is found, then same shall be asked by the Committee members to the Authorized Representative of firms to correct it in front of all committee members. In the absence of authorized representative, the concerned firm will be announced **dis-qualified/ non-responsive**. **Note: If the financial proposal of the Consultant is found non-responsive, then for evaluation purpose, financial score of the Consultant shall be given as zero.**
2.1	The Documents are: (a) Letter of Invitation (LOI). (b) Instructions to Consultants (ITC). (c) Data Sheet. (d) Technical Proposal Forms. (e) Financial Proposal Forms (f) Appendix – A: TOR and Background Information. (g) Appendix – B: List of Supporting Documents (h) Appendix – C: Man-Months and Activity Schedule (i) Appendix – D: Client's Requirements from the Consultant. (j) Appendix – E: Personnel Equipment, Facilities and Other Services to be provided by the Client. (k) Appendix – F: Copy of Model Agreement/ Draft Form of Contract & Appendices etc. (l) Form of Contract *(For Consultants to perform services as a Joint Venture)*
2.2	The words "Twenty-one (21)" is deleted in its entirety and replaced with "Ten (10)". The information will be shared through email or courier. The address for seeking clarification is: **General Manager (P&CA)** National Highway Authority 28, Mauve Area, G-9/1, Islamabad E-mail: gmpca.nha@gmail.com
2.3	Add following clause: "The information will be shared to all prospective consultants through uploading on

	NHA website/ PPRA Website or publishing on Newspapers whatever the case".
3.1.4	a. Add following at the end of Sub – Para 3.1.4 (b): Clearly mention the percentage and detail of share as well of each JV partner in the JV agreement. First page of the JV agreement must be on Stamp Paper of minimum Rs. 100 duly attested by the Oath Commissioner. c. The term associates, if used in the proposal or otherwise shall not be considered as an alternative of JV member. Any personnel proposed for the Assignment but belonging to the so-called associates (Sub-consultants) shall not be marked in evaluation of technical proposal like in case of Sub-consultants (except individual Specialist Sub-consultants having unique expertise which is rarely available OR an expatriate Personnel) who are not supposed to contribute in qualification of their main consultants. **Yes** ___√___ **No** _____ The minimum required experience of proposed Key Personnel is given below:

FOR KEY PERSONNEL	
Team Leader / Tunnel Engineer	**Education:** Preferably PhD (Tunnel Engineering) or PhD (Geotechnical Engineering/ Structure Engineering with Experience in Tunnel Engineering) or minimum M.Sc. in Tunnel Engineering/ M.Sc. in (Structure Engineering/ Geotechnical Engineering with Experience in Tunnel Engineering). **Experience:** Preferably twelve (12) years' relevant experience on Highways/Tunnel Design/Design review projects. He/ she must also have preferably five (05) years' experience in lead role i.e., as a Team Leader/ Equivalent on major Highway/Tunnel Design/Design Review projects. **Rating**: PhD. with relevant training - 100%; PhD. without relevant training - 90%; M.Sc. with relevant training - 80%; M.Sc. without relevant training - 70%.
Senior (E&M) Expert	**Education:** Preferably M.Sc. in (Mechanical / Electrical/Electronic Engineering with Experience in E&M works of Tunnel Engineering) or Minimum B.Sc (Mechanical / Electrical/Electronic Engineering with Experience in E&M works of Tunnel Engineering). **Experience:** Preferably twelve (12) years relevant experience as E&M expert on Highway/Tunnel Design projects] **Rating**: M.Sc. with relevant training - 100%; M.Sc. without relevant training - 90%; B.Sc. with relevant training - 80%; B.Sc. without relevant training - 70%.
Electrical & Mechanical (E&M) Expert for Tunnel	**Education:** Preferably M.Sc. in (Mechanical / Electrical/Electronic Engineering with Experience in E&M works of Tunnel Engineering) or Minimum B.Sc (Mechanical / Electrical/Electronic Engineering with Experience in E&M works of Tunnel Engineering). **Experience:** Preferably ten (10) years relevant experience as E&M expert on Highway/Tunnel Design projects] **Rating**: M.Sc. with relevant training - 100%; M.Sc. without relevant

		training - 90%; B.Sc. with relevant training - 80%; B.Sc. without relevant training - 70%.
	Senior Geologist	**Education:** Preferably M.Sc. (Geological Engineering) or minimum B.Sc. (Geological Engineering)/ M.Sc. Geology. **Experience:** Preferably twelve (12) years' relevant experience as Senior Geologist on major Highway/Tunnels Projects. Weightage shall be given to the experience in similar geographical conditions **Rating**: M.Sc. with relevant training - 100%; M.Sc. without relevant training - 90%; B.Sc./M.Sc. Geology with relevant training - 80%; B.Sc./ M.Sc. Geology without relevant training - 70%.
	Senior Geologist/ Slope Stability Expert	**Education:** Preferably M.Sc. (Soil Mechanics/ Geo-Tech Engineering) or minimum B.Sc. (Civil Engineering/ Geo-Tech Engineering/Geological Engineering)/ MSc. Geology. **Experience:** Preferably twelve (12) years' relevant experience on major Highway/Tunnels Projects. Weightage shall be given to the experience in similar geographical conditions. **Rating**: M.Sc. with relevant training - 100%; M.Sc. without relevant training - 90%; B.Sc. with relevant training - 80%; B.Sc. without relevant training - 70%.
	Senior Highway Engineer	**Education:** Preferably M.Sc. (Transportation Engineering) or minimum B.Sc. (Civil Engineering). **Experience:** Preferably fifteen (15) years' design experience [proven ten (10) years' design experience as Senior Highway Engineer on National Highways Projects] **Rating**: M.Sc. with relevant training - 100%; M.Sc. without relevant training - 90%; B.Sc. with relevant training - 80%; B.Sc. without relevant training - 70%.
	Senior Structural Engineer	**Education:** M.Sc. (Structural Engineering) or minimum B.Sc. (Civil Engineering). **Experience:** Preferably fifteen (15) years' relevant experience [proven ten (10) years' design experience as Senior Structural Engineer on National Highways Projects]. **Rating**: M.Sc. with relevant training - 100%; M.Sc. without relevant training - 90%; B.Sc. with relevant training - 80%; B.Sc. without relevant training - 70%.
	Transport Economist	**Education:** Preferably M.Sc. Transport Economist/ M.Sc. (Transportation Engineering) / M.Sc. Economics with Diploma in Transport Economist or minimum B.Sc. (Transportation Engineering) or M.Sc. Economics. **Experience:** Preferably twelve (12) years' design experience as Transport Economist on Highways/ Roads Projects. **Rating**: M.Sc. with relevant training - 100%; M.Sc. without relevant training - 90%; B.Sc. (Transportation Engineering)/ M.Sc. Economics with relevant training - 80%; B.Sc.(Transportation Engineering) or M.Sc. Economics without relevant training - 70%.

	Note: The Consultants are advised to submit updated CV's strictly in compliance with the format of CVs given in Technical Proposal Form A-5. CVs submitted without regard to the said format may score low.
	e. Training is an important feature of this Assignment: **Yes** √ **No** _____ If Yes, details of training are given in TOR
3.2.3	Professional liability, insurances (description or reference to appropriate documentation): i. The Consultants shall be responsible for Professional Indemnity Bond of the required amount at their own cost. This bond shall be in the joint name of Consultant and the Client. ii. The Consultants are required to insure their Employees and Professionals for Hospitalization/ Medical, Travel and Accident Cover for the duration of the Contract. The details provided in Para 3.5 of Special Conditions of Contract in Model Contract.
3.2.4	The currency of cost shall be expressed in **Pak. Rupees.**
4.1	The number of copies of the Proposal required is: **TECHNICAL PROPOSAL:** **ONE ORIGINAL AND THREE COPIES WITH CD/USB (SOFT FORM OF COMPLETE TECHNICAL PROPOSAL IN PDF FORM) IN SEALED ENVELOPE** **FINANCIAL PROPOSAL:** **ONE ORIGINAL WITH CD/USB (SOFT FORM OF COMPLETE FINANCIAL PROPOSAL IN PDF AS WELL AS MS WORD/ EXCEL FORMS) IN SEALED ENVELOPE** The address for writing on the proposal is: **General Manager (P&CA)** National Highway Authority 28, Mauve Area G-9/1 Islamabad Telephone: +92-51-9032727, Facsimile: +92-51-9260419
4.4	The date and time of proposal submission is: Date: **16th August, 2024** Time: **1130 hours** Location of Submission: **General Manager (P&CA)** National Highway Authority 28-Mauve Area G-9/1 Islamabad
4.5	Validity period of the proposal is: **270 days (Proposal shall be valid for 270 days after the date of submission of proposal).** The location for negotiation of proposal is: **General Manager (P&CA)** National Highway Authority 28-Mauve Area G-9/1 Islamabad Telephone: +92-51-9032727 Facsimile: +92-51-9260419

5.2 The evaluation of technical proposal shall be based on following criteria:

Sr. No.	Description / Items		Points
1.	**Experience of the Firm**		**100**
	1-a)	General Experience in road Transport Sector *	(25)
	1-b)	Specific Experience related to particular Assignment*	(75)
2.	**Approach & Methodology**		**250**
	2-a	Appreciation of the Project	(70)
	(i).	*Evidence of Site Visit with Photographs*	*(30)*
	(ii).	*Clarity of appreciation*	*(20)*
	(iii).	*Comprehensiveness of appreciation*	*(20)*
	2-b	Problem Statement/ Understanding of Objectives	(50)
	(i).	*Identification of Problems/ Objectives*	*(30)*
	(ii).	*Components of Proposed Services*	*(20)*
	2-c	Methodology	(80)
	(i).	*Proposed Solutions for this Project*	*(30)*
	(ii).	*Quality of Methodology*	*(20)*
	(iii).	*Conciseness, clarity and completeness of proposal***	*(30)*
	2-d	Suggested changes for improvement in TOR	(10)
	2-e	Work Program	(20)
	2-f	Staffing Schedule	(20)
3.	**Key Staff*****		**450**
4.	**Performance Certification from clients********		**100**
5.	**Present Commitments (current engagement and available strength – justification)**		**50**
6.	**Transfer of Knowledge (Methodology/ Plans) *********		**50**
		Total Points:	**1000**
	Minimum qualifying technical score:		**700**

* Maximum fifteen (15) best projects completed, indicating their worth, person man-months of key personnel and duration of the project shall be provided under general experience for consideration in evaluation.

Maximum ten (10) projects completed in the last ten 10 years indicating their worth, person man-months of key personnel and duration of the project shall be provided under specific experience for consideration in evaluation.

Note: Any project mentioned completed under Form A-2 (*Specific Experience*) will not be considered for evaluation unless Assignment Completion Certificate/ substantially completed with satisfactory remarks by the client's representative, is attached. The Client NHA reserves the right to verify the Performance/ Assignment Completion Certificates.

	** Conciseness and clarity contain 10 marks and 20 marks will be for the completeness of the proposals which includes but not limited to hard binding, sequential page numbering, signing and stamping of each page of proposal. *** Firm affidavit for presence of personnel carries 25 marks out of 450 marks (complete in all respect as per specimen annexed at **Annex-C** placed in Technical Proposal Forms). **** Authentic Performance/ Client Satisfaction Certificates (with proper Letter Reference No., Issued date, Sign/Stamp) shall be provided for assigning score in evaluation (at least for the three projects/ assignments, competed in the last five (05) years prior to date of submission of proposal) indicating the Title of project, Staff-Months of Key Personnel provided by the firm & completion date. The Client NHA reserves the right to verify the Performance/ Assignment Completion Certificates. The Client NHA also reserves the right to verify/ inquire about the performance of the consultants on its ongoing projects. ***(Note: Scoring of Marks will be affected, if any adverse performance rating of consultant, is reported by any section of NHA).*** 25 out of 100 marks will be allocated for provision of affidavit on stamp paper duly attested by the Oath Commissioner to the effect that the firm has neither been blacklisted nor any contract rescinded in the past for non-fulfillment of contractual obligations (complete in all respect as per specimen annexed at **Annex-B** placed in Technical Proposal Forms). ***** Transfer of knowledge would be in the form of association with new/ less experienced firm(s) by sharing upto maximum 7.5% of Assignment viz-a-viz input with them for promoting the consultancy industry in the country. The nomenclature of new/less experience firm be nominated as **sub-consultant**, whose name will be stated in their proposal. *Criteria for New firm is as under:* i) is the one which has not carried out more than three (3) projects. ii) The new /less experienced firm(s) after having executed three relevant projects be promoted to an independent regular firm. The new company will not be overburden with more than two projects simultaneously having overlapping effect. iii) The new firm must be registered with Pakistan Engineering Council (PEC) but the requirement of the specific PEC profile code is mandatory for the input he is likely to render. The points earmarked for evaluation sub-criteria (3) for suitability of Key Staff are:

Sr. No.	Description / Items	Points (%)
i.	Academic and General Qualifications	**30**
ii.	Professional experience related to the Project	**60**
iii.	Status with the firm (Permanent & duration with Firm as per Data Sheet Clause 3.1.4 (d)	**10**
	Total Points:	**100**

5.3.1	Following is added: The words "three top-ranking qualifying consulting firms" is deleted in its entirety and replaced with the words "qualifying consultants"

	The date, time, and address of the financial proposal opening shall be informed after evaluation and approval of technical proposals, accordingly.
5.3.3	The weights given to the Technical and Financial Proposals are: **Technical (T%): 80%** **Financial (P%): 20%**
6.1	Add following at the end of this Para: Negotiation meeting will be called if required by the client.
7.2	The assignment is expected to commence in: **October, 2024**
8	The Clause is deleted in its entirety

SUMMARY EVALUATION SHEET FOR FULL TECHNICAL PROPOSALS (QCBS)

EVALUATION CRITERIA	Max. Weightage	Firm 1		Firm 2	
		Rating	Score	Rating	Score
1. Firms Experience	**100**				
General Experience in road Transport Sector	25				
Specific Experience related to particular Assignment	75				
2. Approach and Methodology	**250**				
2-a. *Appreciation of the Project*	70				
(i) Evidence of Site Visit with Photographs	(30)				
(ii) Clarity of appreciation	(20)				
(iii) Comprehensiveness of appreciation	(20)				
2-b. Problem Statement/ understanding of objectives	50				
(i) Identification of Problems/ Objectives	(30)				
(ii) Components of Proposed Services	(20)				
2-c. Methodology	80				
(i) Proposed Solutions for this Project	(30)				
(ii) Quality of Methodology	(20)				
(iii) Conciseness, clarity and completeness of proposal	(30)				
2-d. Suggested Changes for Improvement in TOR	10				
2-e. Work Program	20				
2-f. Staffing Schedule	20				
3. Key Personnel	**450**				
Firm affidavit for presence of personnel	**25**				
i. Team Leader/ Tunnel Engineer	120				
ii. Senior (E & M) Expert	30				
iii. Senior Electrical & Mechanical (E & M) Expert for Tunnel	30				
iv. Senior Geologist	30				
v. Senior Geologist/Slope Stability Expert Engineer	50				
vi. Senior Structural Engineer	70				
vii. Senior Highway Engineer	70				
viii. Transport Economist	25				
4. Performance Certification from clients	**75**				
Affidavit on stamp paper duly attested by the Oath Commissioner regarding non-blacklisting	**25**				
5. Present Commitments (current engagement and available strength – justification)	**50**				
6. Transfer of Knowledge (Methodology/ Plans)	**50**				
TOTAL:	**1000**				

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

Score: Maximum Weightage rating / 100. Minimum qualifying score is 70% or 700 marks.

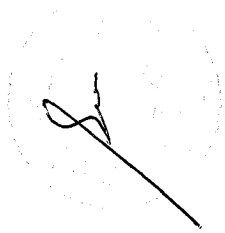
PERSONNEL EVALUATION SHEET

POSITION / AREA OF EXPERTISE	Name	Academic and General Qualification Weightage 30%		Project related Experience Weightage 60%		Status with the Firm 10%		OVERALL RATING (Sum of Weighted Ratings)
(Show all experts to be evaluated)		Percentage Rating	Weighted Rating (A)	Percentage Rating	Weighted Rating (B)	Percentage Rating	Weighted Rating (C)	(A+B+C)
i. Team Leader/ Tunnel Engineer								
ii. Senior (E & M) Expert								
iii. Senior Electrical & Mechanical (E & M) Expert for Tunnel								
iv. Senior Geologist								
v. Senior Geologist/Slope Stability Expert Engineer								
vi. Senior Structural Engineer								
vii. Senior Highway Engineer								
viii. Transport Economist								

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

Score: Maximum Weightage X rating / 100. Minimum qualifying score is 70%.

TECHNICAL PROPOSAL FORMS



Technical Proposal – Forms

{*Notes to Consultant* shown in brackets throughout this Section provide guidance to the Consultant to prepare the Technical Proposal; they should not appear on the Proposals to be submitted.}

Checklist of Required Forms (subparagraph 3.1.3 of ITC)

Required, (√)	FORM	DESCRIPTION	*Page Limit*
√	A-1	Technical Proposal Submission Form	
√	A-1 Attachment	Proof of legal status and eligibility	
"√" If applicable	A-1 Attachment	If the Proposal is submitted by a joint venture, attach a letter of intent.	
"√" If applicable	A-1 Attachment Power of Attorney	Power of attorney for the authorized representative of the lead firm as per instructions given in specimen of letter of intent (**Annexure-D**).	
√	A-2	Consultant's Organization and Experience.	As given below
		A. Consultant's Organization	3
		B. Consultant's Experience/ Client's Reference (excluding certificates)	20
		C. Client's Satisfaction Certificate alongwith details	10
√	A-3	Approach Paper on Methodology proposed for Performing the Assignment	50
√	A-4	Comments/ Suggestions of Consultant	*[See footnote]*[1]
		A. On the Terms of Reference	n/a
		B. On the Counterpart Staff and Facilities	2
√	A-5	Format of Curriculum Vitae (CV) for proposed Key Personnel	8 pages each CV
√	A-6	Completion and Submission of Reports as per TOR	n/a
√	A-7	Composition of the Team Personnel and the Tasks to be Assigned to each Team Member	n/a
√	A-8	Work Plan /Activity Schedule	n/a
√	A-9	Work Plan and Time Schedule for Key Personnel*(Man-months of staff and Project Duration as per TOR.)*	n/a
√	A-10	Current Commitments of the Firm	n/a

Note: **Failure to provide required attachments with Form A-1 will entitle the Client to reject the proposal**

[1] The total number of pages for combined forms A-3 and A-4 should not exceed 50. A page is defined as one printed side of A4 or letter-size paper with font size of 10 or more. In case of non-compliance, scoring for proposal clarity and presentation will be reduced.

Form A-1

TECHNICAL PROPOSAL SUBMISSION FORM

(To be required from lead firm only)

{Location, Date}

To: [Name and address of Client]

Dear Sirs:

We, the undersigned, offer to provide the ... *[NAME OF THE PROJECT]*....in accordance with your Request for Proposals. 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 of our letter of intent to form a joint venture, 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 imposition of any sanction 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 ITC 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 Personnel. We accept that the substitution of Key Personnel for reasons other than those stated in ITC, Clause 6.5 may lead to the termination of Contract negotiations.

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

(h). Our firm/ each member of our JV is not participating in any other proposal for this Project.

We undertake, if our Proposal is accepted and the Contract is signed, to initiate the Services related to the Project 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 reserves the right to reject all proposals as per PPRA Rules.

We remain,

Yours sincerely,

Signature of Authorized Representative* of the Lead Firm:

{In full} _____ {and initial}_____

Name and Title of Signatory: _____

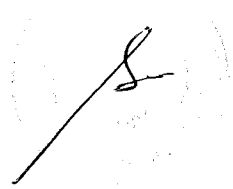
Name of Consultant (Firm's name or JV's name):_____

In the capacity of:_____

Address: _____

Contact information (phone and e-mail):_____

** The above signatory or his authorized representative should attend the proposal submission and opening with authority to sign and stamp any missing pages of proposal in line with instructions given in clause 1.8 of the Data Sheet. The specimen of authorization for submission is given at* ***Annexure-D****.*



Form A-2

CLIENT'S REFERENCE

- **A.** Detail about consultant(s) Organization.
  - Hierarchy/ organizational chart, Office address, Employees details, etc.,

- **B.** Relevant Services (as per RFP notice) carried out in the last ten years (10) which best illustrate qualifications
  - General experience in road Transport Sector; maximum fifteen (15) best projects completed. (to be provided in tabular form showing cost, duration, man-months and brief description of services performed)
  - Specific experience (maximum ten (10) projects completed in the last ten (10) years, related to particular assignment, should be given on following format:

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

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

- **C.** Performance/ Client Satisfaction Certificates (at least for the last three projects/assignments completed in the last five years) clearly mentioning the performance on the project.

Consultants' Name: _____

Form A-3

APPROACH PAPER ON METHODOLOGY PROPOSED FOR PERFORMING THE ASSIGNMENT

(Form TECH-3: a description of the approach and methodology for performing the assignment, including a detailed description of the proposed methodology, work programme, site visit detail and so forth along with training, if the Terms of Reference specify training as a specific component of the assignment.)

Form A-4 (A and B)

COMMENTS/SUGGESTIONS OF CONSULTANT

[Provide here comments and suggestions on the Terms of Reference that could improve the quality/ effectiveness of the Assignment; and on requirements for counterpart staff and facilities, which are provided by the Client, including: administrative support, office space, local transportation, equipment, data, etc., separately under Forms Form-4A and Form-4B respectively.]

A. On the Terms of Reference (TOR)

1.

2.

Etc.,

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

1.

2.

Etc.

Note:

1. The Consultant may propose a team of experts to best achieve the scope of service and activities and to deliver outputs as required in TOR. Proposed changes in position/individual inputs should be indicated and reasoned in the Technical Proposal but incorporated only in the Financial Proposals (showing excess/saving, in datum Price as worked out with the person months indicated in the RFP, which must be clearly bifurcated and marked red at each place for acceptance or otherwise by the Client at its prerogative during negotiations).

   (i) The Proposal may assign person-month inputs differently from TOR. However, Key Personnel input totals in the Proposal should not be less than the minimum totals of person-months inputs mentioned in Data Sheet Sub-Clause-3.1.4 respectively.

   (ii) The Proposal may include additional expert position/s. However, additional expert will be considered Non Key Personnel for the purpose of proposal evaluation.

   (iii) If the Proposal drops or replaces a Key Personnel position with a different one, the original position will receive zero score in the technical evaluation and the new position added in the Proposal will be considered Non Key and will not be evaluated.

   (iv) DO NOT INCLUDE EXCESS/SAVING INFORMATION IN TECHNICAL PROPOSAL. If Technical Proposal includes financial information, the Proposal will be rejected under Clause-3.1.5 of ITC.

2. When the Consultant suggests a change in scope of service, activities or output, the Consultant must describe the details in Form-4A and the change should not be incorporated in the Proposal. Enumerate each suggestion in Form-4A with incremental cost as a separate attachment to Financial Proposal indicating breakdown into individual remuneration and expenses for each suggestion. Forms A-11 to 17 should be prepared without incorporating the changes.

   (i) If Financial Proposal provides no separate attachment about incremental cost to a suggestion, the suggestion will be considered at no additional cost to the Client and no negotiations for an incremental cost shall be done;

   (ii) DO NOT INCLUDE INCREMENTAL COST INFORMATION IN TECHNICAL PROPOSAL. If Technical Proposal includes financial information, the Proposal will be rejected under Clause-3.1.5 of ITC.

Form A-5

FORMAT OF CURRICULUM VITAE (CV) FOR PROPOSED KEY STAFF

1. Proposed Position: _____
2. Name of Firm: _____
3. Name of Staff: _____
4. Profession: _____
5. Date of Birth: _____
6. Years with Firm: _____
7. Nationality: _____
8. N.I.C Number: _____
9. Cell Number: _____
10. Membership in Professional Societies: _____
(Membership Certificate of PEC/relevant council is Mandatory for Engineers. Copy of online updated PEC/relevant council details, as per Membership Number will be attached)
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. Mention majors/research work carried out during Post Graduation].

- 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, 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 candidate/ authorized representative of the Lead firm

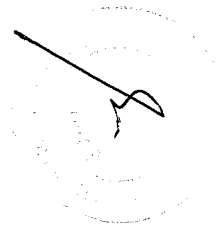
Date: _____
Day/Month/Year

Note: copy or scanned signatures are not allowed

Form A-6

COMPLETION AND SUBMISSION OF REPORTS AS PER TOR

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

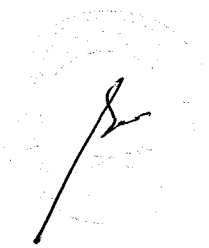


Form A-7

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



Form A-8

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

Form A-9

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 _____

Form A-10

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

Annex-A

Specimen
(On Lead Firm's letterhead)

LETTER OF INTENTION

Subject: Technical and Financial Proposals for Consultancy Services for *(Name of Project)*

This Joint Venture (JV) is made among following parties;

1) M/s _____as Lead Firm having ___% share.
2) M/s _____as JV Partner having ___% share.
3) M/s _____as JV Partner having___% share.
4) M/s _____as JV Partner having___% share.

The above firms are jointly and severally liable to the Client for preparation of Technical and Financial Proposals for Consultancy Services for "[*NAME OF THE PROJECT*]" (hereinafter called "The Project").

The Firm hereto confirm the understanding as follows:

1. **Objective**

   It is hereby agreed to form a Joint Venture for preparation of Technical and Financial Proposals for Consultancy Services for "The Project" to be submitted to National Highway Authority, Islamabad (hereinafter called "The Client").

   The Parties intend to do the following:

   a. Prepare and submit a mutually agreed Technical and Financial Proposals for the Project;
   b. Agree to propose suitable staffing with high level of competence to form a competitive team for the Project.
   c. Enter into the mutually agreed Consultancy Contract Agreement with the Client, if the project is awarded.
   d. Perform all the services to be undertaken for the Project under the Consultancy Contract Agreement if signed.

2. The authorized representative of JV shall be M/s..... for the future official correspondence with the client on behalf of JV.

3. The original letter of intention(s) of the JV member(s) on their letterhead is/are attached at... (for Lead Firm only)

For and on behalf of

.....

Sign & Seal of the Firm

.....

(Authorized Representative of the Firm)*

** Authorized Representative to sign the Letter of Intention can be;*

- *For Sole Proprietor firm; Owner of the Firm, otherwise Owner may authorize any person. (Provided Authorization Letter be submitted)*
- *For Partnership firm; Director of the Firm; otherwise, authorized personnel (provided Authorization Letter be submitted).*
- *For Private Limited firm; Director of the Firm, otherwise, authorized personnel (provided Authorization Letter be submitted).*
- *For Public Private Limited firm; Director of the Firm, otherwise, authorized personnel (provided Authorization Letter be submitted).*

Annex-B

AFFIDAVIT
(Regarding Blacklisting)

Subject: *[NAME OF THE PROJECT]*

I, the undersigned, do solemnly declare that M/s *[NAME OF THE FIRM]* has neither been blacklisted nor any contract rescinded in the past for non-fulfillment of contractual obligations.

Signature of Authorized
Representative of the firm(s)

Date: _____
Day/Month/Year

(Seal)

Attested by
the Oath
Commissioner

Note:

- The Affidavit is to be submitted on Stamp Paper of minimum Rs. 30/- duly attested by the Oath Commissioner.
- In case of Single Entity, to be provided by the firm.
- In case of JV, to be provided by all the JV members

Annex-C

UNDERTAKING
(Regarding Personnel Availability)

Subject: *[NAME OF THE PROJECT]*

I, the undersigned, do solemnly declare that the proposed personnel shall be available for the subject assignment in the project duration as per the terms and condition specified in the Request for Proposal (RFP).

Signature of Authorized
Representative of the Lead firm

Date: _____
Day/Month/Year

(Seal)

Attested by
the Oath
Commissioner

Note: The Affidavit, on Stamp Paper of minimum Rs. 30/- duly attested by the Oath Commissioner, is to be submitted by the Lead firm only.

Annex-D

General Manager (P&CA)
National Highway Authority,
Islamabad, **Pakistan**

Power of Attorney
(Regarding submission of proposal)

Subject: *[NAME OF THE PROJECT]*

Dear Sir,

I, the undersigned, authorize Mr. _____S/o Mr._____ having CNIC No. _____to attend the submission and Opening of Proposals on behalf of all JV members. *(Insert name of sole consultant in case of single entity else name of all JV members)*. He is authorized to attend, submit, sign and stamp any missing pages of the proposal (Technical and Financial) for above-mentioned project on... (*Insert date).*

Signature: _____ Initial_____ Date: _____
Day/Month/Year

Authorized Representative

[Name & Designation]

Signature: _____

Name: _____

[Designation (CEO/MD/Sole Propertier)]

[Consultant Name]

If more than one owner or Board of Directors, then the consultant may add other names as per requirements.

Annex-E

General Manager (P&CA)
National Highway Authority,
Islamabad, **Pakistan**

POWER OF ATTORNEY

(To sign the Contract Agreement which will be submitted by successful consultant at the time of signing of contract)

Subject: *[NAME OF THE PROJECT]*

Dear Sir,

I/We, the undersigned, authorize Mr. _____S/o Mr._____ having CNIC No. _____ of *[Name of the Lead Firm]* to sign the Contract Agreement of the project *[NAME OF THE PROJECT]* on behalf of *[CONSULTANT NAME]*. Furthermore, Mr._____, *[Lead Firm]* is the authorized representative as per General Conditions of Contract and Special Condition of Contract (Clause 1.6) for execution of the Contract.

Signature: _____ Initial_____ Date: _____
Day/Month/Year

Authorized Representative [Lead Firm]

[Name & Designation]

Signature: _____

Name: _____

[Designation (CEO/MD/Sole Propertier)]

[Consultant Name]

If more than one owner or Board of Directors, then the consultant may add other names as per requirements.

FINANCIAL PROPOSAL FORMS

Form A-11

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 initial}_____

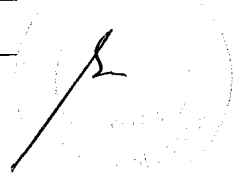
Name and Title of Signatory: _____

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

In the capacity of: _____

Address: _____

Contact information (phone and e-mail):_____



** The above signatory or his authorized representative should attend the proposal submission and opening with authority to sign and stamp any missing pages of proposal in line with instructions given in clause 1.8 of the Data Sheet.*

Form A-12

BREAKDOWN OF RATES FOR CONSULTANCY CONTRACT

Project: _____ Consultant: _____

Name	Position	Name of the Firm	Basic Salary per Cal. Month	Social Charges (%age of 1)	Basic Salary+ Social Charges (1+2)	Over head (%age of 3)	Sub-Total (3+4)	Fee (%age of 5)	Rate per Month for project Office (5+6)	Field Allow. (%age of 1)	Rate per Month for Field Work (7+8)	Rate to be used in Financial Proposal
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

Notes:

Item No. 1 Basic salary shall include actual gross salary before deduction of taxes. **Furthermore, basic salary should at least meet the minimum wages (for support staff) as per Federal Labor Law or Provisional Labor law, whichever the case and the individual staff shall be paid their salaries as per basic rates specified herein above.**

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. 4 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. 6 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. 8 Normally payable only in case of field work under hard and arduous conditions.

Note 1 The consultant is to provide appointment letter and affidavit/undertaking duly signed by each of the individual staff members showing salary rates as above to the project authorities. Further during execution each invoice will also be provided showing that the staff 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: _____

Form A-13

BREAKDOWN OF SOCIAL CHARGES

Sr.No.	Detailed Description	As a %age of Basic Salary*		
		Firm-1	Firm-2	Firm-3.....

***Note:** Each Firm shall use its own social charges (%age) for calculating salaries of its staff i.e. 'Rate to be used in Financial Proposal' in Form A-12.

Form A-14

BREAKDOWN OF OVERHEAD COSTS

Sr.No.	Detailed Description	As a %age of Basic Salary and Social Charges*		
		Firm-1	Firm-2	Firm-3.....

***Note:** Each Firm shall use its own overhead charges (%age) for calculating salaries of its staff i.e. 'Rate to be used in Financial Proposal' in Form A-12.

A - ESTIMATED LOCAL CURRENCY SALARY/ REMUNERATION COSTS EQUIVALENT IN US DOLLARS

[Refer also to Notes under Form A-4]

Sr. No.	Name	Position	Person-Months	Monthly Billing Rate (US $)	Total Estimated Amount (US $)
A.	**All Foreign Expatriates including Foreign Specialist Sub-consultant (if any)**				
				Sub-Total:	

Form A-15
Page 2 of 3

ESTIMATED LOCAL CURRENCY SALARY COSTS/REMUNERATION

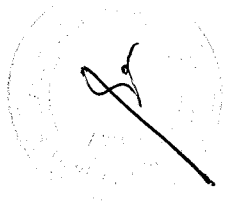
KEY EXPERTS

PHASE-I –SURVEY, INVESTIGATIONS AND STUDIES, DESIGN & FEASIBILITY STUDY (04 MONTHS)

Sr. No.	Expert Position	No. of persons	Individual Man Months (Phase-I)	Monthly Billing Rate	Total Estimated Amount (Rs.)
1	Team Leader/ Tunnel Engineer	1	4		
2	Senior Electrical & Mechanical (E & M) Expert for Tunnel	1	1.5		
3	Senior Geologist/Slope Stability Expert Engineer	1	2		
4	Senior Structural Engineer	1	1		
5	Senior Highway Engineer	1	1.5		
6	Transport Economist	1	1		
				Sub-Total:	

PHASE-II – TENDER DOCUMENTS & PC-1 (02 MONTHS)

Sr. No.	Expert Position	No. of persons	Individual Man Months (Phase-II)	Monthly Billing Rate	Total Estimated Amount (Rs.)
1	Team Leader/ Tunnel Engineer	1	2		
2	Senior Geologist	1	0.5		
3	Electrical & Mechanical (E & M) Expert for Tunnel	1	0.5		
4	Senior Structural Engineer	1	1		
5	Senior Highway Engineer	1	0.5		
6	Transport Economist	1	0.5		
				Sub-Total:	



ESTIMATED LOCAL CURRENCY SALARY COSTS/REMUNERATION

NON-KEY EXPERTS/ SUPPORTING STAFF

PHASE-I –SURVEY, INVESTIGATIONS AND STUDIES, DESIGN & FEASIBILITY STUDY

Sr. No.	Position	No. of persons	Individual Man Months (Phase-I)	Monthly Billing Rate	Total Estimated Amount (Rs.)
1	Senior Surveyor	1	3		
2	Junior Engineer (Tunnel)	1	2.5		
3	Junior Engineer (Structures)	1	1.5		
4	Junior Engineer (Highway)	1	1		
5	Junior Geotech Engineer	1	1		
6	Junior Geologist	1	1.5		
7	IT Specialist (SCADA Design)	1	1		
8	CAD Operator	3	3		
9	Trainee Engineer	3	4		
10	Surveyors	3	3		
11	Computer Operator	2	4		
12	Helpers	3	4		
				Sub-Total:	

PHASE-II – TENDER DOCUMENTS & PC-1

Sr. No.	Position	No. of persons	Individual Man Months (Phase-II)	Monthly Billing Rate	Total Estimated Amount (Rs.)
1	Senior Surveyor	1	1		
2	Junior Engineer (Tunnel)	1	1		
3	Junior Engineer (Structures)	1	1		
4	Junior Engineer (Highway)	1	0.5		
5	Junior Geotech Engineer	1	0.25		
6	Sr. Quantity Surveyor	1	2		
7	Quantity Surveyor	2	2		
8	CAD Operator	4	2		
9	IT Specialist (SCADA Design)	1	0.5		
10	Trainee Engineer	3	2		
11	Computer Operator	2	2		
12	Surveyors	2	1		
13	Helpers	3	2		
	Sub-Total:				

Note: The Consultants are required to quote the rates of Non-Key/Support Staff given in the TOR in above table keeping in view the latest/prevailing notification for minimum wages (i.e., Basic salary) issued by the concerned Labor and Manpower department/Ministry. The Consultant(s) may propose Non-Key/ Support Staff Person-Months in addition to those given in TOR; however, in such a case tenable reason 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.

Form A-16

DIRECT (NON-SALARY) COSTS

Sr. No.	Nomenclature	Unit	Qty.	Unit Price (Rs.)	Total Phase-I (Rs.)	Total Phase-II (Rs.)	Total Amount (Rs.)
1.	Office / Res Accommodation Rent	P.M	4+2=6				
2.	Maintenance of Office / Res Accommodation including Utilities and Office Expenses	P.M	4+2=6				
3.	Rental of Furniture / Furnishings	P.M	4+2=6				
4.	Rent of Vehicles (Average 2 Vehicle for 3 Months)	Vehicle Month	2x3=6				
5.	Operation Cost of Vehicles/Vehicle Maintenance including POL and Driver (Average 2 vehicles for 3 months)	Vehicle Month	2x3=6				
6.	Travel Expenses for Local for meeting at NHA HQ alongwith Site Visit of NHA HQ Officials and Consultant Team	L.S					
7.	Cost of Survey including Construction of Survey Monuments and Land Acquisition Survey "Topographic Survey Using DGPS" including the cost of survey activities mentioned in ToR, Report & Drawing Production, Instrument Rental Charges, Salary of Surveyor (s) & Survey Helpers etc. (Complete in all respects).	L.S				-	
8.	UAV (Drone) Survey and processing along alignment, Portal Areas and for slope stability Analysis	L.S				-	
9.	Purchase 2.5m Stereo Image & Process 5 meter DEM for Hydrology (about 150sq. KM). To be arranged by NHA through SPARCO	**P.S**	-	-	-	**8,40,000**	**8,40,000**
10.	Cost of Traffic Survey and Axle Load Survey " Traffic Survey & Axle Load Survey" including cost of activities mentioned in ToR and cost of report writing, Instrument Rental Charges (if any) , Salary of Traffic Engineer, Enumerators, etc. (Complete in all respects).	L.S				-	

Sr. No.	Nomenclature	Unit	Qty.	Unit Price (Rs.)	Total Phase-I (Rs.)	Total Phase-II (Rs.)	Total Amount (Rs.)
11.	Petrography and index properties Testing for overburden Samples (Approx. 20 Samples), Geophysical Survey and investigations at Tunnels and Bridges (Approx. 250 Points)	L.S				-	
12.	Portal Facilities (Admin Building, Operation Center, Emergency Building, Electrical and Generator Rooms, Parking sheds, Rest Area etc.) including cost of report writing, Salary of Engineer/Architect for Design, etc. (Complete in all respects)	L.S				-	
13.	Detailed Geo technical investigation including Drilling for Geotechnical Field Investigation at tunnel portal locations, tunnel alignment, Slide Shelters, Slope Stability Measures Locations (600m Approx. of drilling) excluding salary of Geotechnical Engineer	**P.S**	-	-	**15,000,000**	-	**15,000,000**
14.	Highway Safety Audit including cost of activities mentioned in ToR and cost of report writing, instrument Rental Charges (if any) Salary of Highway Auditor , Enumerators etc. (complete in all respects).	L.S			-		
15.	"Soil and Material Investigation" including cost of activities mentioned in ToR and cost of Report Writing, Instrumental Rental Charges (if any) Salary of Material Engineer, Lab Technicians and Helpers etc. (Complete in all respects) 1 Sample per 2 Km Avg.	L.S				-	
16.	Hydrology/ Hydraulic study "Hydrology/ hydraulic study" including the cost of activities mentioned in ToR, Purchase of data (If any), cost of report writing, Instrument Rental charges (if any) Salary of Hydraulic Engineer/Hydrologist, Helpers etc. (complete in all respects)	L.S				-	
17.	Simulation for Ventilation Design using Software	**P.S**	-	-	-	**1,000,000**	**1,000,000**
18.	Environmental Impact Assessment Study including NOC Fee and s per	L.S			-		

Sr. No.	Nomenclature	Unit	Qty.	Unit Price (Rs.)	Total Phase-I (Rs.)	Total Phase-II (Rs.)	Total Amount (Rs.)
	requirement of EPA (PUNJAB) "Environmental Impact Assessment" including cost of activities mentioned in ToR, cost of Report Writing, NOC Fee, Environmental Engineer Salary, coordination with Pak EPA & Public Hearing Charges, etc. (complete in all respects)						
19.	Third Party Design Review	L.S					
20.	2 Nos Laptops for Processing of DEM, Intel Core i5-12450H Processor (2),512 GB Solid State Drive (3) , 8GB SODIMM DDR4 SDRAM, Windows11 (67), 15.6" FHD IPS LED Display (250 nits, 144 Hz) (4), NVIDIA ® GeForce ® GTX 1650 4GB, B&O, 3-Cell, 52.5Wh (63), No Of Optical Drive*	L.S			-		
21.	Certified Training for NHA Officials (10) on Tunneling and E&M Works (Design & Planning) Section Only)	L.S				-	
22.	Others not covered above to comply with ToR requirement**						
	Total						

NOTE:

* These items shall become the property of Client upon successful use on the Project. The Consultant shall get formal approval from NHA Design Section prior to purchase of these items. The items shall be returned to Client in perfect condition.

** Any additional item/ cost quoted against this line item must have provided solid/ tenable justification(s) detailed in Technical Proposal Submission Form A-4 "Comments on TOR" without indicating financial value therein. It is also to be noted by the Consultants that the Client is not bound to agree to the reasons given in Form A-4. * Cost quoted against lump sum items (mentioned in above table) is all inclusive and remuneration of staff (if required) shall not be charged separately.

Form A-17

SUMMARY OF COST

Sr. No.	Description		Amount (Rs.)
1.	Salary Cost/ Remuneration	Phase - I	
		Phase - II	
2.	Direct (Non-Salary) Cost	Phase - I	
		Phase - II	
3.	**Sub Total (1+2):**	**Phase - I**	
		Phase - II	
4.	Sales Tax @17% on Item No. 3 above which shall be kept as provisional Sum in the Contract Agreement [3]		
	Grand Total [1]:		

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. For evaluation purpose, only competitive cost shall be considered for calculation of financial score.

2- The dues and salaries (as per basic rate) 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- Any Omission or arithmetical error made by the consultants in entering the amount against item 4 above shall also be rectified during evaluation of the Financial Proposal. Deduction of GST will be as per prevailing rules and regulations.

4- The grand total is inclusive of all the applicable Federal, Provincial and Local taxes. All these taxes are required to be built in the quoted rates and GST is to be mentioned separately.

1. PROPOSAL SECURING DECLARATION

[The Consultant shall fill in this Form in accordance with the instructions indicated.]

Date: *[insert date (as day, month and year)]*
Proposal No.: *[insert number of Proposal process]*
Alternative No.: *[insert identification No if this is a Proposal for an alternative]*

To: *[insert complete name of Procuring Agency]*

We, the undersigned, declare that:

We understand that, according to your conditions, Proposals must be supported by a Proposal Securing Declaration.

We accept that we will automatically be suspended from being eligible for Bidding in any contract with the Procuring Agency for the period of time as determined by the Authority if we are in breach of our obligation(s) under the Proposal conditions, because we:

(a) have withdrawn or modified our Proposal during the period of Proposal Validity specified in the Form of Proposal;
(b) Disagreement to arithmetical correction made to the Proposal price; or
having been notified of the acceptance of our Proposal by the Procuring Agency during the period of Proposal Validity, (i) failure to sign the contract if required by Procuring Agency to do so or (ii) fail or refuse to furnish the Performance Security or to comply with any other condition precedent to signing the contract specified in the SRFP Documents.

We understand this Proposal Securing Declaration shall expire if we are not the successful Service Provider, upon the earlier of (i) our receipt of your notification to us of the name of the successful Service provider; or (ii) twenty-eight (28) days after the expiration of our Proposal.

Signed: *[insert signature of person whose name and capacity are shown]* In the capacity of *[insert legal capacity of person signing the Proposal Securing Declaration]*

Name: *[insert **complete name of person signing the Proposal Securing Declaration**]*

Duly authorized to sign the Proposal for and on behalf of: *[insert **complete name of Service Provider**]*

Dated on _____ day of _____, _____ *[insert **date of signing**]*
Corporate Seal (where appropriate)

APPENDIX-A

TERMS OF REFERENCE

(TOR)

CHAPTER NO. 1
INTRODUCTION

1.1 BACKGROUND:

- Lahore - Islamabad Motorway (M-2) 367 Km is a 6-lane motorway. The M-2 project road is one of the two major trunk roads linking Islamabad/ Rawalpindi and Lahore, which are vital political, agriculture and industrial centers in Pakistan. As a result, the transportation corridor connecting these cities experience high traffic demand.
- The Salt Range section of the M-2 presents significant challenges, such as frequent traffic accidents, exposure to natural disasters and the arduous climbs towards Islamabad for cargo vehicles, facing up to a 7% uphill gradient.
- In light of the projected rise in traffic demand along this corridor and enhance safety, finding effective solutions for the issues in the Salt Range section becomes imperative. Additionally, ensuring a 6-lane traffic capacity for the entire M-2 stretch will further contribute to address the anticipated traffic growth and ensure smooth transportation.
- In 2008, Japan External Trade Organization (JETRO) conducted the Feasibility Study on the Realignment of Motorway M-2 in Salt Range area and submitted report on Feasibility Study with four options.
- The length of the project road is about 10 Km with a significant altitude difference of 428 m, resulting in an average gradient of 4.28%. However, there is a section with a reverse gradient and three sections with a maximum grad of 7%. Additionally, there are five sharp curve sections with a minimum radius of less than 100 m. The critical issues are discussed here under:
- The project will be six Lane facility including Two Tube Tunnel.

1.2 NEED ASSESSMENT:

- The length of the project road is about 10 Km with a significant altitude difference of 428 m, resulting in an average gradient of 4.28%. However, there is a section with a reverse gradient and three sections with a maximum grad of 7%. Additionally, there are five sharp curve sections with a minimum radius of less than 100 m. The critical issues are discussed here under:
  - The Challenging horizontal and longitudinal alignment in the Salt Range Area has led to a design speed of 50 Km/h compared to the standard of speed of 120 Km/h on the remaining stretch of M-2. The steep 7% uphill gradient towards Islamabad (North bound lanes)

Signed for & on behalf of GM (P&D) as per authorization.

poses difficulties for many cargo vehicles forcing them to use the alternative N-5 route. Similarly, Cargo vehicles travelling in the opposite direction towards Lahore (South bound lanes) experience reduced speeds of 5 to 10 Km/h due to extreme downhill grade.

- Black spots of traffic accidents at the Project Road are concentrated into 2 locations i.e., South bound lane at Km 233-224 and Km 299. These accidents are primarily caused by the combination of a 7% downhill grade and sharp bends with a radius of less than 100 m.
- Since geology at the Study Area is very unstable condition, many natural disasters have been occurred. The main disasters are corruption of lime stone cliff and large scale land slide around Km 230 and small scale landslides at Km 223 and Km 228. Even though NHA has been implemented various countermeasures, such as construction of new retaining walls, secure buffer zone (pocket) behind retaining walls, improvement of drainage facilities at lower edge of slopes, etc., it is difficult to prevent natural disaster affecting M-2 traffic. In addition, there is undulation of pavement at Km 224-225, but cause of undulation is not clear.

1.3 PROJECT DEFINITION:

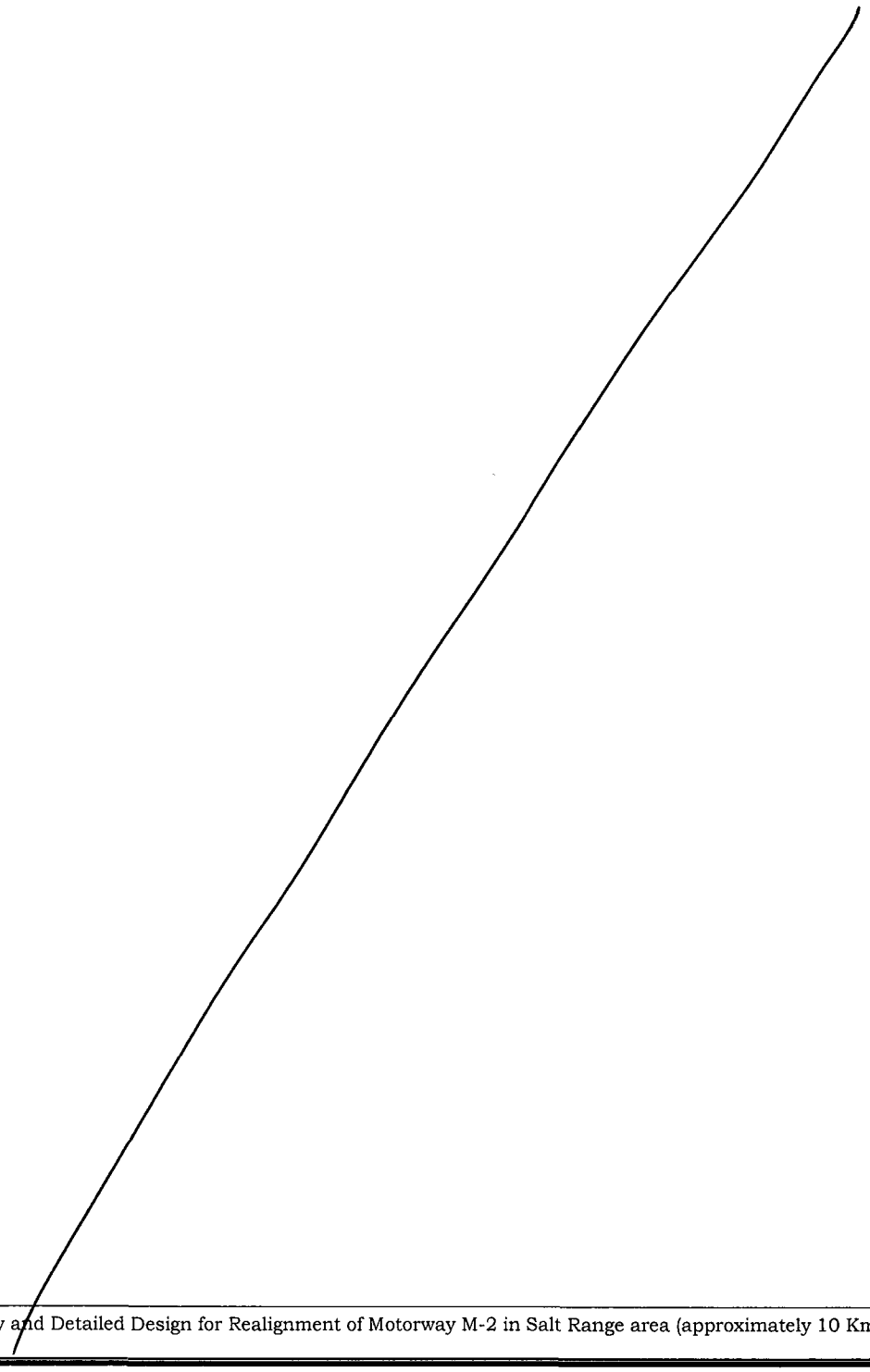
NHA intends to appoint a Consultant for "Feasibility Study and Detailed Design for Realignment of Motorway M-2 in Salt Range area (approximately 10 Km)."

1.4 TECHNICAL PARAMETERS:

Design Elements	Parameters
No of Lanes (Road) Tunnel	06 lanes Two tube facility
Lane width	3.65 m each
Design speed	Tunnel = 40-60 Km/hr Road = 120 Km/hr Bridges = 120 Km/hr
Drainage	As per requirement
Geometric Design	As per AASHTO manual of geometric design

1.5 PROJECT OBJECTIVES:

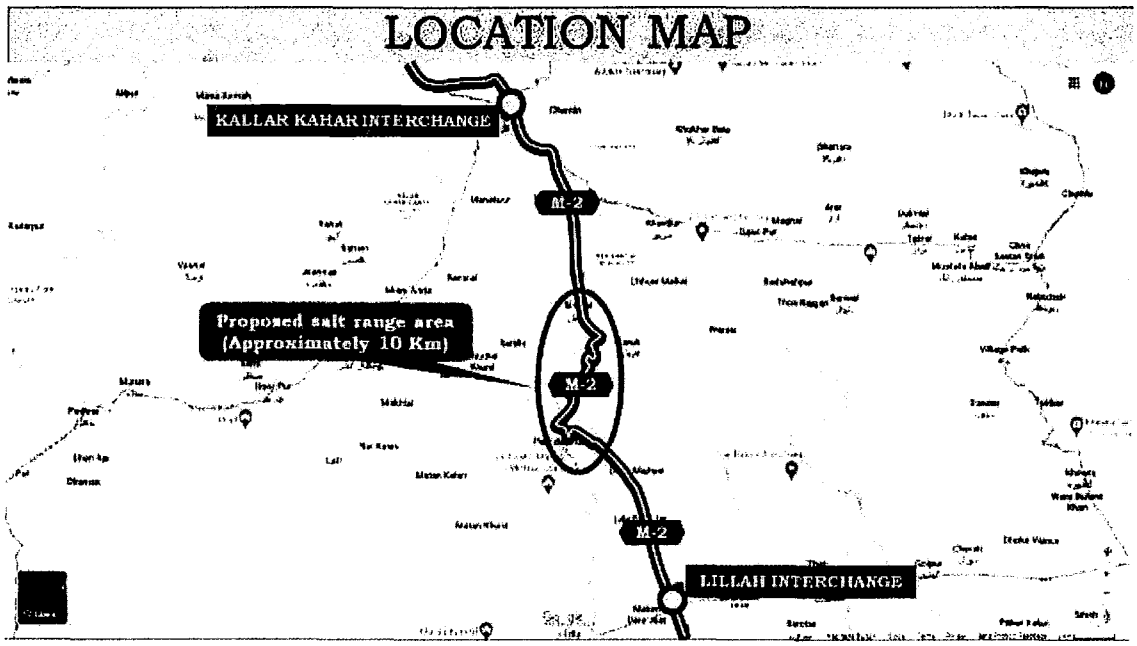
- This section is intended to provide safer, quicker and more efficient passage.
- Realignment of the subject section as per updated Feasibility and detailed design, smooth traffic flow will be possible & traffic accident ratio will be reduced to a great extent.
- Vehicle operating cost will be reduced & traveling time will be saved.
- Job opportunities will be created for local people of Surrounding areas.



CHAPTER NO. 2
DESCRIPTION OF PROJECT

2.1 LOCATION OF PROJECT:

The proposed Motorway, is located in Punjab province of Pakistan.



2.2 PROJECT SCOPE OF WORK:

The project envisages "Feasibility Study and Detailed Design for Realignment of Motorway M-2 in Salt Range area (approximately 10 Km)". The consultant after conducting technical studies of area will propose proper solutions by utilizing best possible professional practices for the subject project.

- The summary of scope of work for subject assignment is presented as following which will be read in conjunction with detailed Tasks presented in later parts of the TORs. Any activity/task or requirement under this TOR will not absolve consultant from any contractual obligation stipulated in general or specific conditions. The whole assignment is required to be completed as per best project management practices and, as stated in general conditions of the contract in a timely, diligent, professional and efficient manner by acting as a faithful advisor.

The scope of work comprises of following but not limited to:

Signed for & on behalf of GM(P&D) as per authorization.

A. PHASE-I: Feasibility Study (4 MONTHS):

- Data Collection / Co-ordination with concerned Departments, Metrological, Geological and Survey of Pakistan including local authorities, FWO and M/s MORE.
- Reconnaissance Survey
- Purchase / Acquisition of stereo image and processing of Digital Elevation Model (DEM) from M/s SUPRCO through RAMD Section.
- Review, Evaluate and Incorporate where applicable, the Final Report prepared by JETRO
- Study of Alignment
- Propose alignment alternatives prepared in accordance with the Geometric Standards set forth in the TOR, and approval of Recommended Alignment
- Topographic survey of the approved alternative (where required in addition to the DEM) with establishment of survey control points;
- Detailed Traffic survey and Axle load survey;
- Soil & Material Investigation including identification of quarry sites and construction material survey;
- Condition Survey of Structures and Road Furniture.
- Geological Survey of the Area including Geological mapping of Tunnels;
- Identification of Tunnel Portals Location
- Petrography and Index Property testing of over burden samples, geophysical survey and investigation of tunnels and bridges
- Geophysical Testing.
- Hydrology & Hydraulic Study
- Evaluation of Existing Structures and Pavement
- Geotechnical Investigation survey for tunnels, bridges and structures.
- Assess the length of Debris Shelters for safe access to Tunnel Portal and slope protection.
- Pavement Design with surface runoff calculations;
- Geometric Design including Road furniture design including traffic signs and gantries and Structures Design including Design of Bridges, Culverts, Retaining Walls, Drainage Structures on the Link Access Road, Slope Protection and Tunnel Lining with or without Ceiling Slab.
- Tunnel X-Section Types and Internal Elements of Civil Works with respect to Electro-Mechanical Works, Types of Road inside and outside Tunnel and Tunnels cross-section, Tunnel Drainage System, etc.
- Design of Tunnel Civil Works including Tunnel Lining with or without Ceiling Slab.
- Basic Design of E&M work of Tunnels.

- Portal Facilities Detail & Design
- Rough Cost Estimates
- Detailed Feasibility Study

B. PHASE-II: DETAILED DESIGN & PC-1 (02 MONTHS):

- Design of Tunnel E&M Works supported with simulation through software along with IT & SCADA Designs
- Highway Safety Audit;
- Tender Documents including Drawings, C-Factor, BOQ, Engineer's Estimate, Particular Specifications and Special Provisions;
- Validation of Design by 3rd Party;
- Stakeout of design alignment after approval for ground validation;
- Environmental Impact Assessment along with NOC
- Utility folders and Land acquisition plans including acquisition cost on DC rates.
- Preparation/revisions of PC-1.
- Future Assistance; (Detailed Design Review & Approval and any other reasonable requirement including audit observations, inquiries, investigations, litigations

2.3 TIME PERIOD:

The services specified in the TOR shall be completed and all relevant reports submitted in the form and format acceptable to the Employer, within **06 months** from the date of signing of Contract Agreement.

2.4 FINANCING:

The project will be financed by the Government of Pakistan through **PSDP under Design and Feasibility head.**

*PC-II of the subject project is attached at Annex-A

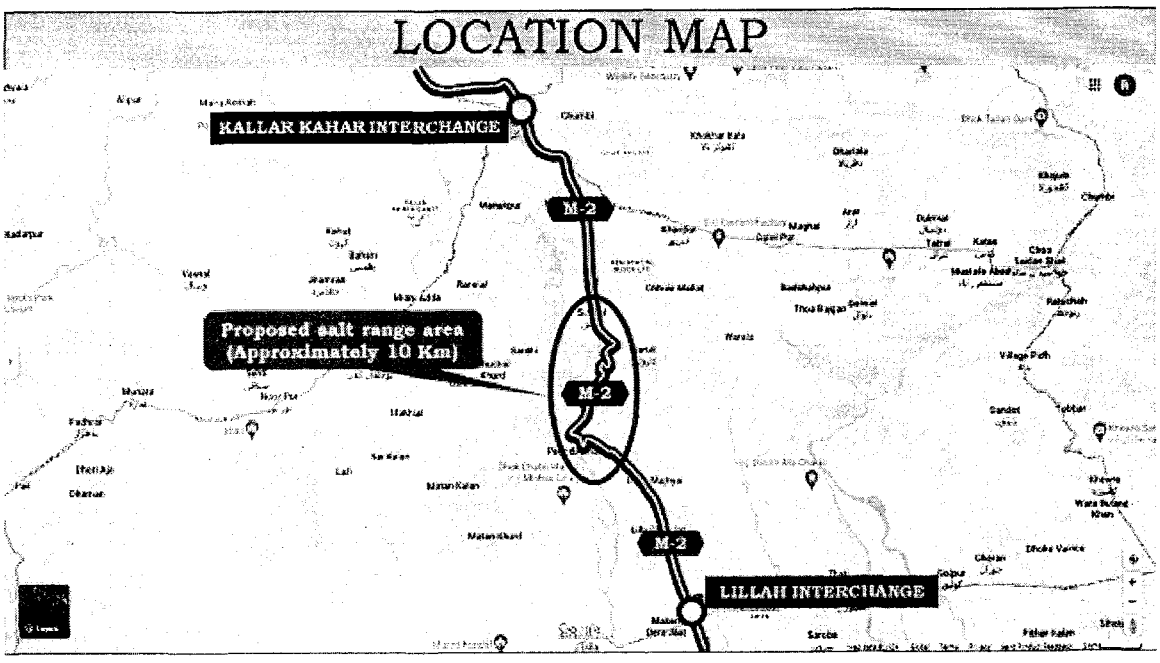
CHAPTER NO. 3
TOR / SCOPE OF SERVICES FOR UPDATION OF FEASIBILITY STUDY & DETAILED DESIGN

3.1. BACKGROUND

- Lahore - Islamabad Motorway (M-2) 367 Km is a 6-lane motorway. The M-2 project road is one of the two major trunk roads linking Islamabad/ Rawalpindi and Lahore, which are vital political, agriculture and industrial centers in Pakistan. As a result, the transportation corridor connecting these cities experience high traffic demand.
- The Salt Range section of the M-2 presents significant challenges, such as frequent traffic accidents, exposure to natural disasters and the arduous climbs towards Islamabad for cargo vehicles, facing up to a 7% uphill gradient.
- In light of the projected rise in traffic demand along this corridor and enhance safety, finding effective solutions for the issues in the Salt Range section becomes imperative. Additionally, ensuring a 6-lane traffic capacity for the entire M-2 stretch will further contribute to address the anticipated traffic growth and ensure smooth transportation.
- In 2008, Japan External Trade Organization (JETRO) conducted the Feasibility Study on the Realignment of Motorway M-2 in Salt Range area and submitted report (attached at **Annex-A**) on Feasibility Study with four options. The said Feasibility Study needs updation.

3.2. LOCATION OF PROJECT

The project under consideration is located near Kallar Kahar.



3.3. OBJECTIVE

- This section is intended to provide safer, quicker and more efficient passage.
- After construction of tunnels Land sliding in the area will be prevented.
- After construction of Tunnels and Bridges smooth traffic flow will be possible and Traffic accident ratio will be reduced to a great extent.
- Vehicle operating cost will be reduced & traveling time will be saved.
- Job opportunities will be created for local people.

3.4. SCOPE OF WORK

Keeping in view the urgency and importance of the project, the consultant scope of work /assignment are broadly grouped under Two (02) Phases as listed below.

A. PHASE-I: Updation of Feasibility Study (4 MONTHS):

- Data Collection / Co-ordination with concerned Departments, Metrological, Geological and Survey of Pakistan including local authorities, FWO and M/s MORE.
- Reconnaissance Survey
- Purchase / Acquisition of stereo image and processing of Digital Elevation Model (DEM) from M/s SUPRCO through RAMD Section.
- Review, Evaluate and Incorporate where applicable, the Final Report prepared by JETRO
- Study of Alignment
- Propose alignment alternatives prepared in accordance with the Geometric Standards set forth in the TOR, and approval of Recommended Alignment
- Topographic survey of the approved alternative (where required in addition to the DEM) with establishment of survey control points;
- Detailed Traffic survey and Axle load survey;
- Soil & Material Investigation including identification of quarry sites and construction material survey;
- Condition Survey of Structures and Road Furniture.
- Geological Survey of the Area including Geological mapping of Tunnels;
- Identification of Tunnel Portals Location
- Petrography and Index Property testing of over burden samples, geophysical survey and investigation of tunnels and bridges
- Geophysical Testing.
- Hydrology & Hydraulic Study
- Evaluation of Existing Structures and Pavement

- Geotechnical Investigation survey for tunnels, bridges and structures.
- Assess the length of Debris Shelters for safe access to Tunnel Portal and slope protection.
- Pavement Design with surface runoff calculations;
- Geometric Design including Road furniture design including traffic signs and gantries and Structures Design including Design of Bridges, Culverts, Retaining Walls, Drainage Structures on the Link Access Road, Slope Protection and Tunnel Lining with or without Ceiling Slab.
- Tunnel X-Section Types and Internal Elements of Civil Works with respect to Electro-Mechanical Works, Types of Road inside and outside Tunnel and Tunnels cross-section, Tunnel Drainage System, etc.
- Design of Tunnel Civil Works including Tunnel Lining with or without Ceiling Slab.
- Basic Design of E&M work of Tunnels.
- Portal Facilities Detail & Design
- Rough Cost Estimates
- Detailed Feasibility Study

B. PHASE-II: DETAILED DESIGN & PC-1 (02 MONTHS):

- Design of Tunnel E&M Works supported with simulation through software along with IT & SCADA Designs
- Highway Safety Audit;
- Tender Documents including Drawings, C-Factor, BOQ, Engineer's Estimate, Particular Specifications and Special Provisions;
- Validation of Design by 3rd Party;
- Stakeout of design alignment after approval for ground validation;
- Environmental Impact Assessment along with NOC
- Utility folders and Land acquisition plans including acquisition cost on DC rates.
- Preparation/revisions of PC-1.
- Future Assistance; (Detailed Design Review & Approval and any other reasonable requirement including audit observations, inquiries, investigations, litigations
-

Consultant is entrusted with the Scope of Work outlined above. It is required that the consultant should undertake the job in a professional manner to the best of his ability and resources. NHA as Client may offer comments through in-house review consultant. Any comments offered by the Client do not absolve the consultant from

its obligation to develop correct and cost effective engineering solutions for the Project. It is solely the discretion of the Consultant to either incorporate them or reject them all together. Only one round of review comments will be entertained. If the issue(s) still remain unsolved, then a meeting of Design Consultant with the Client may be arranged for timely address of the issue(s). Hence, all sort of unnecessary correspondences must be avoided. NHA reserves the right to take punitive actions as required at appropriate forum even during construction stage.
The following points must be given due consideration by Consultant:

- Consultant is responsible for coordination with all concerned stakeholders. In case of any discrepancy or design change, arising out at any stage of the project due to lack of coordination with the relevant departments, the Consultant shall be held liable for such a change. In such a case, the Consultant shall not only modify the design but will be subjected to penalty equivalent to 5% of the Total Contract Amount (excluding taxes).
- If the consultant wants to outsource any part of the scope of work, it will be mandatory to take prior approval of the Client.
- If the Consultant wants to deploy any party to carry out Geo-Technical and Soil Investigations, the party may have experience of at least 15-20 Years in Highway /Tunneling / Dams / Mega Projects.
- Consultant should strictly adhere to the work plan submitted in the Proposal or submitted during the Kickoff Meeting
- Client will not accept any submission unless and until the pre-requisites for that submission are submitted.
- The Consultant is required to submit Geo-Tagged Photographs along with date and time stamps for each survey and investigation location such as Bench Marks, Survey Monuments, Traffic & Axle Load Survey Locations, Soil, Material & Geotechnical Investigation Locations, etc.
- The Consultant is required to submit original Field books of Topographic Survey, Traffic and Axle Load Survey Forms & Testing Reports of Soil, Material and Geo-Technical Investigations. Same shall be stamped and signed by the concerned Engineer of the Consultant.

3.5. DESIGN STANDARDS

The project will be six lane carriageway for Highway and Bridges and two or three lane carriageway for Tunnels (Design Consultant to suggest based on site conditions and cost). X- sections of Lahore-Islamabad Motorway are attached at **Annex-B** for reference. NHA understands that the Tunnels' parameters, codes, and standards etc., given in following table should be followed for carrying out the services required under this contract. However, these may be reviewed by the consultant and improvement may be proposed on the basis of specialized knowledge and expertise in the context of project. Proposed improvements, if any, should be realistic, practicable, and cost effective in project context. If consultant requires any clarification regarding parameters, then same must be solicited in

written and a timely manner instead of making a presumption. **Bare minimum standards or inappropriate combination of the recommended standards must be avoided in all design aspects**:

3.5.1. TECHNICAL STANDARDS – TUNNELS

- Lane Width: 3.65 m
- Sidewalks/Emergency Egress Walkway: 1.0 m
- Central Barrier: 0.3 m
- Inspection Gallery: 0.75 m
- Maximum Grade: 1.5% typical and in exceptional cases 2.5%
- Design Speed: As per motorway requirement
- Vertical Clearance: 5.3 m
- Cross fall normal (Carriageway): 2%
- Geometric Design: "A Policy on Geometric Design of Highway & Streets, 2011"
- Tunnel Excavation + Support System NATM
- Refuge Facility Emergency Parking Bay @ 750 m Emergency Shelter @ 250 m
- Drainage + Ventilation + Lighting + ITS

The above standards will be validated by the Consultant against the traffic volumes and may require revision.

3.5.2. Other Design Parameters

Geometric Design	*A Policy on Geometric Design of Highways and Streets* by AASHTO (preferably latest published version). Roller Coaster profile will not be acceptable at all.
Pavement Design	*AASHTO Guide for Design of Pavement Structures – 1993*
Roadside Design	*AASHTO Roadside Design Guide* (preferably latest published version)
Lighting	*Roadway lighting design guide* by AASHTO (preferably latest published version)

Structural Design	*AASHTO Guide Specifications for LRFD Seismic Bridge Design* (preferably latest published version) along with *West Pakistan Code of Practice for Highway Bridges* and Seismic Zone Mapping of Pakistan
Tunnel Design	*Refer to LATEST acceptable Tunnel codes*
Drainage Design	*Highway Drainage Guidelines* by AASHTO (preferably latest published version)
Design of Traffic Control Devices, Work Zone Safety, and preparation of 'Maintenance & Protection of Traffic (MPT) Plans'	*Manual of Uniform Traffic Control Devices (MUTCD)* by FHWA USA (preferably latest published version) with due consideration to the requirements of NHA
For testing and specifications of materials, following codes and standards will be followed:	ASTM, AASHTO, NHA General Specifications etc.
Capacity Analysis and Level of Service analysis	*Highway Capacity Manual* (preferably latest published version)
Engineer's Estimate	As per prevailing CSR of NHA

*The standards will be validated by the Consultant against the traffic volumes and may require revision.

3.5.3. TUNNELS – INTERNATIONAL SAFETY STANDARDS

- Directive 2004/54/EC of The European Parliament and of the Council on Minimum Safety Requirements for Tunnels in the Trans-European Road Network, 2004.
- Systems and Equipment for Fire and Smoke Control in Road Tunnels, World Road Association (PIARC) Committee on Road Tunnels Operation (C3.3), Report 2007.
- Road Tunnels: Vehicle Emissions and Air Demand for Ventilation, World Road Association (PIARC) Technical Committee C4 Road Tunnel Operation, Report 2012.
- Human Factors and Road Tunnel Safety regarding Users, World Road Association (PIARC), Report, 2008.
- Road Safety in Tunnels, World Road Association (PIARC), Report 05.04.B, 1995.
- Guide for the lighting of Road Tunnels and underpasses (International Commission of Illumination, CIE 88: 2004), Austria

3.5.4. STANDARDS FOR STRUCTURES

Following codes, standards and loads will be adopted for analysis and design of structures:

- **AASHTO-(LRFD): -**

For analysis and design for all loads and load combinations.

- **Pakistan Highway Code of Practice for Bridges 1967: -**

For vehicular loads, their spacing & impact factors.

- **UBC / IBC 2003: -**

For seismic zoning in addition to the revised seismic risk map of Pakistan.

- **ASTM: -**

For material specifications & testing.

- **ACI: -**

For analysis, design and detailing, only in case such details are not specified in AASHTO.

- **Vehicles Live Load**

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

- **Class AA Loading:**

The 70-Ton tracked military vehicle to be placed in accordance with WPCHB to give maximum stresses. Modifying factors to be applied in consultation with Client to cater for overloading.

- **Class A Loading:**

The 54.5 Ton train of trailers (with different axle loads) to be placed in accordance with WPCHB to give maximum stresses. Modifying factors to be applied in consultation with Client to cater for overloading.

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

Additionally, the bridge deck slab shall be checked in Punching Shear for a Wheel Load of 21,000 Pounds [95 KN] on 0.25 x 0.5m2 tire contact area.

- **Other Loads**

  - **Side-walk Live Load**

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

- **Horizontal Live Load on Railing / Posts of Side Barrier**

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

- **Impact Load**

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

- **Wind Loads**

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

- **Seismic Design**

International Building Code (IBC-2003) and Earthquake forces are calculated according to article 3.21 of AASHTO, keeping in view the recent earthquake of October 8, 2005, the earthquake zones will be considered accordingly.

3.6. DETAILS OF SCOPE OF WORK:

Consultant is entrusted with the Scope of Work outlined below. It is required that the consultant should undertake the job in a professional manner to the best of his ability and resources. NHA as Client may offer comments through in-house review / 3rd party review consultant. Any comments offered by the Client do not absolve the consultant from its obligation to develop correct and cost-effective engineering solutions for the Project.

3.6.1. DATA COLLECTION & COORDINATION WITH LOCAL DEPARTMENTS

Immediately after signing of the Contract, the consultant will attend the kickoff meeting at NHA headquarters and present his working schedule and confirm availability of resources as specified in the Technical proposal. NHA will issue necessary authorization letter "To Whom It May Concern". Consultant will immediately mobilize and get possession of the relevant maps, reports and imageries for the detailed design of the Project. After the Completion of the design, SOP maps and imageries shall be returned to the Client in Original and un-damaged form.

The Consultant should inform the motorway police, M/s FWO, M/s MORE and administration before conducting all types of filed surveys. Before planning the field reconnaissance, the consultant should coordinate meeting with NHA General Manager (M-2), etc.

Coordinated meetings with relevant departments particularly General Manager (M-2), Metrological, Geological, Survey of Pakistan and project authorities shall be done and minutes recorded (same shall be made part of the Reconnaissance and Alignment report). Special emphasis shall be given to meeting with NHA Project Authorities so as to know about their expectations and requirements for this project. Data from various sources shall be collected at this stage:

- Topographic Maps
- Available Geological reports, if any (from local departments, adjacent projects)
- Available Satellite Imagery & Digital Elevation Model (DEM) Data

- Agriculture soil reports
- Soil survey maps (Soil survey of Pakistan)
- Flood Maps / Discharge Data

3.6.2. RECONNAISSANCE SURVEY

After the completion of Task 1, the consultant shall carry out the desk study of alignment using maps, imageries and ground validation followed by a site visit.

The alignment options shall be validated on the grounds by conducting a reconnaissance visit. A team of relevant expatriate and local key staffs who would be later involved on the subsequent phase and preparation of Reports will visit the project area for about one week to acquaint themselves with all the existing relevant physical features of the area.

The team will obtain and record the preliminary visual information during Reconnaissance survey along with GPS inter alia the following: -

- Potential areas of portals with respect to the alignment of Tunnel.
- Economically feasible location of area for portal platform by earthwork, retaining wall and protective structures.
- Extent of Link Access Roads/ Bridges to portal areas from the existing road.
- Potential quarry site for fine and coarse aggregate.
- Preliminary information about identification of location of landslides.
- Existing Geological Conditions.
- Preliminary information on potential location of flash flood and debris & mud flow around potential portal areas.
- Availability of other civic amenities nearest to portal area; particularly relating to health care.

During the reconnaissance visit, particular requirements of the project shall be identified that will be addressed in the detailed design. At the reconnaissance stage, social, economic, financial and environmental aspects shall also be considered. The Consultant shall develop and submit a Map showing all above stated options duly marked on Satellite imagery.

3.6.3. PROCUREMENT OF SATELLITE IMAGERY & DIGITAL ELEVATION MODEL

The objective is to have a digital representation of the Ground Topography by extracting Terrain parameters, performing Surface Analysis, modelling water flow or mass movements, creation of relief maps and Engineering Design that depict the existing ground features which include all natural and manmade features that exist on the ground.

3.6.3.1. 2.5m Tri-Stereo Image for Hydrology

The Consultant shall initiate the procurement/ Acquisition with the assistance of the client, the specified Triple Set/ Stereo Satellite Imagery of 2.5m Resolution for preparing DEM of 5m resolution **(approximate area of 150 Sq. Km.)** for carrying out hydrology study of the area.

3.6.3.2. Ground Control Points

Ground Control Points are normally used to associate projection coordinates with locations on a raw (uncorrected) image; however, they can theoretically be used to relate locations in any two Georeferencing systems. Sufficient Ground Control Points will be collected to accurately georeferenced the Image. GCPs should be uniformly selected in the Image. GCPs selection should also respect terrain variations in the Image. Selected ground control point should represent clearly identifiable point in the image. Sufficient Ground Control Points will be taken to control the whole block of images.

3.6.4. REVIEW, EVALUATE AND INCOPERATE, WHERE APPLICABLE, THE FINAL REPORT PREPARED BY JETRO

A feasibility was carried out by JETRO in 2008. NHA Project Authorities, will share the Final report to the prospective Consultant. The Consultant is required to study, examine, review and evaluate the proposals given in the study. The Consultant shall thoroughly study, examine and ground validate the Alternatives provided in the Report. The Consultant shall provide their comments on the applicability of the solution provided in the report and identify the portions which can be incorporated in the subsequent Feasibility study to be conducted by the Consultant under this TOR.

3.6.5. ALIGNMENT ALTERNATIVES AND APPROVAL OF RECOMMENDED ALIGNMENT

Depending upon project requirements the consultant will study the alignment in detail and propose different Alignment Alternatives along with KMZ file and submit Alignment Study Report. The Consultant shall highlight the merits and demerits of envisaged alignment options (at least three) to be studied subsequently, considering the Technical viability, economy of Construction Cost and extent of physical difficulties to be encountered during construction and operational phase. The Report should contain but not necessarily be limited to detailed description of alignment, self-explanatory maps, photographs key features, area-wise division, significance, tentative list of required/proposed structure. The Consultant will deliver a detailed presentation on the alignment study to NHA for the approval of the recommended Alignment Alternative from the competent Authority.

3.6.6. TOPOGRAPHIC SURVEY OF APPROVED ALIGNMENT

Even with the availability of DEM, the requirement of topographic survey cannot be overruled as it will be required for taking Cross-sections, centerlines, road edges, underground utilities, overhead transmission lines, Ground Control Points (GCPs), Inventory of Structures, Benchmarks and Monumentation and other reference points which cannot be obtained from Satellite Imagery / DEM. The Consultant is required to carry out topographic survey in a suitable scale (1:500 or 1:250 as per requirement) including all potential portal areas for approximately 25 Hectares for

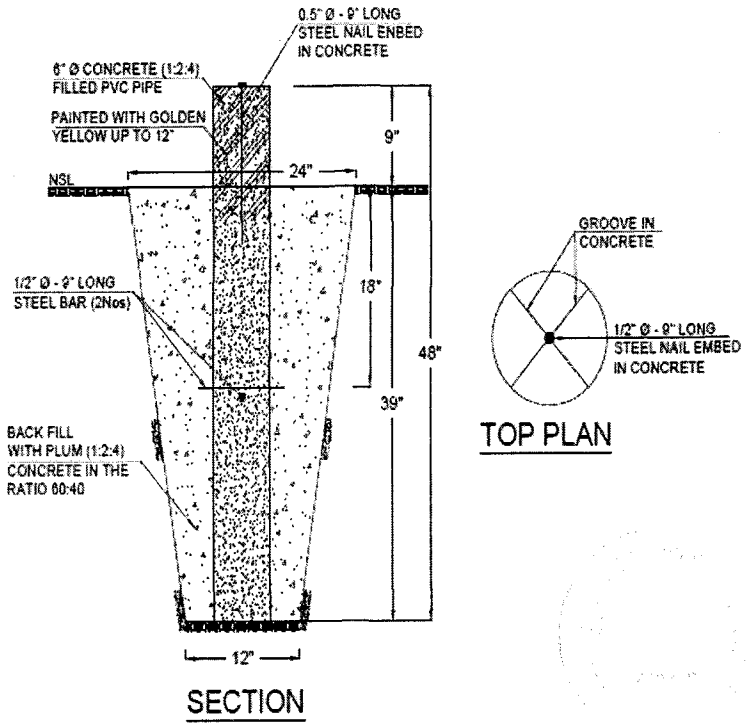
each portal with establishment of permanent survey control points as per specification at potential portal areas of selected Alignment. The detailed TOR for topographic survey is given as under:

The consultant should use the latest technology for the topographic surveys, which include as many DFGPS (6 minimum) for the establishment of highly accurate control network. In case the consultant does not have the requisite number of DFGPS, he is advised to hire the services of professional survey companies having the required expertise. The DFGPS shall be simultaneously used for at least 8-hour duration to develop accurate control points. The control points shall be tied to survey of Pakistan Standard benchmarks SBMs.

The Survey company mobilizing to the site must comply with the requirement of the recent "Surveying & Mapping Act 2014". Before mobilizing to site for Survey, the Consultant shall submit to the Client detailed topographic survey program with actual human resources planned to be deployed. The consultant shall specify the timeline of survey program. Total number of equipment with models and calibration certificates not more than 6 months old shall be produced. The name and qualifications of surveyors shall also be submitted. NHA reserves the right 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. NHA will ensure that the survey firm is not blacklisted and has sufficient resources and complies with the Surveying and Mapping Act 2014.

3.6.6.1. Survey Monuments for Controls

Permanent Ground Monument for Control points shall be made of Concrete 1:4:8 with 75 mm steel nail embedded at center. The type and dimensions of Survey monuments to be installed at site is shown here. Using spray paint and a stencil, the monument number shall be painted.



Besides start and at the end, it is required that these markers shall be fixed at appropriate locations. These shall be fixed at such locations that these are least susceptible to disturbance and damage. The consultant shall fill out a Performa for each station showing picture, sketch and reference with permanent ground features. If sub-standard monuments are used, then NHA will deduct the necessary amount from consultant's due payments.

3.6.6.2. Control for Traverse

Projection: UTM

Datum: WGS84

Vertical Datum: GEOID EGM-2008

3.6.6.3. Control Points

Primary Controls shall be established at a maximum distance of 5 kms and shall be tied with survey of Pakistan benchmarks. Minimum (6) DFGPS Primary Controls shall be established simultaneously. Minimum observation time shall be at least Eight (8) hours for each of these points.

3.6.6.4. Vertical Control

Vertical Control shall be established in GEOID EGM-2008 and tied with SOP SBMs.

3.6.6.5. Monuments for Controls

The monuments for controls shall be as described above.

3.6.6.6. 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) shall be taken to create a topographic map in the scale of 1:1,000.

b. The Consultant is required to observe 10 cross-sections across the flow channels 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 upon which the Model study survey was done should be incorporated in the traverse / level circuit.

3.6.6.7. Cross section Points

- The cross section should be measured one by one.
- The cross section of the embankment should be measured at 25m interval
- The cross section shall be measured to the ROW limit.
- For the alignment sections with proposed retaining wall, the cross section shall be measured at 5m interval.
- For the bridge pier, the measuring range of the cross section is 10m at both left and right sides of the centre; whereas for the bridge abutment, the measuring range is till the ROW limits.

3.6.6.8. 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 recorded along with all break points to clearly define the canal shape.

3.6.6.9. 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 10 m interval, which is perpendicular to their axis. Minimum 5 points shall be taken at each cross section to correctly depict the top and bottom of the sloping bank, width of bank and center of channel. The distance between the cross section points shall not be more than 5m for wider water channels / Nullas.

3.6.6.10. Survey corridor

The detailed topographic survey in normal circumstances shall be carried out in a corridor of 100 m (50 m from CL on either side). At locations of crossing rivers & nullas, the detail of survey extent is given in respective sections.

3.6.6.11. Mapping (Unit of Measurement)

Metric units shall be used throughout.

3.6.6.12. Scale

Besides soft copy, mapping of drawings shall be plotted to a scale of 1:1,000.

3.6.6.13. Details to be shown

All natural or manmade erections above ground need to be depicted in the topographic survey. Enough points should be recorded, so that its clear picture including identification, size and elevation is available for the designer. The consultant should also depict underground utilities with markers available at site. Intelligent nomenclature need to be adopted to describe the feature. The information should be available in CAD software in layer format with fully defined attributes.

3.6.6.14. Bridge details

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

a. The coordinates and levels of the four corners of the bridge (points shall be on the adjacent road surface), the two edges of the piers, abutment and wing walls.
b. The coordinates and levels of the bridge deck to the intermediate piers (if any) of the bridge.
c. 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 centreline and the road on the bridge at approximate intervals of 5 m.
f. The cross-sectional clearance envelope at the two sides of an overpass ridge (with respect to the road centreline passing underneath) showing all the relevant levels, offsets and skew angle.

3.6.6.15. Culvert details

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

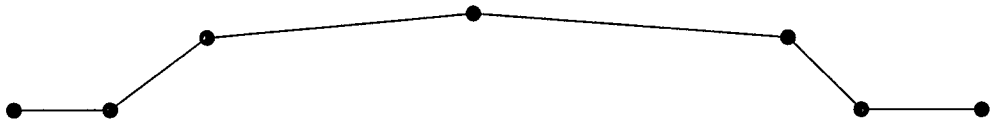
a. Type of culvert and diameter.

b. Chainage of culvert at the road centreline.
c. Skew angle of the culvert from the centreline.
d. Length of culvert from each side of the centreline.
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 through recording enough points so that the culvert can be modeled in CAD.

3.6.6.16. 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.



3.6.6.17. Details of Junctions and Existing Roads

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

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

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

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

3.6.6.18. Digital Ground Models (DGM)

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

All survey feature lines will herein be referred to as 'strings'. The data shall be presented by the Surveyor in a form suitable for input to the software to be used for

generation of DGM. Using the recorded data in x,y,z format on data logger, the ground surface over the required area shall be simulated by strings of coordinated information along characteristic lines on the terrain. The models shall consist of three-dimensional (3D) contour strings.

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

TIN (Triangular Irregular Network) shall be developed by using software. Using TIN, Contours shall be generated. Since NHA uses AutoCAD Civil 3D for vetting, same shall be used by the consultant.

3.6.6.19. Grid

The coordinates of the DGM shall be referred to the grid system as described already in section 3.6.2 of this document. The coordinates of the DGM shall be Easting, Northing and elevations.

3.6.6.20. String Labelling

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

3.6.6.21. Property Model

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

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

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

3.6.6.22. Contours

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

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

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

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

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

3.6.6.23. Longitudinal Profile and Cross-Section

The longitudinal profile shall be plotted in A1 / A3 size (as requested by Client) to a scale of 1:1,000 Horizontal and 1:100 Vertical with chainage interval of 25 m unless otherwise specified or instructed by the Client. The cross sectional plan of the existing road shall be plotted in A1 size to a scale of 1:200 both horizontal and vertical with 25 m interval. The plan shall show the chainage interval as specified and the existing ground profile and all the existing features.

3.6.6.24. Original Drawings & Preliminary Copies

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

3.6.6.25. Soft Submission of Data and Drawings

The Surveyor shall supply the digital ground model data, all Drawings, reports suitable for input to the computer and according to the specification acceptable to Client. The survey data shall be supplied in CSV & DWG format.

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

3.6.6.26. Field Books and Record

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

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

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

3.6.7. DETAILED TOPOGRAPHIC SURVEY OF APPROVED ALIGNMENT

The Consultant is required to carry out detailed topographic survey of the approved alignment including tunnel, portal areas, approach & access roads in accordance with the requirements mentioned above. Consultant shall use the UAV for detailed survey to generate the DEM of 3cm resolution for its use in the detailed design. The Consultant shall carry out Topographic Survey with UAV with less than 3cm resolution of all potential portal areas for approximately 25 Hectares for each portal with establishment of permanent survey control points at potential portal areas. The Specifications of Topographic Survey is the same as already stated above.

3.6.8. SURVEY OF AREAS PRONE TO LANDSLIDE, DEBRIS FLOW AND MUDFLOW

Based on the preliminary identification during Reconnaissance Survey, further detailed observations, measurement of affected areas prone to Landslide, Debris flow and mud flow would be carried out. The information is required to re-align the road if possible or preliminary assessment of the protection measures to be taken along the Alignment for preparing the Alignment Alternatives.

3.6.9. TRAFFIC AND AXLE LOAD SURVEY

3.6.9.1. Field Books and Record

Traffic count forms the basis for capacity analysis, pavement design and economic analysis etc. Consultant is required to carry out 7-Days 24 Hours classified traffic counts at required locations along the project and on the connected network to develop an understanding of traffic pattern. The study will also entail the estimation of diversion and generated traffic. The consultant shall submit detailed program of traffic count along with locations, duration and repetitions in Inception report. Same shall be exercised after the approval of the Client.

The classified traffic count shall include following classifications:

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

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

3.6.9.2. Journey Time

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

3.6.9.3. Origin & Destination Survey

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

3.6.9.4. Axle Load Survey

Consultant shall use latest NRTC axle load factors to be used in the pavement design factors shall also be annexed in the final report.

3.6.9.5. Traffic Diversion Plans

Traffic Diversion Plans shall be provided for the following situations:

a. At toll plazas (If required)
b. At Intersections and interchanges
c. In urban areas including methodology for separating the local and through traffic.
d. On at-grade railway crossings.
e. At places where underground constructions like construction of box culverts and underpasses.
f. At places where overhead bridge construction is likely to take place.

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

3.6.10. SOIL INVESTIGATION INCLUDING IDENTIFICATION OF QUARRY SITES AND CONSTRUCTION MATERIAL.

Soil & Material investigation shall be done to ascertain the index and engineering properties of encountered soil. 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.

The consultant is required to carry out following steps:

- Determine needs of the design
- Carry out complete ground investigations
- Carry out complete laboratory testing
- Evaluate results for final design
- As per fixed horizontal and vertical alignment, identify the areas of deep cuts and high fills. Study precise geometry of the roadway structures and develop design requirements.

Field investigations shall be carried out in three main areas:

- Investigation along the length of the proposed alignment and to determine the pavement support potential offered by the subgrade soils.
- Investigation to determine the source and quantity of naturally occurring construction materials.

- Examine specific sites such as deep cuts, retaining walls and culverts etc.

Enough samples with appropriate spacing is required to be investigated to fully analyze the ground conditions that shall be addressed with appropriate treatment for construction. Consultant is required to propose appropriate methodology to address the problems of embankment construction, if any.

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

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

3.6.10.1. 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 necessary to confirm the quantity and quality of available material. Test results from any nearby operational quarries should also be included.

The material to be investigated includes but not limited to earthwork, subbase, aggregate base, asphaltic material, cement, steel, pre-stressing strands, sand, crush aggregates and geo-textile, etc.

Considerable amount of water is likely to be required for proper compaction of earthworks. 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. Tests to assess the suitability of water for concrete are necessary and shall be undertaken.

3.6.10.2. Soil Classification

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

3.6.10.3. Identification of Quarry sites and construction material survey

The Consultant shall identify approximate Source of locally available construction materials along the approved Alignment options. With respect to Construction Material Survey, the consultant would study the availability of the following:

- Course aggregate
- Fine aggregate
- Water from construction activity and their storage facility

The Consultant will identify the potential areas for the above items, and assess the approximate quantity particularly with the storage facility of water during construction activities.

It is normal that the Excavated Rock material from the Tunnel would be used for development of portal platform and widening of Link Access Road but initially the availability of material from outside tunnel may be required.

As an evidence of Soil & Material Investigation Activity, the Consultant is required to submit Geo-tagged Photographs along with Date and Time Stamp of each investigated site. The Consultant is also required to submit Linear Plan of all the locations where Investigations have been carried out and same shall be made part of the Soil & Material Investigation Report. Also, the Consultant will submit the original Lab Reports / Testing Results duly stamped and signed by the Material Engineer of the Consultant, failing to which the report shall not be acceptable.

3.6.11. GEOLOGICAL SURVEY AND MAPPING

Firsthand information about the general geology of the project would be required, which can be conveniently prepared from the visual inspection of mountainous terrain along the existing road in proposed project vicinity supported with the information available from the Geological Map to be obtained from Geological Survey of Pakistan. This would be required for preliminary classification of Rock Mass and Excavation class of Rock for preparation of BOQ. However, actual geological conditions would be exactly revealed as the excavation proceeds inside the Tunnel. The output is the Geological survey map.

3.6.11.1. Geological Mapping Along the Alignment including Road, Bridges' and Tunnels'

Geological mapping is done to obtain and provide basic knowledge about the prevailing field conditions, not only through direct observations but also by collecting and analyzing rock, mineral and sediment samples. The features recorded during geological mapping are the following: -

- Rock types and Contacts
- Discontinuities type, orientation, infilling, spacing, persistence and weathering

- Shape of the rock bodies
- Note on the sequence and relative ages
- Note on the primary porosity and permeability.
- Note on the weathering and their patterns
- Note on the depositional or magmatic flow features - Structures including

a) Folding - dip, strike, deformation, orientation of grains

b) Joints – attitude, size, open or closed

c) Faults – look for slickensides, fault gouge, breccia and their visible displacements.

By interpreting and extrapolating all these data, the geologist should have a better understanding of the rock conditions likely to be present along the proposed tunnel and at the proposed portal and shaft excavations. The collected mapping data can be used in stereographic projections for statistical analysis using appropriate computer software (e.g., DIPS).

3.6.11.2. Geology Specific to Portal Areas:

A detailed geological observation would be importantly required at the proposed portal areas of Tunnel, to ensure that all the structures in the portal areas are safe and well protected keeping in view the altitude of the area. The Rock conditions near and above portal locations must be sound and competent and not excessively fractured and fragmented causing rock fall & landslide during summer and monsoon season. These portals must be safe from large scale flash flood.

3.6.11.3. Testing of Overburden Collected Samples

The Consultant shall collect the representative overburden samples along the Alignment **(at every 500m along Road and 250m along Tunnel)** depending on the accessibility and need for petrographic testing and determination of index properties. The Cost of petrography and index properties testing will be made as per cost incurred against the Lum sum.

3.6.12. GEO-PHYSICAL TESTING

Geophysical tests are indirect methods of exploration in which changes in certain physical characteristics such as magnetism, density, electrical resistivity, elasticity, or a combination of these are used as an aid in developing subsurface information. Geophysical methods provide an expeditious and economical means of supplementing information obtained by direct exploratory methods, such as borings, test pits and in situ testing; identifying local anomalies that might not be identified

by other methods of exploration; and defining strata boundaries between widely spaced borings for more realistic prediction of subsurface profiles. Typical uses of geophysical tests include determination of the top of bedrock, the rip ability of rock, the depth to groundwater, the limits of organic deposits, the presence of voids, the location and depth of utilities, the location and depth of existing foundations, and the location and depth of other obstruction. In addition, geophysical testing can also obtain stiffness and dynamic properties which are required for numerical analysis. Geophysical testing can be performed on the surface, in boreholes (down or cross hole).

The consultant shall conduct geophysical survey of proposed Tunnels, bridge locations and Landslide prone areas to ascertain type, nature, arrangement and thickness of various sub surface strata including overburden deposits and bedrock together as they exist to the depth. Geophysical survey will assist the consultant in selection of type of foundation, either deep or shallow foundation etc.

Geophysical testing includes seismic refraction survey, electrical resistivity and electromagnetic survey. The Consultant shall finalize the BOQ of this work for its approval with client. The Cost of Geophysical testing at Tunnels and Bridges will be made as per cost incurred against the lump sum.

3.6.13. HYDROLOGY & HYDRAULIC STUDY

Conventional hydraulic impact using empirical connotations are not warranted, as they do not depict the real impact of food and flood routing in extreme flat land. Our consultants generally follow such practices and are devoid of modern techniques employed using DEM and aerial photographic techniques. It is strongly suggested to undertake the state-of-the-art methodology with ground validation of land use and drainage patterns.

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

The following items shall be used as a checklist of the data that shall be included in the hydrological report. The comprehensiveness of the report shall depend upon the nature of the valley, flood plain to be traversed, the cost of proposed drainage structure, and class of highway.

If the consultant wants to outsource the Hydrology and Hydraulic Study, it will be mandatory to take prior approval of the Client. The sublet firm must be registered with Pakistan Engineering Council and must be an experienced firm.

The main scope of the required study is as follows:

a. Field Work and GIS data.

i). Reconnaissance survey, literature review and marking of waterways
ii). Calibration of field data with remote-sensing data
iii). Flood routing investigation
iv). Satellite Imagery and DEM processing: -
The Satellite shall be used for upstream and downstream to identify the land use and drainage characterises. Photographs shall be taken for all crossings whose design flow exceeds 20 m3/s. These photographs shall be of sufficient quality to enable the engineer to estimate channel roughness characterises, nature & extent of vegetation cover, and land use. Picture shall be made part at the end of the projects.
v). Land use and Soil Mapping with ground verification: -
Using the topographic maps, satellite imagery and site visits, the engineer shall comment on the nature of the land use in the effected water sheds, nature of vegetation and soil characteristics of the basins. Individual types of land use, vegetation, and soil classifications shall be indicated as percentages of basin area.

b. Hydrological observation and Field Data Collection

The Consultant shall record Hydrological Observations and carryout field data collection at Bridge sites to protect the structure from flash flood, debris & mud flow. The Hydrological Observations would also be carried out near the portal areas and Link Access Road. The phenomena related to hydrology would be broadly divided into two categories under two seasonal variations.

(a) Summer & Monsoon Period:

(b) Winter Season

Both the hydrological information and data obtained under (a) and (b) would be needed for designing Bridges, Culverts and Protective Structures near the portals and Link Access Road. Study of some after effect of Debris & Mud Flow may be studied during these seasons too.

c. Hydrology and Hydraulic study

i). Watershed delineation and Parameters: -
The list of parameters below is based is based on the information needed by the various models used in the hydrological analyses. Some parameters will be inserted directly into a particular formula and other will be used in comparing one watershed to another for use in transferring data

- Basin Length

- Basin Slope
- Percent Impervious
- Infiltration
- Detention Depression Storage
- Drainage Basin Roughness coefficient
- Channel or Conduit Slope
- Channel or Conduit Cross-Section
- Channel or Conduit Roughness

ii). Soil and land use analysis.
iii). Rainfall analysis: -
The rainfall intensity value used in the Rational Equation is based on the amount of rainfall that occurs, the time it takes for that rainfall to occur, and the recurrence interval associated with each design class. Statistical approach shall be used to develop IDF curves. Detailed calculations and IDF curves be made part of the Report.
iv). Storm-frequency analysis
v). Design Storm calculation
vi). Soil and land use analysis.
vii). Surface runoff model
viii). 2D Hydraulic River modelling as well as flood modelling for embankment height, structures design and value engineering: -

The listed below are several methods for use in estimating peak runoff from drainage areas are:

- Rational Equation: To be used for area less than 50 Ha.
- Gumbel Distribution: Area greater than 100 ha with gauging station data at the site.
- Indirect Estimates: Area greater than 100 ha with gauging station data from neighbouring watersheds.
- Regression Equation: Area greater than 100 ha with rainfall data.
- Whether on of above methods or any other methods is chosen to estimate the watershed runoff, the Engineer shall include in the hydrology report a copy of sample computation and any reference used.

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

Expressway	100 years (1 percent)
Arterials	50 years (2 Percent)
Collectors	50 years (3 percent)

d. Hydraulic design of cross drainage structure

The above methodology is robust and predict accurate water shed pattern. The DEM used is preferably 5M should be used to give acceptable results. It is highlighted that the whole design philosophy in such conditions are dictated by the Hydrology / Hydraulic study.

The Consultant is required to quote for "Hydrology and Hydraulic Study" in Direct Cost Page which must include the cost of aforementioned activities, purchase of data

(if any), cost of report writing, Instrument Rental Charges (if any), Salary of Hydraulic Engineer / Hydrologist, Helpers, etc. (complete in all respects)"
The above methodology is robust and predict accurate water shed pattern. It is highlighted that the whole design philosophy in such conditions are dictated by the Hydrology / Hydraulic study.

The Consultant is required to quote for "Hydrology & Hydraulic Study" including cost for field data collection and field survey, use of procured and processed DEM. It also includes man months of design team working at head-office, complete in all respect.

3.6.14. EVALUATION OF EXISTING STRUCTURES AND PAVEMENT

The Consultants shall carry out detailed inspection of existing structures and based on the condition of the structure shall recommend retention of existing structures or replacement. Where existing structures can be retained, design for widening / extension of existing structures shall be carried out to commensurate with NHA standards for cross-section of the road and structures. Condition Survey along with two photographs of each existing structure will be submitted in Evaluation of Existing Structures & Pavement Report.
The Consultant shall also carry out evaluation of existing pavement strength and condition and shall recommend rehabilitation strategy accordingly. Condition survey along with report on major distresses identified chainage wise shall be made part of the Evaluation of Existing Structures & Pavement Report.
The Consultant will present a detailed condition survey of existing pavement and structures before NHA for getting prior go-ahead for Detailed Design.

3.6.15. GEOTECHNICAL INVESTIGATION

Consultant shall perform geotechnical investigations for Tunnels, Bridges, Retaining Walls, Slope Stability Works, etc. including field and laboratory testing. Consultant shall perform geotechnical investigations including field and laboratory testing. Detailed program for mobilization and doing tests at site shall be submitted to the Client and after approval work shall commence. The consultant will supervise the sub soil investigation work in case he sublets the work to a Geotechnical Firm and shall submit an undertaking in this regard.

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

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

encountered, undisturbed samples shall be obtained in accordance with ASTM thin-walled sampling of soils. Movie clip of 15 minutes at each location is required to be submitted.

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

- Trial Pits to a maximum depth of 3 meters.
- Hand auger holes to a maximum depth of 7.5 meters.
- Separate BOQ shall be prepared by the Consultant with all required tests for deep boring. It is required to carry out grain size analysis at required scour depth.
- Submission of proper site investigation report comprising all relevant notes and pertinent information required by this TOR together with laboratory test results. The above scope of work may be varied or deleted depending on the findings as the investigation proceeds. All Sections in this Specification and the Bill of Quantities, which relate to work or materials not required shall be deemed not to apply.

As evidence of Geo-Technical Investigation Activity, the Consultant is required to submit Geo-Tagged Photographs along with Data and Time Stamp of each investigated site. The Consultant is also required to submit Linear Plan of all the locations along the road (Left + Right Side) where Investigation & Testing have been carried out and same shall be made part of the Geo-Technical Investigation Report. Also, the Consultant will submit the original Lab Reports / Testing Results duly stamped and signed by the Geo-Tech Engineer of the Consultant, failing to which the report shall not be acceptable.

Drilling at Bridges and Structures

Deep Machine boring to a maximum depth of 40-60 m below ground level or as per prevailing site condition and associated field-tests for Bridge Piles, 20m for Debris Shelters and other structures.

Drilling along Tunnel Alignment

At-least two (02) Boreholes at Each Tunnel up to appropriate depth at appropriate/accessible location along with associated tests to obtain **"Rock Quality Designation (RQD)", compressive strength of Rock and to evaluate the joint properties of rock strata under RMR and Q-system.**

Drilling at Portal

After the finalization/approval of Alignment of Tunnel and location of portals as per Feasibility Study, the Consultant may be required to carry out Geotechnical Investigation through drilling boreholes at each portal location of about 50 meters depth or as per prevailing site condition. The information then obtained would be used in the Design of Tunnel Portal.

Drilling at Landslide Areas for slope stability Analysis and Design

Lateral/vertical borings shall be done up to 30m depth or as per prevailing site condition at the locations required slope stability to assess the soil/rock

characteristics along the slopes. A piezometer shall be installed in each of the boreholes to measure the water table.

Drilling Length

For preparing the design for bidding purpose, a total of **600m** of drilling is estimated. Exact, numbers, depth will be finalized upon completion of the Feasibility study and Final Design. Further confirmatory Geotechnical Investigation at Bridge site and other structures will be carried out by the Construction Contractor through their Construction Contract and detailed design may be adjusted accordingly, if required.

The Cost of Geotechnical testing at Tunnels, Bridges and landslide areas will be made as per actual cost incurred against the provisional sum allocated.

The Consultant is required to quote for "Geo-technical Investigations" in Direct Cost Page which must include the cost of aforementioned activities, cost of report writing, Instrument Rental Charges (if any), Salary of Geo-Tech Engineer, Lab Technicians and Helpers, etc. (complete in all respects)".

3.6.16. SLOPE STABILITY SURVEY, INVESTIGATION, ANALYSIS AND DESIGN

The Consultant shall identify all areas prone to failure with respect to slope either in slip circle or shear failure of soil stratum whereas planar failure, wedge failure, toppling failure and for Rock fall in case of Rock mass. Kinematic analysis on stereo net and limit Equilibrium Analysis may be performed to determine the factor of safety against failures. The Consultant shall propose the latest and proven methodology / technology for stabilization of slopes using latest software of the design of stable slopes.

UAV Survey for Slope Stability Locations

The Consultant shall perform the UAV Survey for a resolution of less than 1cm for its accurate depiction at each of the vulnerable areas prone in terms of slope stability.

Geotechnical / Soil Investigations for Slope Stability Locations.

The Consultant will perform vertical borings for about 30 m depth or as per prevailing site condition to assess the index properties of the material at each of the potential slide areas for their analysis and the design of protective measures. A piezometer shall be installed in each of the boreholes to measure the water table.

The cost of drilling/boring shall be paid through item 3.6.14 (Geotechnical Investigations).

3.6.17. PAVEMENT DESIGN REPORT

Consultant will submit Pavement Design Report complete in all respect based on Soil investigation/material characterization on the finalized alignment and finalized traffic & Axle Load study. The pavement Design Report will include/contain all necessary soil material investigation tests and complete process of ESALs determination starting from AADT. All typical pavement cross section clearly elaborating all details will also be made part of pavement design report. In addition, the consultant will provide the details of Embankment Design as well as drainage design. Pavement will be designed for a period of 10 years' design life. Each input to

design should be dully calculated/justified through proper referencing in the Report. The Pavement design shall be carried out by the consultant on the basis of AASHTO Guide for Design of Pavement Structure 1993. In this regard, pavement type selection process of AASHTO Pavement Design Guide 1993 shall also be followed. In addition, pavement design shall also be validated through Mechanistic-Empirical approach using KENPAVE software. Shell Model shall also be used under KENLAYER analysis. All calculations shall be attached to the report in hard and soft form.

3.6.18. GEOMETRIC AND STRUCTURE DESIGN

The Consultant shall carry out Geometric Design and Structure Design on state-of-the-art and licensed software in accordance with the standards mentioned in this TOR. The Consultant shall submit separate design folders for Geometric and Structure Design and provide soft copy of design models alongwith design calculations. The structure design submission must include design of Bridges, Culverts, Retaining Walls, Slope Stability Measures, Drainage Structures on the Tunnel / Link Access Road, Slope Protection and Tunnel Lining with or without Ceiling Slab.

The Consultant shall also undertake roadside design and road furniture design including traffic signs, pavement markings and gantries, etc.

3.6.19. DESIGN OF TUNNEL CIVIL, ELECTRO-MECHANICAL WORKS, IT, SCADA & PORTAL FACILITIES

The scope of works under this Task is mostly the same as already explained in relevant sections, however, some works are added, and some are further elaborated with respect to Tunnel and Portal Requirements as follows:

a) **General**

- Identification of Underground Structure and Other Obstacles
- Subsurface, geological and geo-hydraulic conditions
- Structure Preconstruction Survey
- Location of Tunnel
- General Description of Various Tunnel Types, Planning of Tunnel Shape and Internal Elements
- Route Study with Traffic / cross-section
- Environmental and Community Issues
- Operational SOP
- Sustainability
- Tunnel Design Methodology/Process
- Groundwater/tunnel water burst Control
- Tunnel Portals
- Fire-Life Safety Systems
- E & M Systems
- Tunnel Drainage

- Operational and Financial Planning
- Risk Analysis and Management
- Structure Design
- Tunnel Lining
- SCADA / IT system
- Determination and Identification of Problematic Areas with Nature of Problems & their Suggested Solution w.r.t seismology of the area
- Collection and review of available Information (Published topographical, hydrological, geological, geotechnical, environmental, zoning and other information should be collected, organized and evaluated).

b) **Reconnaissance Survey**

A team of relevant staff will visit the project area to acquit themselves with all the relevant physical features of the area. The team will obtain and record the preliminary visual information as mentioned below:

- Identification of Potential areas of portals with respect to the alignment of Tunnels.
- Development of portal platform by earthwork, retaining wall and protective structures.
- Extent of Link Access Road to portal area.
- Potential quarry site for fine and coarse aggregate.
- Information of site for Contractor's Camps and Storage of Equipment & Machinery.
- Information about identification of location of landslides along with the Access Road to Portal.
- Geological Conditions.
- Information on potential location of flash flood and debris & mud flow around potential portal areas.
- Availability of other civic amenities nearest to portal area; particularly relating to health care.
- Identification of area and limit from subsequent detailed topo survey & hydrological study

The Consultant is required to submit Appraisal Report containing assessment of numbers and length of Tunnels, approximate Elevations at various locations, for approval by the Client. The task under this site assessment would be carried out expeditiously based on the information obtained through Reconnaissance Survey and use of GPS and other available information.

The Consultant will make a presentation to client of the various proposed Tunnels with relative Merits and Demerits based on Appraisal Report.

c) **Toposurvey Survey**

The Consultant shall carryout Topo survey which should cover the immediate project vicinity as well as larger regional area so that regional geologic, hydrologic and seismic influences can be accounted for.

d) **Topographic Survey with UAV (with less than 3 cm resolution) of Portal Areas**

The Consultant shall carryout Topographic Survey with UAV with less than 3cm resolution printable on a suitable scale (1:500 or 1:250 as per requirement) of all potential portal areas for approximately 25 Hectares for each portal with establishment of permanent survey control points at potential portal areas. The Specifications of Topographic Survey shall be the same as already stated under Article 3.6.6, 3.6.7 and 3.6.8 of this document.

e) **Geological Survey**

Firsthand information about the general geology of the Tunnel project would be required, which can be conveniently prepared from the visual inspection of mountainous terrain along the existing road supported with the information available from the Geological Map to be obtained from Geological Survey of Pakistan. The following surface features should also be observed and documented during geologic mapping program;

- Slides, new or old, particularly in proposed portal and shaft areas.
- Faults
- Rock weathering
- Sinkholes and karstic terrain
- Groundwater springs
- Volcanic activity
- Stress relief cracks
- Presence of talus and boulders
- Anhydrite, gypsum, pyrite or swelling shales

This would be required for preliminary classification of Rock Mass and Excavation class of Rock for preparation of BOQ. The Consultant is required to do the scale line geological survey along the Alignment of the Tunnels to determine the joint patterns, shear zones and fault zones along the proposed Alignment of the Tunnel along with collection of samples @ 150-200m. Actual geological conditions would be exactly revealed as the excavation proceeds inside the Tunnel, however, very careful geological observation will be required at the portal area.

f) **Geology Specific to Portal Areas**:

A detailed geological observation would be importantly required at the proposed portal areas of Tunnel, to ensure that all the structures in the portal areas are safe and well protected keeping in view the altitude of the area. The Rock

conditions near and above portal locations must be sound and competent and not excessively fractured and fragmented causing rock fall & landslide during summer and monsoon season. These portals must be safe from large scale snow Avalanche and flash flood.

g) **Petrographic Testing**

The Consultant is required to quote for "Geological Survey for Tunnels" in Direct Cost Page which must include the cost of aforementioned activities, cost of **petrographic testing of overburden samples along the proposed alignment @ 200m approx,** report writing, Instrument Rental Charges (if any), Salary of Material Engineer, Lab Technicians and Helpers, etc. (complete in all respects)"

h) **Construction Material Survey for Tunnel Works**

This would inter alia include:

- Identification of Source of locally available construction materials.
    - Coarse aggregate
    - Fine aggregate
    - Availability of water from construction activity and their storage

The Consultant will identify the potential areas for the above items and assess the approximate quantity particularly with the storage facility of water during construction activities.

It is normal that the Excavated Rock material from the Tunnel would be used for development of portal platform and widening of Link Access Road but initially the availability of material from outside tunnel may be required.

i) **Tunnel Design of Civil Works**

Long Tunnel Parameters shall be followed if tunnel length exceeds > 3.5 Km. Consultant shall do the efficient planning for a road tunnel which requires multi-disciplinary involvement and assessments, while considering lighting, ventilation, life safety, fire safety, instrumentation and monitoring, operation and maintenance, etc. The design life shall be 150 years. The aspects which shall be considered for a Tunnel Route study are Subsurface, geological, geo-hydraulic conditions, Constructability, Long-term environmental impact, Seismicity, Land use restrictions, Potential air right developments, Life expectancy, Economical benefits and life cycle cost, Operation and maintenance, Security and Sustainability.

The Consultant shall finalize the Alignment of Tunnel based on relative positions of the portals and directions of approaches, geology, clearances from external obstacles, gradients, vertical curve, and horizontal curves. Geotechnical issues such as the soil or rock properties, the ground water regime, the ground cover over the tunnel, the presence of contaminants along the alignment, presence of underground utilities and obstructions such as boulders or buried objects, and the presence of sensitive surface facilities should be taken into consideration when evaluating tunnel alignment.

Based on the road class, traffic characteristics, capacity of road, the Consultant shall finalize the Geometrical Shape. While considering space required for traffic and other facilities including construction methods, the Consultant shall

finalize the cross section of tunnel which is the important factor in designing the tunnel as construction costs vary greatly accordingly.

The Consultant shall perform the Geological Investigations and Geotechnical Interpretation for Tunnels. Tunnel design, method of its excavation and stability are greatly influenced by the geological conditions such as Lithology, Geological structures and Groundwater conditions. Good knowledge of the expected geological conditions is essential. The type of the ground encountered along the alignment would affect the selection of the tunnel type and its method of construction.

Ground conditions including geological, geotechnical, and hydrological conditions, have a major impact on the planning, design, construction and cost of a road tunnel, and often determine its feasibility and final route. Fundamentally, subsurface investigation is the most important type of investigations to obtain ground conditions, as it is the principal means for: defining the subsurface profile (i.e. stratigraphy, structure, and principal soil and rock types), determining soil and rock material properties and mass characteristics, Identify geological anomalies, fault zones and other hazards (squeezing soils, methane gas, etc., defining hydrogeological conditions (groundwater levels, aquifers, hydrostatic pressures, etc.) and Identifying potential construction risks (boulders, etc.).

The Consultant shall perform:

- Borings / Drilling; to identify the subsurface stratigraphy, and to obtain disturbed and undisturbed samples for visual classification and laboratory testing (to be performed under item 3.6.14).
- In situ tests; to obtain useful engineering and index properties by testing the material in place to avoid the disturbance inevitably caused by sampling, transportation and handling of samples retrieved from boreholes; in situ tests can also aid in defining stratigraphy;
- Geophysical tests quickly and economically obtain subsurface information (stratigraphy and general engineering characteristics) over a large area to help define stratigraphy and to identify appropriate locations for performing borings;
- Laboratory testing soil samples and rock core retrieved from the borings.

The Consultant shall perform the Rock Mass Classification for performing the design under RMR, Q-system and Convergence & confining method. The Tunnel Support system and Excavation classes shall be determined based on these systems.

- Based on the ground conditions along the Tunnel, the Consultant shall select the method of excavation i-e Drill and Blast or TBM using NATM approach.

j) Basic and Detail Design of Electro-Mechanical, IT & SCADA Works

- The Consultant shall design the Lighting System as per international Codes.

- The Consultant shall prepare design for E & M works for Tunnels as per best engineering practices commensurate with technical specifications of manufacturer.
- The Consultant shall also update the Electro-Mechanical (E&M) Design and Specifications during the construction period (if required). The Construction Works of E&M are stipulated to be taken up after the completion of all Civil Works inside the Tunnel after 2 to 3 years of time. By that time, there is a likelihood of improved technology in the matter of E&M Equipment/Instrumentation and Electronics and IT technology for improved performance and economy in cost. The Consultant shall again review and update the Design and Specifications of E&M Works including IT system by then after the completion of civil works for most effective and economic performance.
- The E&M Experts will carry out the Preliminary & Typical Design of the E&M with respect to their Types & Respective Dimension & location of installation within the Tunnel Cavity Length and Alignment of Tunnel. These Preliminary Design/Drawings of E&M Work will be used as reference for the Design of the standard values in Civil Engineering Structures including and components inside the Tunnel Cavity and near the Tunnel Portal. The Major Components of E&M System of Tunnel Are inter alia the following: -

• Tunnel	• Fire	• Fire	• Public
• Air Quality	• Traffic	• CCTV	• SCAD
• Tunnel	• Emergency Telephone System		• Toll
• Tunnel	• Power Supply System		

- Both 1D, 2D and 3D (CFD and Evacuation) simulation shall be performed using simulation software.
- The Consultant shall design the Tunnel to meet the fire safety requirements and ventilation as per the latest codes.

k) Design of Portal Facilities

The Consultant shall design the Tunnel Facilities including Admin Building, Operation Centre, Emergency Building, Electrical and Generator Rooms, Parking Sheds, Rest Area, etc.

3.6.20. FEASIBILITY STUDY

The Consultant shall submit a detailed feasibility report encompassing the technical / economic viability of the project after carrying out design and necessary investigations. The basic data, result of investigations and studies as well as design estimates and evaluation shall be collected in a condensed and

comprehensive form, in the feasibility report. Benefit cost methodology, cost appraisals of alternatives, benefit cost ratio, net present value, economic internal rate of return, sensitivity analysis, shall also be made part of the report.

The Feasibility Study Report shall also include inter alia the following:

- General description of various Tunnel Types, Planning of Tunnel alignment, and Internal Elements of Civil Works with respect to Electro-Mechanical Works.
- Types of Road inside and outside Tunnel and Tunnels cross-section.
- Preliminary basic Design and parameters for E&M System, which essentially required for Design of Tunnel Civil Works.
- Tunnel Drainage System.
- Determination and Identification of Problematic Areas with Nature of Problems & their Provisional Suggested Solution.

The Consultant shall also present the Feasibility Study at forums as and when required and seek approval of the most optimum alignment and location of Tunnel for undertaking subsequent Design and Documentation, ending with PC-1.

3.6.21. HIGHWAY SAFETY AUDIT (HSA)

Pakistan is among those countries, where the road accidents and fatalities are high. One of the major components about 28% relating to road accidents is attributed to the road environment factors. It is therefore, essential that the highway safety audit (third party) should be carried out by a certified HAS, at various stages, as per requirements of international standards.

Since the project in hand is selected for feasibility study and detailed design, the HSA shall be carried out with the submission of alignment report and feasibility report and shall conclude with the submission of final design report. In this regard, the Consultant is required to carry out the following activities:

a) Assist employer to arrange and perform RSA through an independent detailed systematic and technical safety check relating to the design characteristics of road infrastructure. The road safety auditor shall be an independent person/entity outside the team of experts who were not involved in the design or design review. The Employer will hire the independent Road Safety Auditor under a separate contract.
b) The third-party Road Safety Audit would be practically performed in two stages:
c) Concept Design Stage to evaluate implemented general design standards, and relative safety of interchanges' types and concept layouts (wherever applicable).
d) Detailed Design Stage to evaluate final geometric design features, traffic signing and pavement marking plans, lighting plans, landscaping, interchanges' details (such as tapers, lengths of acceleration and deceleration lanes, turning radii, etc.), facilities for other participants in traffic and operation, drainage, guardrails, and other roadside objects.

e) Principally, the audit will follow the Road Safety Audit Guideline issued by the World Road Association (2007).
f) Ensure that results from RSAs are reflected in the engineering design and operation.

Highway Safety Audit shall be carried out under the supervision of NHA's Highway Safety Audit Expert (if any). Other members of Highway Safety Audit team may include a third-party expert. An Engineer from NHA Design & Planning section shall be made part of the Highway Safety Audit team. Consultant is required to arrange the Highway Safety Audit visit, collection of required data, field visit, coordinate meetings and compilation of final Audit report including proceedings and Consultant shall bear all the expenses, transport, boarding & lodging, etc. of the Highway Safety Audit Team. The costs of carrying out Highway Safety Audit including expense of all aforementioned items are meant to be included in the other payable items.

3.6.22. ENVIRONMENTAL IMPACT ASSESSMENT AND NOC

As per EIA Rules, Consultant is required to carry out the EIA Study for the Project. It involves collection of required base line data from site, analysis and recommendation for mitigations. Findings shall be recorded in the form of Report, which shall be reviewed by NHA EALS Section. The scope also includes submission of EIA Report to Concern EPA, addressing their requirements, to their entire satisfaction (Including submission fee), conducting the Field hearing and obtaining NOC for NHA. All costs whatsoever shall be quoted. The detailed TOR for Environmental Impact Assessment is attached as **Annex-D** of this document.

The Consultant is required to quote for "Environmental Impact Assessment" in Direct Cost Page which must include the cost of aforementioned activities, cost of report writing, NOC Fee, Environmental Engineer Salary, Coordination with Pak EPA (Punjab) & Public Hearing Charges, etc. (complete in all respects)".

For EIA, consultants shall directly coordinate with GM (EALS) office. And all the corresponding shall be done directly with the EALS section. Moreover, the payment will be made to the consultant after getting clearance and satisfaction certificate from the EALS section. The consultancy fee against the EIA shall be verified and processed by the office of GM(EALS). The payment will be made to the consultant after clearance certificate from the EALS section of NHA. The consultant must also give recommendation for growing best suitable plants inside the ROW.

3.6.23. TENDER DOCUMENTS

Tender Documents shall comprise of the following: -

a. Volume-I

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

b. Volume-II

- General Specifications.

c. Volume-III

- Particular Specifications, Special Provisions and Bills of Quantities.

d. Volume-IV

- Drawings as per the following detail:
    - Title Sheet
    - Sheet Index
    - Key & Location Plan with Coordinates and alignment with stationing. Pits of soil investigations shall also be marked.
    - Sheet of Legends & Symbols
    - Traverse, Benchmark and Design alignment data including curve data
    - Typical Cross-Sections with locations of applications
    - Super-elevation details and Linear Plan
    - Road Furniture Details (Guard rails, Pavement Markings & Traffic signs etc) with locations of applications
    - Retaining walls with location tables
    - Soil investigation linear plan
    - Intersection Details
    - Drainage plan for surface runoff and urban areas
    - Mass Haul Diagram
    - Plan and Profile Drawings
    - General Notes for Structural Drawings
    - Drawings for Small drainage structures
    - Drawings for Large structures
    - Drawings for ITS and Command & Control centre for Tunnels
    - Drawings for Earth retaining structures.
    - Drawings for Tourism Rest/Lay by Area, Pedestrian Bridges, Electrification Works, etc.
    - Horticulture and Landscaping details
    - Miscellaneous Details / Ancillary Works including training works.
    - Detail drawing folders of Utilities / Infrastructure for Land Acquisition and removal of all utilities / infrastructure etc., having all the requisite information in the form of GIS corridor maps.
    - Drawings related to Environmental Mitigation Measures.

e) Principally, the audit will follow the Road Safety Audit Guideline issued by the World Road Association (2007).
f) Ensure that results from RSAs are reflected in the engineering design and operation.

Highway Safety Audit shall be carried out under the supervision of NHA's Highway Safety Audit Expert (if any). Other members of Highway Safety Audit team may include a third-party expert. An Engineer from NHA Design & Planning section shall be made part of the Highway Safety Audit team. Consultant is required to arrange the Highway Safety Audit visit, collection of required data, field visit, coordinate meetings and compilation of final Audit report including proceedings and Consultant shall bear all the expenses, transport, boarding & lodging, etc. of the Highway Safety Audit Team. The costs of carrying out Highway Safety Audit including expense of all aforementioned items are meant to be included in the other payable items.

3.6.22. ENVIRONMENTAL IMPACT ASSESSMENT AND NOC

As per EIA Rules, Consultant is required to carry out the EIA Study for the Project. It involves collection of required base line data from site, analysis and recommendation for mitigations. Findings shall be recorded in the form of Report, which shall be reviewed by NHA EALS Section. The scope also includes submission of EIA Report to Concern EPA, addressing their requirements, to their entire satisfaction (Including submission fee), conducting the Field hearing and obtaining NOC for NHA. All costs whatsoever shall be quoted. The detailed TOR for Environmental Impact Assessment is attached as **Annex-D** of this document.

The Consultant is required to quote for "Environmental Impact Assessment" in Direct Cost Page which must include the cost of aforementioned activities, cost of report writing, NOC Fee, Environmental Engineer Salary, Coordination with Pak EPA (Baluchistan) & Public Hearing Charges, etc. (complete in all respects)".

For EIA, consultants shall directly coordinate with GM (EALS) office. And all the corresponding shall be done directly with the EALS section. Moreover, the payment will be made to the consultant after getting clearance and satisfaction certificate from the EALS section. The consultancy fee against the EIA shall be verified and processed by the office of GM(EALS). The payment will be made to the consultant after clearance certificate from the EALS section of NHA. The consultant must also give recommendation for growing best suitable plants inside the ROW.

3.6.23. TENDER DOCUMENTS

Tender Documents shall comprise of the following: -

a. Volume-I

- Instructions to Bidders.
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b. Volume-II

- General Specifications.

c. Volume-III

- Particular Specifications, Special Provisions and Bills of Quantities.

d. Volume-IV

- Drawings as per the following detail:
    - Title Sheet
    - Sheet Index
    - Key & Location Plan with Coordinates and alignment with stationing. Pits of soil investigations shall also be marked.
    - Sheet of Legends & Symbols
    - Traverse, Benchmark and Design alignment data including curve data
    - Typical Cross-Sections with locations of applications
    - Super-elevation details and Linear Plan
    - Road Furniture Details (Guard rails, Pavement Markings & Traffic signs etc) with locations of applications
    - Retaining walls with location tables
    - Soil investigation linear plan
    - Intersection Details
    - Drainage plan for surface runoff and urban areas
    - Mass Haul Diagram
    - Plan and Profile Drawings
    - General Notes for Structural Drawings
    - Drawings for Small drainage structures
    - Drawings for Large structures
    - Drawings for ITS and Command & Control centre for Tunnels
    - Drawings for Earth retaining structures.
    - Drawings for Tourism Rest/Lay by Area, Pedestrian Bridges, Electrification Works, etc.
    - Horticulture and Landscaping details
    - Miscellaneous Details / Ancillary Works including training works.
    - Detail drawing folders of Utilities / Infrastructure for Land Acquisition and removal of all utilities / infrastructure etc., having all the requisite information in the form of GIS corridor maps.
    - Drawings related to Environmental Mitigation Measures.

- Highway and Tunnel Drainage Design.
- Design for provision of Ducts/crossings of future utilities like OFC, pipelines, etc.
- Intelligent Transport Systems and command & control System for Tunnels.

e. Contract Conditions (Legal Part)

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

f. Technical & Particular Specifications

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

g. Bill of Quantities

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

h. Engineer's Estimate

Consultant shall prepare the Engineer's Estimate of the project based on the detailed design, drawings and final Bill of Quantities, using NHA Schedule of Rates (2022) or latest, if any. For items not specified in NHA CSR, rate analysis shall be provided based upon market price.

For review of Engineer's Estimate, the Consultant shall provide the following:

- Backup calculations / Measurement Sheets of the Engineer's Estimate in soft editable format.
- Earthwork Cross-Sections generated at every 25m interval. Same shall be submitted in a separate folder titled "Cross-Sections" for verification of the earthwork quantities.
- The Consultant shall also submit a "Project Data Sheet" showing the location and dimensions of bridges, culverts, subways, underpasses, cattle creeps, retaining & breast walls, traffic & road signs, slope stability works etc.

i. Certificate of Technical Sanction

As per Para 55-65, Chapter-Two, NHA Code, Vol-I & NHA's Circular No. 11(19)/Secy(Coord)/NHA/15/569 dated November 04, 2015, the Consultant is required to submit a certificate which is to be used for obtaining technical

sanction of the project from the competent authority. A standard certificate is attached at Annex-B.

3.6.24. STAKEOUT OF ALIGNMENT ON GROUND - REPORT

After the Design drawings are approved, the Consultant shall be asked to stake out the alignment on ground if required. The Centerline markers shall be fixed on ground at 25 m interval. A 1.5m long PVC pipe 4" diameter filled with lean concrete and orange color spray paint shall be erected. All verification and payment shall be processed by the Nominated project director of NHA.

3.6.25. LAND ACQUISITION AND UTILITY FOLDERS /INSTALLATION OF ROW MARKERS

The consultant shall identify land and property falling within the right of way (ROW) to be acquired with coordination with NHA Project and Local Authorities. The consultants shall submit 5 copies of ROW plans showing the alignment and defining the Right of Way to facilitate timely action for acquisition of land. The Consultant shall also prepare estimate for acquiring any additional land based on DC Rates and removal of structures and utilities, particularly in the built-up areas. The Consultant shall also prepare estimate for acquiring any additional land and removal of structures and utilities, particularly in the built up areas along with complete details of land owners as per Shajra Parcha as per Provincial Department Record. The Consultant shall also include the following information in the Land Folders:

- Details of Trees (Numbers, Types, Girth, etc.)
- Permanent Points
- Graveyards, Mosques, other Religious / Worship Places, etc.
- Government Schools
- Names of Villages and Towns
- Government and Private Land falling in the proposed corridor

Folders shall be submitted in soft format in CAD with reference to grid coordinates.

ROW permanent markers shall be set up by the consultant, upon request. The markers as per NHA specifications shall be erected and payment shall be verified and processed by the Project Director directly.

3.6.26. CONSTRUCTION MACHINERY REPORT INCLUDING MASS HAUL DIAGRAM

A detailed report on construction resource shall be prepared. It will include, based on the construction duration, the amount and type of construction machinery required. Based on the Construction plan developed in Primavera / Microsoft Project, the resource allocation / the Cash flow required shall be stated. Computations and assumptions for productions shall be attached in the report.

Consultant shall submit the mass Haul Diagram which shall be represented directly below the longitudinal section of the alignment plan. It shall clearly depict the following:

- The distances over which the cut and fill will balance;
- Quantities of materials to be moved and direction of movement;
- Areas where earth have to be borrowed/wasted and amounts involved.

3.6.27. FORMULATION OF PC-I

The consultant shall prepare the PC-I for the project road including economic analysis on prescribed Performa of PC-I by Planning Commission. If acquisition for land or structures is involved, then PC-I for land will also be prepared and requisite number of copies submitted to NHA.

The Consultant shall write letter to concern DC for Land Cost and will sent copy of same to concern General Manager for facilitation to get cost of Land. Subsequent revision shall also be done by the Consultant, if required.

3.6.28. FINAL PRESENTATION AND SUBMISSIONS

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

Important Features of Presentation:

- Consultant will describe the selected road alignment, merits, demerits, land acquisition and other impediments (if any).
- Consultants will highlight important components of project like major bridges, Tunnels, flyovers, interchanges, service areas and landslides etc.
- Important parameters of sub-soil investigation like CBR, Pile Capacity and General Soil Classification etc.
- Consultant will also highlight the environmental impact of the road construction on the road influence areas.
- Important hydraulic parameters used in the design of bridges over rivers/ canals.
- Results of traffic study and axle load survey.
- Location of quarry sites
- Consultant shall clearly explain the traffic management plans.
- Complete description of design criteria and functional requirements.
- Description of specialised equipment and machinery required for the construction.
- Description of methodology / codes for pavement and structural design including details of computer models.

- For Structural Design, Summary of results of computer output (especially maximum and minimum forces for all elements) in tabulated form shall be presented.
- A plan showing major quarry sites / borrow area sites including mass diagram showing cut and full along the finally selected alignment shall be presented.
- Tunnel Portals design and Location.
- Important Parameters of Tunnel and its E&M Works.

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

3.6.28.1. Submission of Documents

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

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

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

3.6.28.2. Provision of Data on Compact Discs

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

3.7. TRAINING ON TUNNEL FOR NHA OFFICERS

The Consultant will arrange training on the Design and Construction of Tunnels for NHA officers. GM (Design) will nominate and recommend the names of the individuals for the approval of Member Planning. The Cost of Training will be made against the lump sum amount.

3.8. TRAINING OPPERTUNITIES

The Consultant will manage to train three (03) fresh Graduate Engineers as Junior / Trainee Engineers regarding the design activities in these services. Consultants have to submit the training program to Member (Planning) for approval. All the Trainee Engineer will be selected with the approval of General Manager (Design).

Moreover, the Consultant is also responsible to pay a minimum stipend of Rs. 75,000/- per month after of all applicable taxes and Consultant's overhead to

each Trainee Engineer. Moreover, all non-key staff shall be appointed with the approval of General Manager (Design).

3.9. PERFORMANCE OF THE CONSULTANT

The Consultant shall attend the pre-bid meeting with bid preparing team (coordinator only is not acceptable). The performance of the Consultant with reference to his response to the queries of the contractors shall be evaluated and recorded by GM (P&CA) & GM (Design).

a. During the construction phase, the design review shall finally reveal the performance status recorded by the Design Section.

b. The performance of the consultant shall be evaluated based on the performance status recorded by the Design Section. Performance evaluation shall be done by concerned experts of Pavement, Structure, Geometry & Cost Estimation. Each expert shall evaluate rating of consultant based on timely submission, quality of submission and responsiveness of consultant. The overall performance rating based on the inputs from all experts shall be made in the following manner:

A+	Excellent
A	Good
B	Requiring improvement
C	Poor

c. "B" performance rating without subsequent improvement shall drop the consultant performance to the stage "Poor". If "C" persists in two consecutive stages, the Design section shall propose penalty and P&CA shall implement the recommendation in the light of legality of the matter.

3.10. MODE OF PAYMENT

"A" is to be calculated by excluding all Provisional Sum / (Deliverable) Lump Sum items from Contract Cost.

S.#	DELIVERABLES AND APPROVAL	%age of "A"
1	Data Collection & Coordination Report along with Inception Report and Reconnaissance Report	2.5%
2	Tri-stereo Image (2.5m resolution) and Processed DEM (5m resolution) along with GCPs (about 150 sq. km)	PS
3	Review, Evaluate and Incorporate where applicable, the Feasibility Report prepared by JETRO	5%
4	Alignment Study Report including all the requirements spelled out in the TOR along with recommendations and KMZ files	7.5%
5	Topographic Survey Drawings & Report	LS
6	Traffic Survey and Axle load survey Report	LS
7	Geological Survey Report	2.5%
8	Soil Investigation & Material Investigation (Including Construction Material Report & Geology Survey)	LS
9	Existing Pavement and Structures Conditions Report	2.5%

S.#	DELIVERABLES AND APPROVAL	%age of "A"
10	UAV (RTK Drone) Survey along the Approved Alignment including UAV Survey Report	L.S
11	Geotechnical Field Investigation Report of Core Drilling at each Portal location, Structures and potential sliding areas requires slope stability (500m approx. of drilling) excluding Salary of Geotechnical Engineer.	PS
12	Slope Stability Investigation, Analysis and Design for protection measures	5%
13	Petrography and index properties Testing for overburden samples, Geophysical survey, Testing and Investigations at Tunnels and Bridges Report	LS
14	Hydrology and Hydraulic Designs	LS
15	Pavement Design Report	5%
16	Structure Design Report (including Tunnel, Bridge (if any), Culvert, Drainage Structures, Retaining Structures, Slope Protection, Brest/ Retaining Wall Etc.)	10%
17	Design of Tunnel Civil Works, Preliminary Design of E&M, Design of IT and SCADA	10%
18	Design of Portal Facilities	LS
19	Detailed Feasibility Study Report	10%
20	Highway Safety Audit Report	LS
21	EIA Report with NOC from EPA Punjab	LS
22	Tender/Bidding Documents including Specifications & BOQ, Engineer Estimates	10%
23	Cost Estimates of Civil Works and Electro-Mechanical Works.	5%
24	Land Acquisition, Utilities Relocation Drawings and ROW drawings	7.5%
25	Construction Machinery Report and Mass Haul Diagram	2.5%
26	PC-1	10%
27	Future Assistance	5%
	TOTAL	**100%**

Upon checking the report that it is in line with the TOR, 50% payment shall be released. The remaining shall be released upon acceptable quality along with desire reports (signed and stamped) are ensured. Upon initial submission, a checklist correlating to TOR requirement shall be attached and checked for requirement spelled out.

Final payment shall not be cleared until Consultant gives a satisfactory final report and until consultant submits soft copies of all documents / reports / drawings. Furthermore, no EOT shall be required for the balance payments against each report.

3.11. DELIVERABLES

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

S.#	DELIVERABLES AND APPROVAL	Numbers
1	Data Collection & Coordination Report along with Inception Report and Reconnaissance Report	03 Hard Copies + 01 Soft Copy
2	Tri-stereo Image (2.5m resolution) and Processed DEM (5m resolution) along with GCPs (about 220 sq. km)	03 Hard Copies + 01 Soft Copy (In Hard Drive)
3	Review, Evaluate and Incorporate where applicable, the Feasibility Report prepared by JETRO	03 Hard Copies + 01 Soft Copy
4	Alignment Study Report	03 Hard Copies + 01 Soft Copy (In Hard Drive)
5	Topographic Survey Drawings & Report	03 Hard Copies + 01 Soft Copy
6	Traffic Survey and Axle load survey Report	03 Hard Copies + 01 Soft Copy
7	Geological Survey Report	03 Hard Copies + 01 Soft Copy
8	Soil Investigation & Material Investigation Report	03 Hard Copies + 01 Soft Copy
9	Existing Pavement and Structures Conditions Report	03 Hard Copies + 01 Soft Copy
10	UAV (RTK Drone) Survey along the Approved Alignment including UAV Survey Report	03 Hard Copies + 01 Soft Copy (In Hard Drive)
11	Geotechnical Field Investigation Report of Core Drilling at each Portal location, Structures and potential sliding areas requires slope stability (450m approx. of drilling) excluding Salary of Geotechnical Engineer.	03 Hard Copies + 01 Soft Copy
12	Slope Stability Investigation, Analysis and Design for protection measures	03 Hard Copies + 01 Soft Copy
13	Petrography and index properties Testing for overburden samples, Geophysical testing, survey, Testing and Investigations at Tunnels and Bridges Report	03 Hard Copies + 01 Soft Copy
14	Hydrology and Hydraulic Designs	03 Hard Copies + 01 Soft Copy
15	Pavement Design Report	03 Hard Copies + 01 Soft Copy

S.#	DELIVERABLES AND APPROVAL	Numbers
16	Structure Design Report (including Tunnel, Bridges, Culvert, Avalanche Galleries, Drainage Structures, Retaining Structures, Slope Protection, Brest/ Retaining Wall Etc.)	03 Hard Copies + 01 Soft Copy
17	Detail Tunnel Design & Portal Facilities including design of E&M Works	03 Hard Copies + 01 Soft Copy
18	Portal Facilities	03 Hard Copies + 01 Soft Copy
19	Detailed Feasibility Study Report	03 Hard Copies + 01 Soft Copy
20	Highway Safety Audit Report	03 Hard Copies + 01 Soft Copy
21	EIA Report with NOC from EPA Punjab	15 Hard Copies + 01 Soft Copy
22	Tender/Bidding Documents including Specifications & BOQ, Engineer Estimates	03 Hard Copies + 01 Soft Copy
23	Cost Estimates of Civil Works and Electro-Mechanical Works.	03 Hard Copies + 01 Soft Copy
24	Land Acquisition, ROW Folders and Utilities Relocation Drawings including Fixing of ROW Markers	05 Hard Copies + 01 Soft Copy
25	Construction Machinery Report and Mass Haul Diagram	03 Hard Copies + 01 Soft Copy
26	PC-1	03 Hard Copies + 01 Soft Copy

Note: The soft copy will also be submitted in the format compatible with document i.e. Word, Excel, CAD, etc. One copy in PDF must be provided along with.

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

i. Alignments (all possible options) marked on SOP sheets should be submitted at the outset of the project along with Inception Report.

ii. Consultants will get approval of location / concept of Bridges & Tunnels from NHA Design Section before embarking on detailed structural designs.

It is reiterated that all documents / drawings shall be subject to review and checking by NHA's In-house consultants. Consultants will incorporate any comments / modifications made by the NHA's In-House Consultants (if agreed, the responsibility for correctness of design lies with the Consultants). Consultants will provide two additional sets of the tender documents and reports to the Client at a later stage at no extra cost to the Client. Additional number of sets (if required) shall be provided at a cost of Rs. 5,000/- per set.

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ANNEXURE – A

COPY OF FINAL REPORT PREPARED BY JETRO

FID

63

...he Ministry of
...de and Industry

Study on Economic Partnership Projects in Developing Countries in FY2007

Feasibility Study
...the Realignment of Motorway M-2 in Salt Range Area in Pakistan

Final Report

March 2008

Japan External Trade Organization (JETRO)

3.3.3 Technical Consideration for the Study

(1) Analyses of the Route Realignment Study Carried Out by NHA

Shortly after the completion of the M-2 in 1997, NHA carried out three studies on the realignment of the Salt Range section of the M-2. However, these studies did not take into account structures such as long-span bridges and a tunnel. As a result, the total length of planned realignment was greatly extended with a large-scale detour to ease the vertical alignment. Figure 3-12 shows alternative realignment routes in this study. In the latest Study, the length of the recommended route is 31 km, which is 21 km longer than the existing alignment, and the project cost is estimated at Rs. 4.9 billion. The major problems identified by the Study Team for this recommended realignment plan are as follows:

- ◇ Even though the maximum design gradient is 4%, there are continuous sharp bends that require reduced speed; hence, it is impossible to secure the functions of a motorway.
- ◇ Even though the realignment is [illegible] requirement of structures, continuous high retaining walls are necessary. In addition, the original terrain is very steep and large-scale excavation of foundation would be required, making the actual construction very difficult.

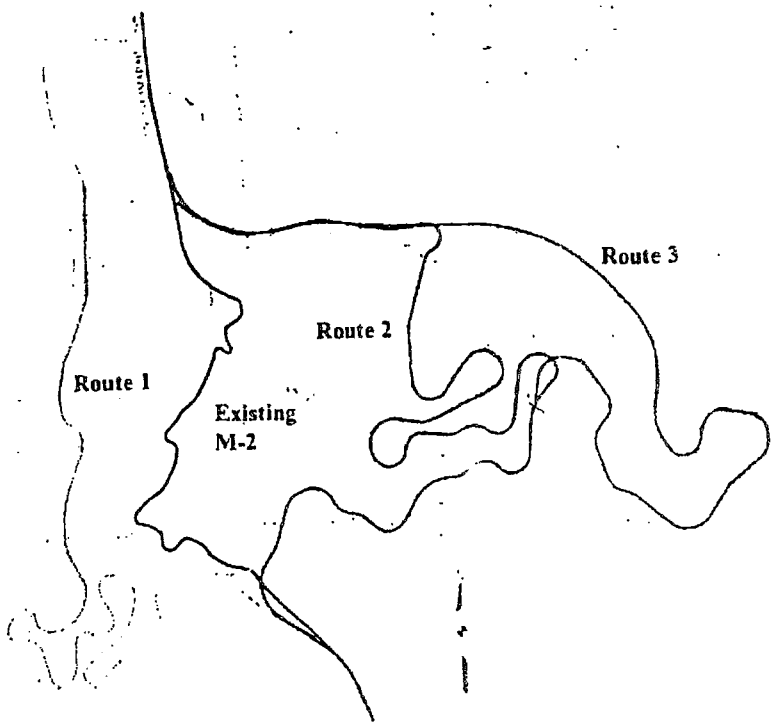


Figure 3-12 Alternative Route Realignment Plan in the Existing F/S

(Source: Feasibility Study & Detailed Design for Improvement of Existing Alignment & Re-Alignment of Motorway M-2 in Salt Range Area, Alignment Study Report)

(2) Examination of Engineering Method Applied for the Study

The main objective of the Study was to examine the route realignment of the Salt Range section of the M-2 applying Japanese technology as requested by NHA. Therefore, it is necessary to propose the most suitable plan employing a tunnel and high pier steel girder bridges, which have rarely been implemented in Pakistan. Also, NHA has concerns about the large extension of road length by realignment, since users tend to avoid longer routes. Hence, NHA is not satisfied with the previous realignment plan.

After analyzing the present conditions and problems of the Study area, the Study Team employed the following planning policy. In addition, transition (clothoid) curves are applied at both ends of curves in order to secure smooth driving.

(a) Policy for improvement of south bound lanes

- If alignment of the entire stretch of both south and north bound lanes were to be improved, the total project cost would be extremely high. On the other hand, traffic safety could be achieved if steep combination gradients were eased and sharp S-shaped curves (hair-pin curves) could be avoided by adopting larger-radius horizontal curves, even though the steep gradient would remain.
- Traffic accident black spots are concentrated at locations with a combination of 7% down gradient and sharp bends with a curve radius of less than 100 m. Therefore, improvement of sharp bends is one of the targets in the Study. Hence, partial realignment to avoid problem sections (km 223-225 and km 229-231) is proposed for the south bound lanes.
- Since natural disasters such as rock falls and landslides mainly occur on the slopes next to the south bound lanes, countermeasures can be achieved by shifting the south bound lanes to the existing north bound lanes, securing a certain distance from the slopes.
- From the above-mentioned points of view, the Study Team proposes an improvement plan of the south bound lanes for maximum utilization of existing carriageway, including the existing north bound lanes, to improve the minimum radius of sharp bends, with the same down gradient.

(b) Policy for improvement of north bound lanes

- In order to avoid a reduced climbing speed of cargo vehicles of not less than 45 km/h with a design speed of 90 km/h, a completely new alignment is proposed with a maximum gradient of 4% or less, since the entire stretch is uphill.
- In order to apply the 4% maximum gradient, it is necessary to secure sufficient road length. However, since the proposed alignment involves passing through steep

topography, a minimum curve radius of 300 m is applied to cope with the design speed of 90 km/h.

- To satisfy the design conditions, high embankments, high pier bridges and a tunnel are employed.
- In order to reduce the Project cost, utilization of north bound lanes as an exclusive large vehicle lanes was also considered.

3.4 Outline of the Project

3.4.1 Basic Policy for Determining the Project Contents

(1) Road Design Standard

The geometric design standard defined in "Road Standards in Pakistan" (NHA, Feb 1992) is employed in the Study. This standard was prepared mainly based on the "Geometric Design Guide" of the American Association of State Highway and Transportation Officials (AASHTO).

(a) Determination of Design Standard

Since the Study Area is hilly terrain, a design speed of 90 km/h is employed as shown in Table 3-6.

Table 3-6 Design Speed

Item	Unit	Flat Terrain	Hilly Terrain
Design Speed	km/h	120	90

(b) Geometric Design Standard and Typical Cross-Sectional Elements

Geometric design standard and typical cross-sectional elements corresponding to a design speed of 90 km/h are summarized in Table 3-7.

Even though the geometric design standard and typical cross sections of design speed of 90 km/h are applied in general, values less than the minimum standard are applied as absolute values at sections with geographical constraints. Also, slope protection is applied for cut slopes, if required, in consideration of extremely adverse topographical and geological conditions.

(2) Method to Select Route Realignment Plan in the Study

In the Study, realignment plans are examined in three stages based on existing study reports and data/information. Then, preliminary design is carried out for the route selected in the second stage of the realignment study.

Table 3-7 Geometric Design Standard

Item		Unit	Norma	Notes
Horizontal curve radius		m	300	
Radius for terminating cross slope		m	1,100	
Vertical gradient		%	4	Absolute value of 5%, if difficult terrain
Vertical curve	Stopping sight distance	k/%A	43-71	
	Passing sight distance	k/%A	390	
Lane width (each 1 lane)		m	3.65	
Width of shoulder		m	3.0	
Cross slope		%	2.0	
Grade of embankment slope		H:V	2:1	Depends on site conditions
Grade of cutting slope		H:V	-	Depends on site conditions

(a) First Route Realignment Selection

The first route realignment selection was carried out based on the existing 1/50,000 topographical maps and satellite photos. In this stage, possible routes for the north bound lanes were examined and selected for comparative evaluation. In order to satisfy the maximum gradient of 4% or less, three alternatives were selected, including partial realignment of the existing road and two alternatives using a long detour in both the eastern and western direction. Alternative routes for the first route realignment selection are shown in Figure 3-13, and a comparison table is shown in Table 3-8.

Table 3-8 Comparison Table of First Route Realignment Alternatives

Item for Comparison	Alternative Route A	Alternative Route B	Alternative Route C
Image of alternative route	 ——Existing route	 ——Existing route	 ——Existing route
Outline of alternative route	Realignment route is located at the eastern side of the existing road	Realignment with maximum utilization of the existing road	Realignment route is located at the western side of the existing road
Minimum curve radius	R=100m	R=100m	R=100m
Maximum gradient	5.0%	4.0%	6.2%
Total length of bridges	1,530m	2,750m	-
Length of tunnel	6,930m	2,300m	9,810m
Earth work length	11,300m	15,730m	17,140m
Evaluation results	Tunnel length is about 7 km; this route is unreliable Bad	Even though the tunnel length is 2.3 km, this route is the most economical and reliable among the alternatives. Good	Tunnel length is 10 km; this route is the most uneconomical and unreliable Bad

Even though Alternative B is the most reliable route, it is impossible to design vertical alignment at 4% or less. Hence, realignment routes to secure longer distance were considered in the second route alignment selection.

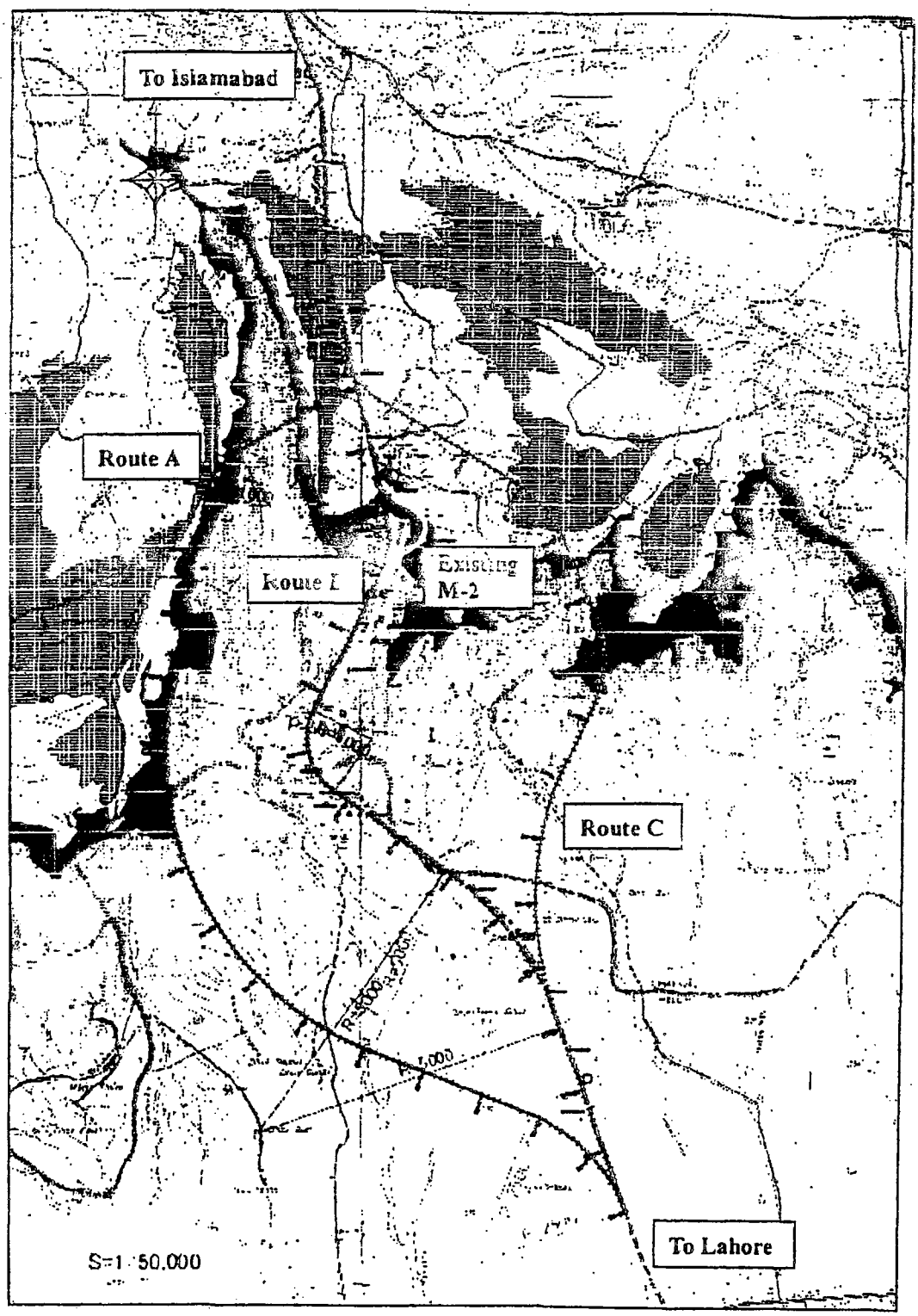


Figure 3-13 Comparison of Realignment Routes for First Selection

(b) Second Route Realignment Selection

The second route realignment selection was carried out based on the digital data from aerial photographs obtained during survey work in Pakistan with verification by site observation.

A comparative analysis between Alternative 1 (combination of Alternatives A and B) and Alternative 2 (combination of Alternatives B and C) was conducted in order to secure sufficient road length. Alternative routes for the second route realignment selection are shown in Figure 3-14, and a comparison table is shown in Table 3-9. Considering the geological conditions and economic advantages, Alternative 2 was selected after confirming its greater number of advantages.

Table 3-9 Comparison Table of Second Route Realignment Alternatives

Item for Comparison	Alternative 1 (A-B Route)	Alternative 2 (B-C Route)
Image of alternative route		
Outline of alternative route	Combination of Alternative routes A and B in the first selection	Combination of Alternative routes B and C in the first selection
Minimum curve radius	R=700	R=400
Maximum gradient	5.0%	5.0%
Total length of bridges	1,580m	3,910m
Length of tunnel	8,720m	1,890m
Earthwork length	8,510m	6,830m
Evaluation results	Tunnel length is about 9 km; this route is expensive and unreliable. Bad	Tunnel length is less than 2 km; this route is economical and reliable. Good

On the other hand, Alternative 2 involves problems concentrated at sections with a combination of sharp curves and down gradient of 7%. Partial realignment of these sections

is considered in order to secure traffic safety and driving comfort.

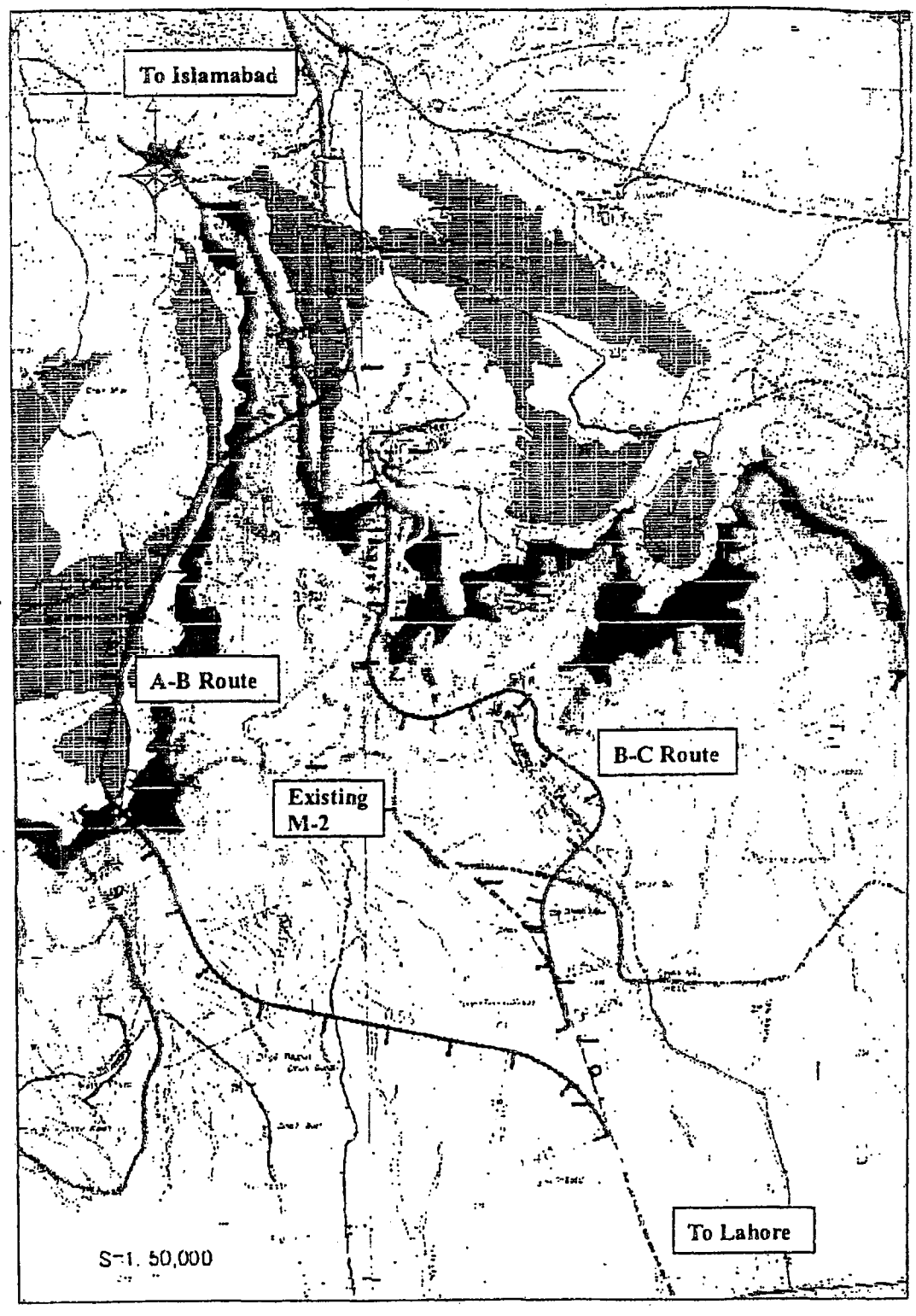


Figure 3-14 Comparison of Realignment Routes for Second Selection

(3) Natural Condition Survey

Based on the results of the second route realignment selection, topographical surveys were conducted on the sections of south bound lanes requiring partial realignment and the section of north bound lanes requiring total realignment in order to carry out the preliminary design under the difficult topographical and geological conditions of the Study area. Boring surveys were also conducted at the seven locations proposed for the construction of structures (bridge and tunnel). Geological observation along the proposed realignment routes was performed by a geologist selected by the local consultant. Results of boring surveys are attached in Appendix-2.

(a) Outline of Geology in the Study Area

The rocks present in the Study area belong to the Infra-Cambrian Salt Range Formation to Eocene Chorgali Formation, and consist of limestone, marl, gypsum, salt, sandstone and shale. Due to the movement of evaporite and clay deposits, the area has undergone severe disturbance, fracture and disintegration. Formations requiring close attention in the realignment plan are described below. Also, a geological map covering the proposed realignment route is shown in Figure 3-15..

① The major part of the Salt Range Formation in the area consists of red, contorted, gypseous clay stone and marls without any apparent bedding. Intercalated thick rock salt bodies predominantly pinkish in color are being mined from different areas. The middle part of the formation contains gypsum, dolomite, shale, siltstone and sandstone. Rocks are exposed at the slope end part on the Lahore side of the Study area and existing motorway. The slope is very fragile, a condition that could lead to slope failure.

Red marls in the Salt Range Formation

Entrance to rock salt mine

② The Patala Formation consists of mostly dark gray to black and greenish gray to brownish gray, silty and partly pyretic shale. The shale is partly carbonaceous and contains thin

seams of a sub-bituminous mostly resinous and pyretic coal, which is mine from a number of small mines located at different parts of the Study area.

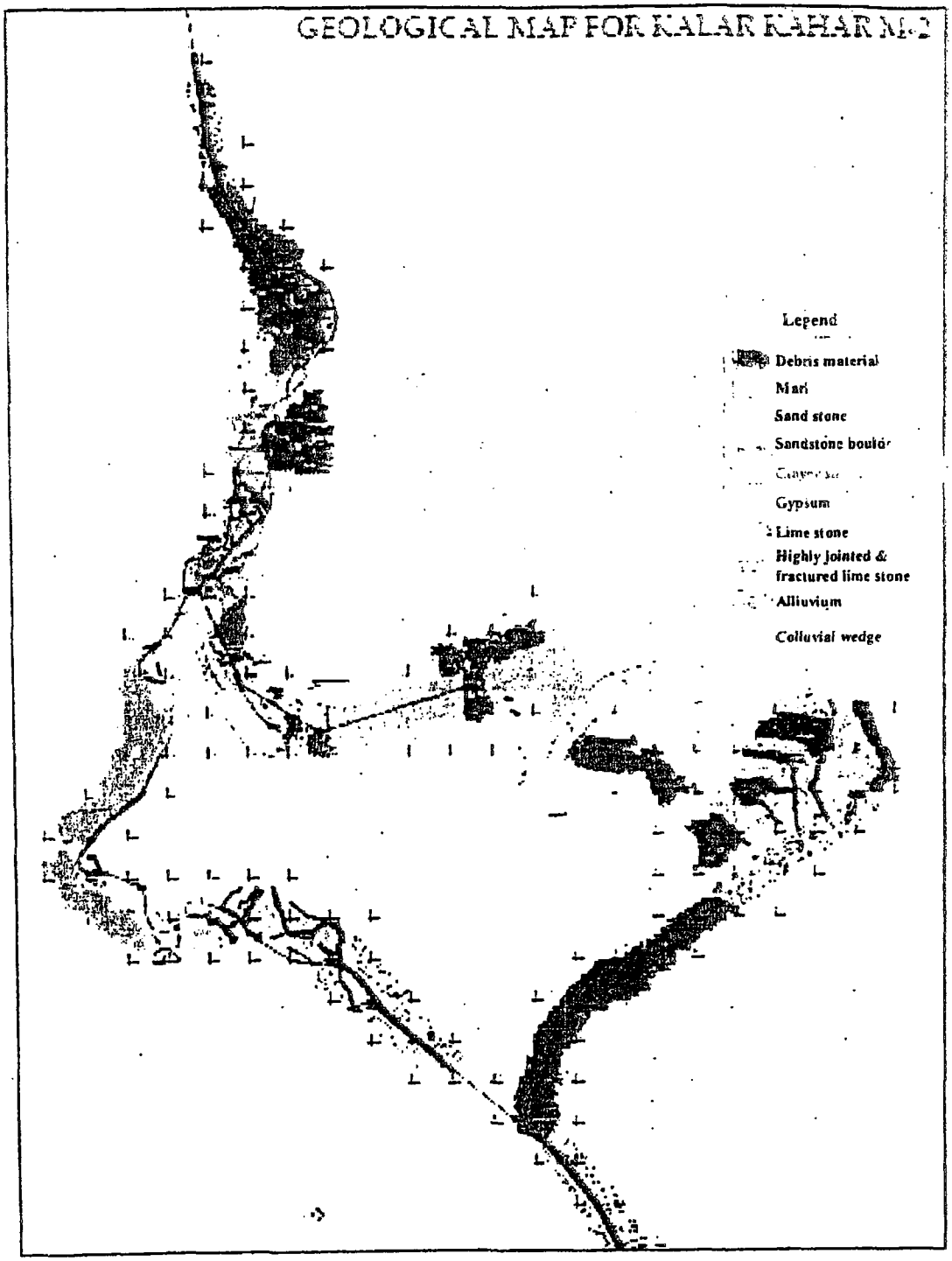
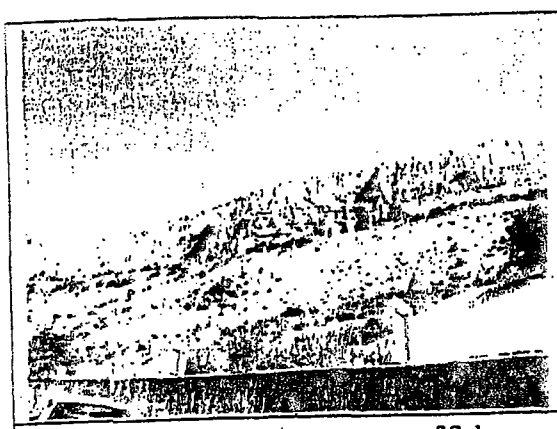


Figure 3-15 Map of Geological Conditions of Proposed Realignment Sections

③ The Sakesar Limestone is a lightly gray to yellowish gray, massive, cliff forming limestone with abundant back chert nodules. In the area, a marlstone horizon also occurs

in the upper part of the formation. The thickness of Sakesar limestone is 70-150m in Salt Range.



Highly jointed limestone outcrop of Sakesar Limestone

Entrance of Coal Mine at upper part of Patala Formation

3.4.2 Route Realignment Plan

(1) Road Realignment Plan

In the route realignment plan, based on the results of the site investigations, topographical surveys and boring surveys, the most appropriate realignment plans, as described below, have been selected in order to solve problems of M-2 in the Study Area (Frequent traffic accidents, natural disaster, and difficulty of climbing of the north bound lanes by goods vehicles.

(a) Partial Realignment Section of the Existing Motorway

The improvement plan for the south bound lanes involves partial realignment at existing sharp bend sections with the adoption of larger-radius horizontal curves. Also, efforts are made to avoid a 7% gradient at sections with small-radius curves during realignment planning.

(b) New realignment section

In order to balance the cut-and-fill earth volume, horizontal alignment is set at the upper side of the mountain at the lower part of the Salt Range section. At the section where new alignment crosses the river, alignment is set to cross the upper stream in order to minimize the scale of bridges by avoiding a long-span bridge. At the section where the proposed alignment crosses over the existing M-2, alignment is set at the eastern side of the existing south bound lanes to minimize the height of the piers of the proposed continuous bridges.

For determination of gradient, maximum gradient of 3% is adopted for the tunnel section, while the absolute maximum gradient of less than 5% were adopted for earth work sections and bridge sections where maximum gradient was determined by securing climbing

speed of goods vehicles not less than a half of the design speed. (Velocity-Gradient Profile is attached in Appendix 3.

In the Study, the improvement plans of partial realignment of existing M-2 for the south bound lanes and new realignment for the north bound lanes with 3 lanes each were planned and proposed to NHA during the explanation of the Draft Report. However, due to high project cost, NHA has requested the Study Team to consider the new alignment with 2 lanes exclusively for goods vehicles. According to the request of NHA, the Study Team has selected additional alternatives, and technical and economical feasibility of alternatives shown in Table 3-10 have been studied.

Table 3-10 Alternatives for the Route Realignment Plan

Alternative	Improvement Content	Project Cost	Accident Prevention	Natural Disaster Prevention	Measure for North Bound Goods Vehicles
Alternative-1	* New realignment of the north bound lanes with 3 lanes. * Partial realignment of the south bound lanes with 3 lanes.	High	Good	Good	To secure minimum speed of 45 km/h for the north bound goods vehicles.
Alternative-2	* New realignment route with 2 lanes exclusively used for the north bound large size vehicles. * Partial realignment of existing M-2 with 5 lanes, i.e., 2 lanes for the north bound traffic except large size vehicles and 3 lanes for the south bound traffic.	High	Good	Good	To secure minimum speed of 45 km/h for the north bound goods vehicles.
Alternative-3	* New realignment route with 2 lanes exclusively used for large size vehicles of both directions by two-way movement. In this case, provision of climbing lanes at earthwork sections are proposed for the north bound lane, in order to minimize effects of slow moving goods vehicles for orderly traffic flow. * Limited improvement of sharp horizontal curves within the existing 6 lanes width.	Medium	It is possible to prevent traffic accident of the south bound traffic. However, there is a new risk of head-on collision.	Possible	To secure minimum speed of 45 km/h for the north bound goods vehicles.
Alternative-4	* Partial realignment of the existing carriageway of both directions with 6 lanes.	Low	Good	Good	No improvement

Note: The comments for the Project Cost are the results of comparison of costs between the Route Realignment Study carried out by NHA and alternatives in the Study.

At this stage, in order to respond to the comment from NHA during explanation of the Draft Report, the cross-sectional elements of new realignment section are determined with 2 lanes, as shown in Figures 3-16 to 3-18, and the route alignment improvement planning, bridge planning, and tunnel planning have been carried out. At the same time, the cross-sectional elements of partial realignment section with 5 lanes are shown in Figures 3-19 and 3-20.

(2) Bridge Planning .

(a) Planning of Superstructure

Two long-span bridges are planned at 4 sections where judged necessary according to the horizontal and vertical alignment study, and the comparison of bridge types of 2 representative locations are made as shown in Tables 3-11 and 3-12.

Table 3-11 shows a comparison of bridge types for the lower part of the Salt Range area, where it is necessary to secure a span greater than 200 m across a river. For this location, a three-span continuous composite steel girder cable-stayed bridge, a three-span continuous PC girder cable-stayed bridge, and a three-span continuous suspension bridge were compared. As a result, a continuous composite steel girder cable-stayed bridge was selected as the most economical type for this location.

A continuous composite steel girder cable-stayed bridge consists of composite steel girders and concrete slabs, supported by slanting cables, and the slabs can be considered as main structural components in designing the bridge. Hence, a continuous composite steel girder cable-stayed bridge is more economical and easier to construct compared to an ordinary steel girder cable-stayed bridge, because of the reduced volume of steel material, and the total weight of the bridge structure is less than that of a PC cable-stayed bridge. Two main girder-type structures can be adopted to reduce the manufacturing and erection period for construction.

Table 3-12 shows a comparison of bridge types for the location where the proposed alignment crosses over the existing M-2, requiring high piers. A continuous composite steel girder bridge, continuous steel deck truss bridge, and continuous PC box girder bridge are compared. As a result, the continuous composite steel girder bridge was selected as the most economical type for this location.

A continuous composite steel girder bridge consists of three 'I'-shape steel girders with a combination of either composite steel girders and concrete slabs or PC slabs; the slabs can be considered as main structural components in designing the bridge. Hence, a continuous composite steel girder bridge is more economical and easier to construct compared with a PC box girder bridge since it is possible to reduce the total weight of the bridge structures.

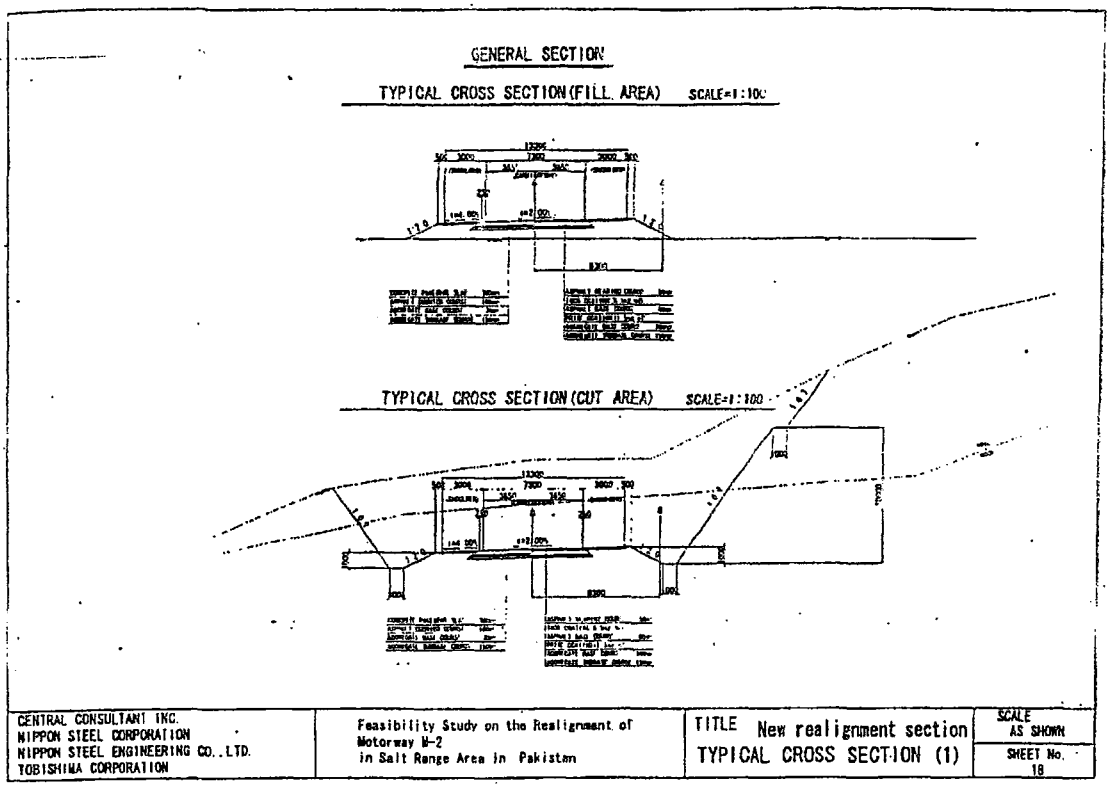


Figure 3-16 Typical Cross-Sectional Configuration of New Realignment Route (1)

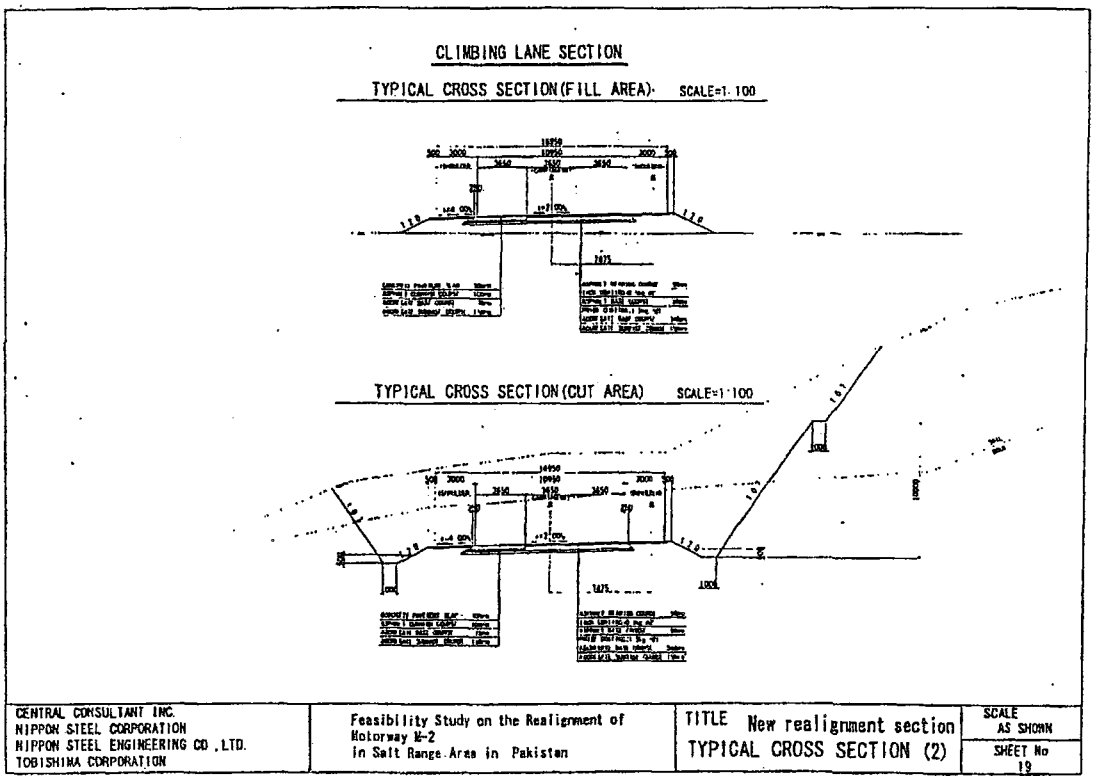
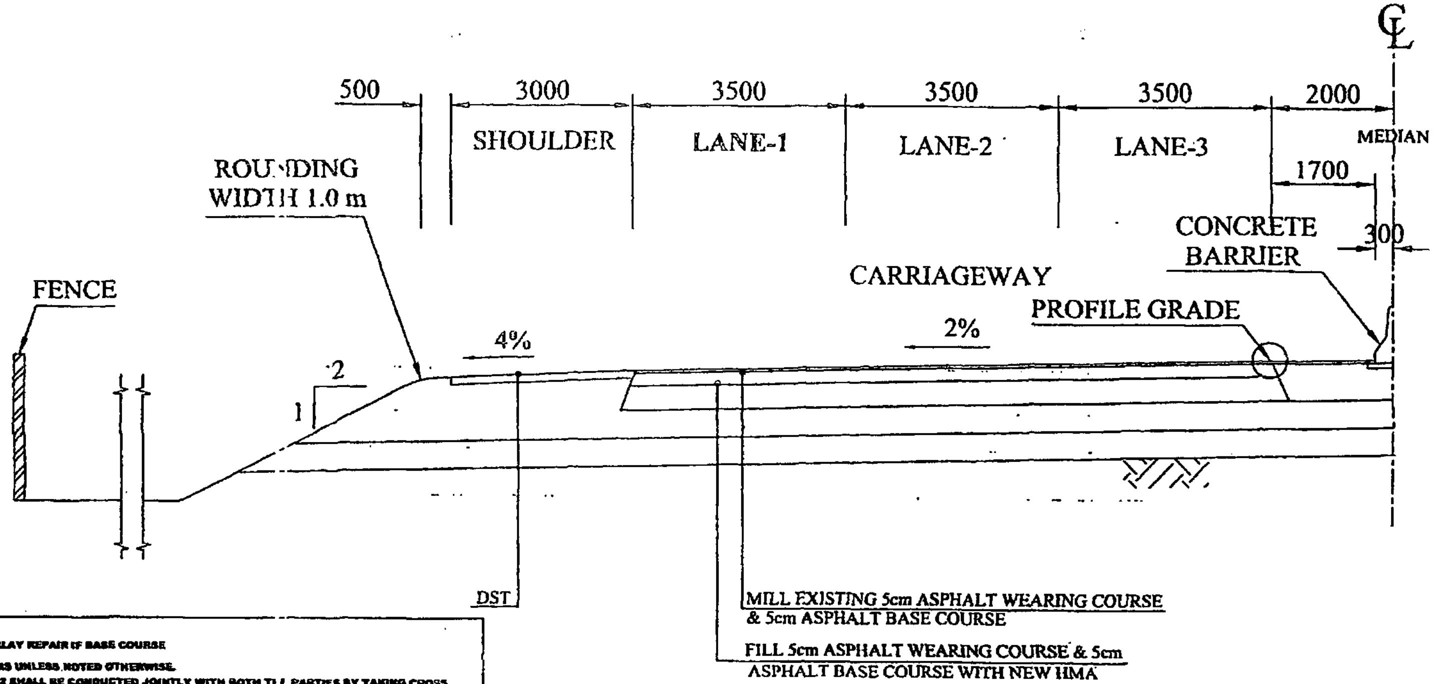


Figure 3-17 Typical Cross-Sectional Configuration of New Realignment Route (2)

ANNEXURE – B

LAHORE-ISLAMABAD MOTORWAY X-SECTIONS

NORTH BOUND



NOTES:

1. DEEP PATCH IS A PART OF PRE-OVERLAY REPAIR IF BASE COURSE SHOW ANY SIGN OF CRACKING.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
3. AS-BUILT SURVEY OF MOTORWAY M-2 SHALL BE CONDUCTED JOINTLY WITH BOTH THE PARTIES BY TAKING CROSS SECTION AT AN INTERVAL OF 25m ON STRAIGHT PORTION AND 10m OR LESS IF REQUIRED AT SUPER-ELEVATED, SPIRAL AND TRANSITION SECTIONS.
4. CARE SHOULD BE TAKEN DURING THE MILLING PROCESS TO AVOID, AS MUCH AS POSSIBLE, DAMAGE OF THE HMA AND OTHER LAYERS ALONG THE INNER LANES.
5. EFFECTIVE AND SUPERIOR CONSTRUCTION PROCESS SHOULD BE ADOPTED DURING THE CONSTRUCTION PHASE. ALL PEOPLE INVOLVED IN CONSTRUCTION SHOULD RECEIVE CERTAIN DEGREE OF TRAINING ESPECIALLY THE OPERATORS OF THE PAVER, ROLLERS, AND THE DRIVERS OF THE DELIVERY TRUCK.
6. GOOD QUALITY CONTROL MEASURES BE DESIGNED AND IMPLEMENTED DURING THE CONSTRUCTION OF THE REHABILITATION ACTIONS.
7. FWD DEFLECTION TESTING OF THE NEWLY REHABILITED PAVEMENT SECTIONS BE ADOPTED AS A PART OF THE QUALITY CONTROL PROCESSES. THE DATA SHOULD BE USED TO EVALUATE CONSTRUCTION QUALITY AND THE EXPECTED PERFORMANCE.
8. THE FRESH ASPHALT BINDER AND ASPHALT MIXTURES SHOULD BE TESTED TO ENSURE THAT THEIR PROPERTIES ARE SIMILAR TO THOSE ASSUMED IN THE DESIGN OF THE PAVEMENT REHABILITATION ACTIONS.
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10. A 3.5CM M&F TREATMENT IS RECOMMENDED FOR ALL SECTIONS WHERE THE EXISTING STRUCTURAL CAPACITY IS ADEQUATE ESPECIALLY ALONG THE INNER LANES. THE OBJECTIVE IS TO PROVIDE SMOOTH PAVEMENT SURFACE.
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15. IRI OF FINISHED SURFACE LEVEL SHOULD NOT BE MORE THAN 1.5m/Km

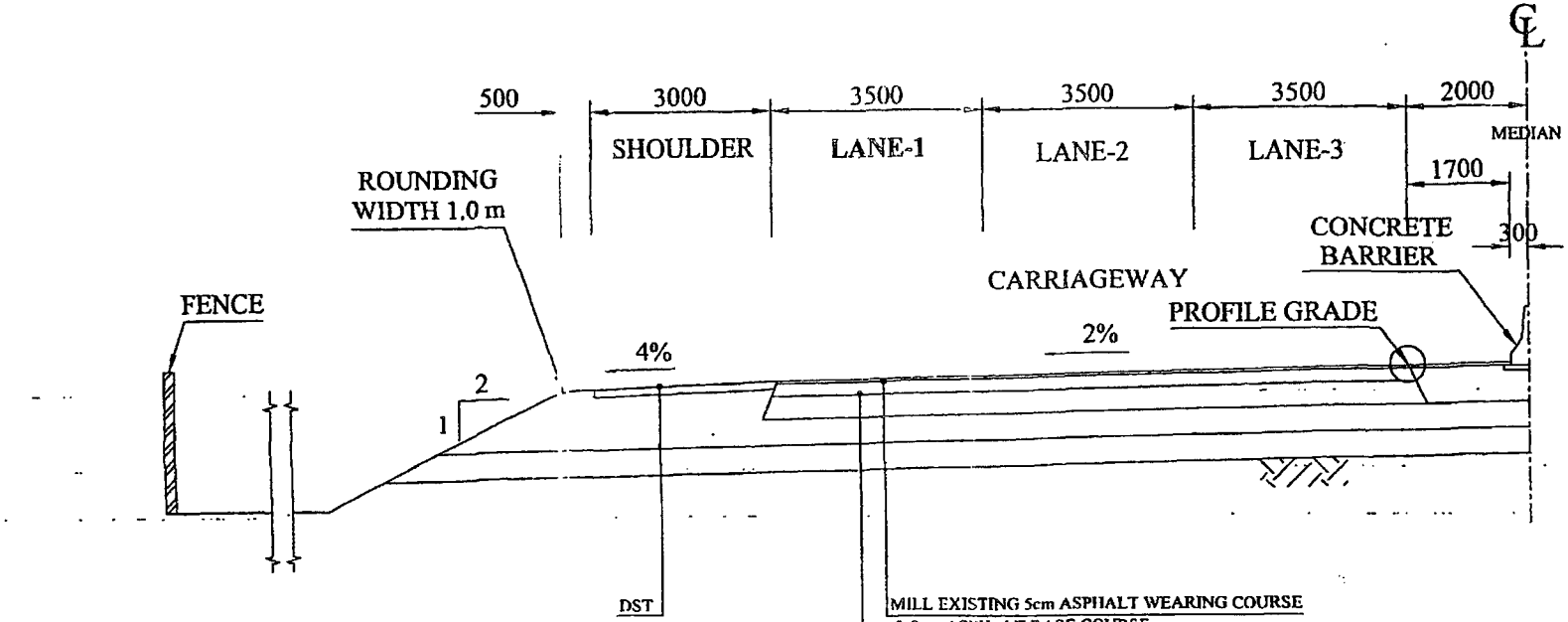
TYPICAL CROSS SECTION LANE-1

Km 242+000 to Km 318+000 (NB)

VETTED & APPROVED AS PER DATA PROVIDED

CLIENT:	DESIGN CONSULTANT:							PROJECT:	TITLE:	SCALE
F.W.O. Frontier Works Organization (Headquarter) 509, Kashmir Road R. A. Bazar	ZEERUK INTERNATIONAL House # 7, Sahibzada Abdul Qayyum Road, Main Service Road Sector I-8/3, Islamabad-Pakistan Ph: 051-4100114-5, Fax:051-4860029	03			DESIGNED	NAVEED ALI		OVERLAY & MODERNIZATION OF LAHORE-ISLAMABAD MOTORWAY (M-2) ON B.O.T. BASIS	TYPICAL CROSS SECTION	
		02			PREPARED	ASIM QURESHI	DRAFTSMAN		DATE	DWG. NO.
		01			CHD./VER	NAVEED ALI			DEC,2014	ZI/M-2/GEN/05-35
		REV	DATE	DESCRIPTION	APPROVED	INAM MINHAS				

NORTH BOUND



TYPICAL CROSS SECTION LANE-1

Km 318+000 to Km 350+000 (NB)

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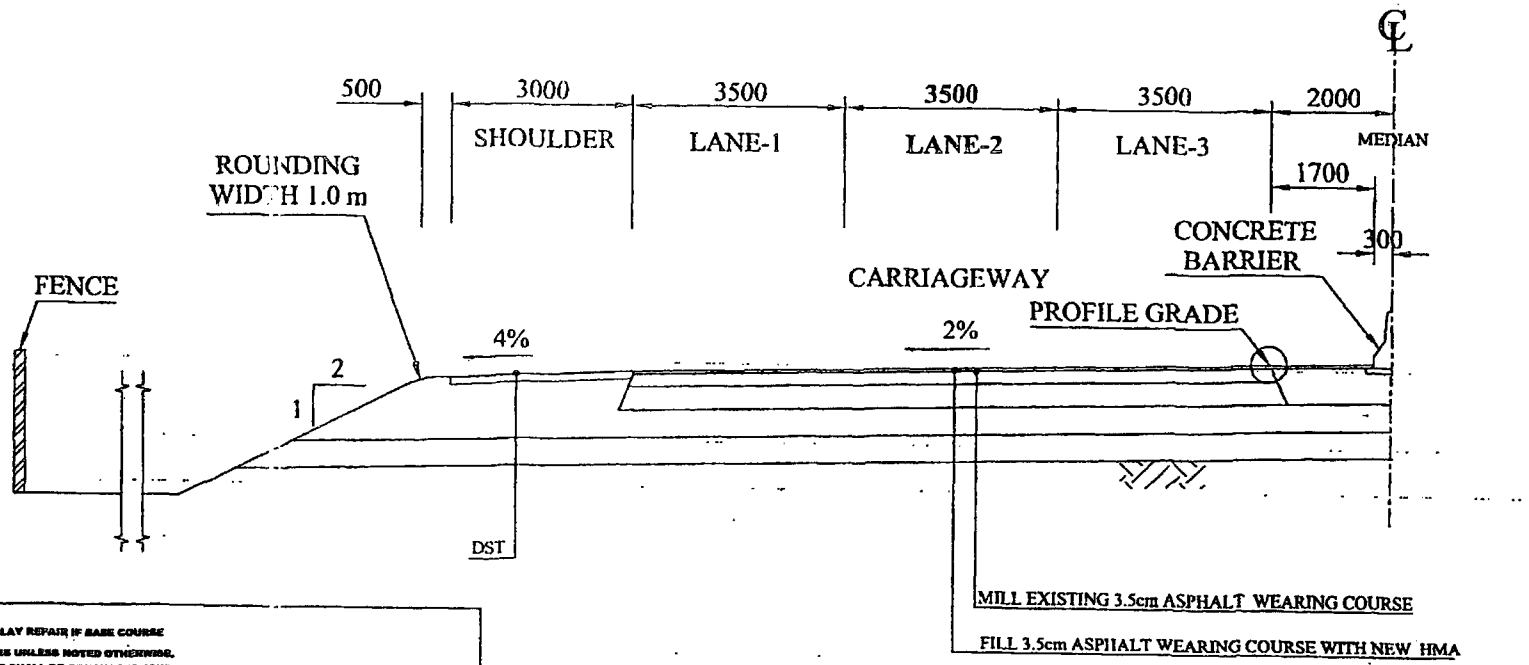
VETTED & APPROVED
AS PER DATA PROVIDED

Q.A.I - M2

CLIENT: F.W.O. Frontier Works Organization (Headquarter) 509, Kashmir Road, R. A. Bazar. FWO	DESIGN CONSULTANT: ZEERUK INTERNATIONAL House # 7, Sahibzada Abdul Qayyum Road, Main Service Road Sector I-8/1, Islamabad-Pakistan Ph: 051-4100114-5, Fax:051-4860029	03			DESIGNED	NAVEED ALI		PROJECT: OVERLAY & MODERNIZATION OF LAHORE-ISLAMABAD MOTORWAY (M-2) ON B.O.T. BASIS.	TITLE: TYPICAL CROSS SECTION	SCALE
		02			PREPARED	ASIM QURESHI	DRAFTSMAN			
		01			CHECKED	NAVEED ALI			DATE: DEC.2014	DWG. NO. ZIM-2/GEN/05-36
		REV	DATE	DESCRIPTION	APPROVED	INAM MINHAS	---			

NORTH BOUND



TYPICAL CROSS SECTION LANE-2

Km 242+000 to Km 290+000 (NB)
Km 330+000 to Km 350+000 (NB)

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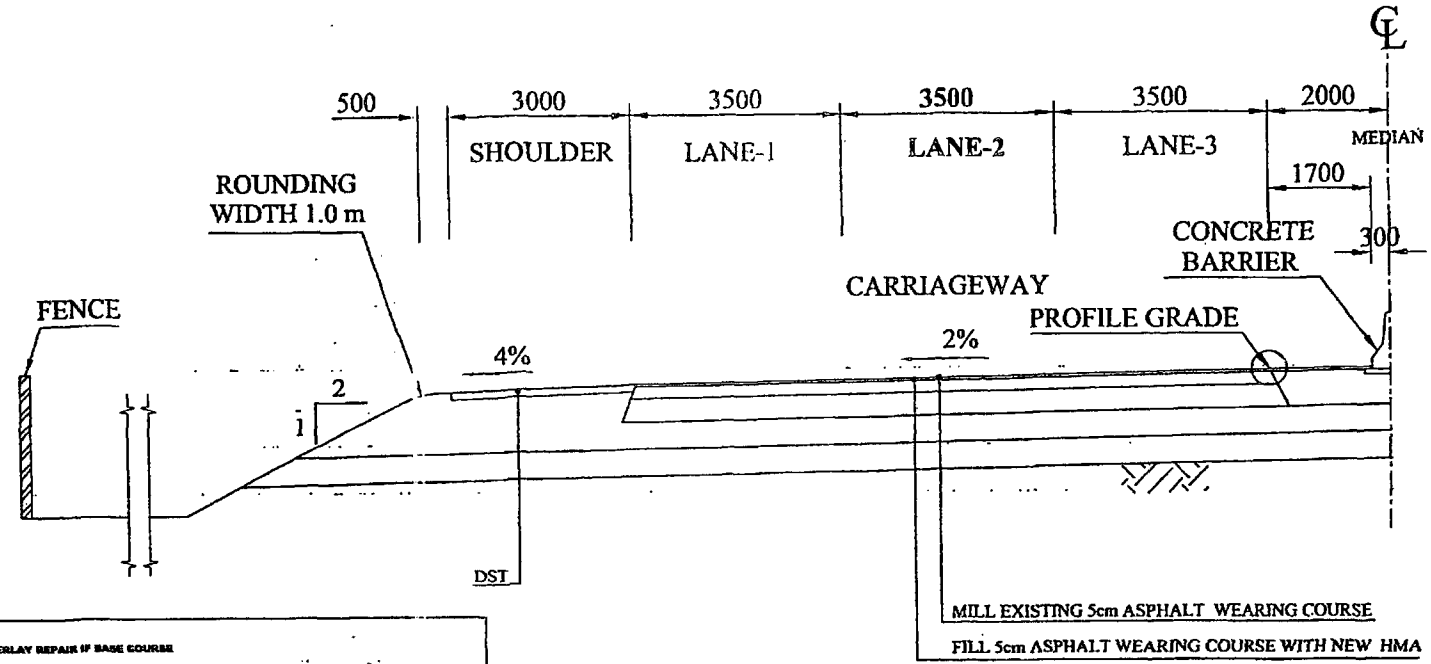
VETTED & APPROVED AS PER DATA PROVIDED

Associated Consultancy Centre (Pvt) Ltd. Islamabad Q.A.I. M2

ZEERUK INTERNATIONAL ISLAMABAD (PK)

CLIENT:	DESIGN CONSULTANT:						PROJECT:	TITLE:	SCALE
F.W.O. Frontier Works Organization (Headquarters) 509, Kashmir Road,R. A. Bazar	ZEERUK INTERNATIONAL House # 7, Sahibzada Abdul Qayyum Road, Main Service Road Sector I-8/3, Islamabad-Pakistan Ph 05 4100114-5, Fax:051-4860029	03			DESIGNED	NAVEED ALI		OVERLAY & MODERNIZATION OF LAHORE-ISLAMABAD MOTORWAY (M-2) ON B.O.T. BASIS	TYPICAL CROSS SECTION	
		02			PREPARED	ASIM QURESHI	DRAFTSMAN			
		01			CHD VER.	NAVEED ALI			DATE	DWG. NO.
		REV	DATE	DESCRIPTION	APPROVED	INAM MINHAS			DEC.2014	ZI/M-2/GEN-05-37

NORTH BOUND



NOTES:

1. DEEP PATCH IS A PART OF PRE-OVERLAY REPAIR IF BASE COURSE SHOW ANY SIGN OF CRACKING.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
3. AS-BUILT SURVEY OF MOTORWAY M-2 SHALL BE CONDUCTED JOINTLY WITH BOTH THE PARTIES BY TAKING CROSS SECTION AT AN INTERVAL OF 20m ON STRAIGHT PORTION AND 10m OR LESS IF REQUIRED AT SUPER-ELEVATED SPIRAL AND TRANSITION SECTIONS.
4. CARE SHOULD BE TAKEN DURING THE MILLING PROCESS TO AVOID,AS MUCH AS POSSIBLE, DAMAGE OF THE HMA AND OTHER LAYERS ALONG THE INNER LANES.
5. EFFECTIVE AND SUPERIOR CONSTRUCTION PROCESS SHOULD BE ADOPTED DURING THE CONSTRUCTION PHASE.ALL PEOPLE INVOLVED IN CONSTRUCTION SHOULD RECEIVE CERTAIN DEGREES OF TRAINING ESPECIALLY THE OPERATORS OF THE PAVER, ROLLERS, AND THE DRIVERS OF THE DELVERY TRUCK.
6. GOOD QUALITY CONTROL MEASURES BE DESIGNED AND IMPLEMENTED DURING THE CONSTRUCTION OF THE REHABILITATION ACTIONS.
7. FWD DEFLECTION TESTING OF THE NEWLY REHABILITED PAVEMENT SECTIONS BE ADOPTED AS A PART OF THE QUALITY CONTROL PROCESSES. THE DATA SHOULD BE USED TO EVALUATE CONSTRUCTION QUALITY AND THE EXPECTED PERFORMANCE.
8. THE FRESH ASPHALT BINDER AND ASPHALT MIXTURES SHOULD BE TESTED TO ENSURE THAT THEIR PROPERTIES ARE SIMILAR TO THOSE ASSUMED IN THE DESIGN OF THE PAVEMENT REHABILITATION ACTIONS.
9. TRIAL SECTIONS SHOULD BE CONSTRUCTED, IF POSSIBLE, TO EVALUATE THE DEGREE OF READINESS OF THE PAVEMENT AND OPERATORS.
10. A 3.5CM M&F TREATMENT IS RECOMMENDED FOR ALL SECTIONS WHERE THE EXISTING STRUCTURAL CAPACITY IS ADEQUATE ESPECIALLY ALONG THE INNER LANES. THE OBJECTIVE IS TO PROVIDE SMOOTH PAVEMENT SURFACE.
11. THE CAPACITY OF THE ASPHALT MIXING PLANT SHOULD BE ADEQUATE TO PRODUCE ASPHALT MIXTURES IN CONTINUOUS SUPPLY.
12. FREQUENT STOPPING OF THE ROLLER BE AVOIDED AT ALL COSTS.
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14. COMPACTION OF THE ASPHALT MIXTURES SHOULD BE ACCOMPLISHED IN A TIMELY FASHION TO AVOID TEMPERATURE SEGREGATION.
15. IRI OF FINISHED SURFACE LEVEL SHOULD NOT BE MORE THAN 1.5m/KM

TYPICAL CROSS SECTION LANE-2

Km 290+000 to Km 330+000 (NB)

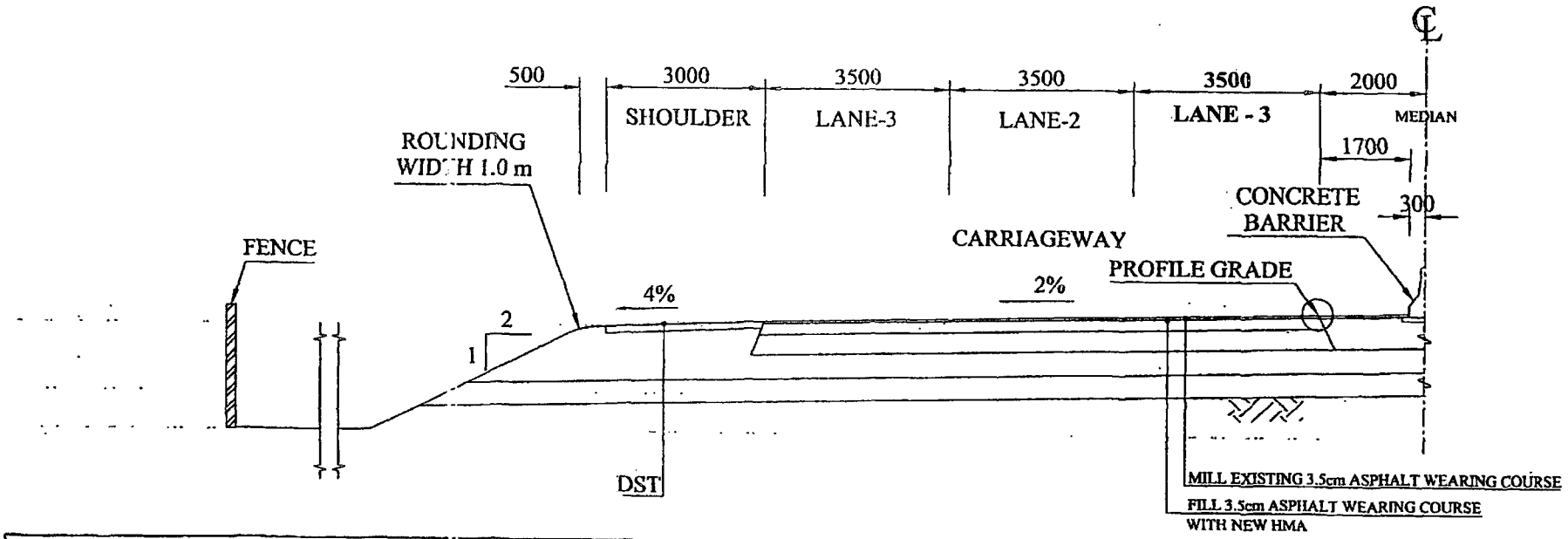
VETTED & APPROVED
AS PER DATA PROVIDED

Q.A.I. M2

ZEERUK INTERNATIONAL ISLAMABAD (PK)

CLIENT: F.W.O. Frontier Works Organization (Headquarter) 509, Kashmir Road,R. A. Bazar	DESIGN CONSULTANT: ZEERUK INTERNATIONAL House # 7, Sahibzada Al ul Qayyum Road, Main Service Road Sector I-8/ Islamabad-Pakistan Ph: 051-4100114-5, Fax:051 860029	03			DESIGNED	NAVEED ALI		PROJECT: OVERLAY & MODERNIZATION OF LAHORE-ISLAMABAD MOTORWAY (M-2) ON B.O.T. BASIS	TITLE: TYPICAL CROSS SECTION	SCALE
		02			PREPARED	ASIM QURESHI	DRAFTSMAN			
		01			CHD./VER.	NAVEED ALI			DATE: DEC.2014	DWG. NO. ZI/M-2/GEN/05-38
		REV	DATE	DESCRIPTION	APPROVED	INAM MINHAS				

NORTH BOUND



TYPICAL CROSS SECTION LANE-3

Km 242+000 to Km 350+000 (NB)

NOTES:

1. DEEP PATCH IS A PART OF PRE-OVERLAY REPAIR IF BASE COURSE SHOW ANY SIGN OF CRACKING.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
3. AS-BUILT SURVEY OF MOTORWAY M-2 SHALL BE CONDUCTED JOINTLY WITH BOTH THE PARTIES BY TAKING CROSS SECTION AT AN INTERVAL OF 25m ON STRAIGHT PORTION AND 10m OR LESS IF REQUIRED AT SUPER-ELEVATED,SPIRAL AND TRANSITION SECTIONS.
4. CARE SHOULD BE TAKEN DURING THE MILLING PROCESS TO AVOID,AS MUCH AS POSSIBLE, DAMAGE OF THE HMA AND OTHER LAYERS ALONG THE INNER LANES.
5. EFFECTIVE AND SUPERIOR CONSTRUCTION PROCESS SHOULD BE ADOPTED DURING ONE CONSTRUCTION PHASE.ALL PEOPLE MYOLVED IN CONSTRUCTION SHOULD RECEIVE CERTAIN DEGREES OF TRAINING ESPECIALLY THE OPERATORS OF THE PAVER, ROLLERS, AND THE DRIVERS OF THE DELIVERY TRUCK.
6. GOOD QUALITY CONTROL MEASURES BE DESIGNED AND IMPLEMENTED DURING THE CONSTRUCTION OF THE REHABILITATION ACTIONS.
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9. TRIAL SECTIONS SHOULD BE CONSTRUCTED, IF POSSIBLE, TO EVALUATE THE DEGREE OF READINESS OF THE PAVEMENT AND OPERATORS.
10. A 3.5CM M&P TREATMENT IS RECOMMENDED FOR ALL SECTIONS WHERE THE EXISTING STRUCTURAL CAPACITY IS ADEQUATE ESPECIALLY ALONG THE INNER LANES. THE OBJECTIVE IS TO PROVIDE SMOOTH PAVEMENT SURFACE.
11. THE CAPACITY OF THE ASPHALT MIXING PLANT SHOULD BE ADEQUATE TO PRODUCE ASPHALT MIXTURES IN CONTINUOUS SUPPLY.
12. FREQUENT STOPPING OF THE ROLLER BE AVOIDED AT ALL COSTS.
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14. COMPACTION OF THE ASPHALT MIXTURES SHOULD BE ACCOMPLISHED IN A TIMELY FASHION TO AVOID TEMPERATURE SEGREGATION.
15. IRI OF FINISHED SURFACE LEVEL SHOULD NOT BE MORE THAN 1.5m/KM

VETTED & APPROVED AS PER DATA PROVIDED

Associated Consultancy Q.A.I. M2 ZEERUK INTERNATIONAL ISLAMABAD (PAK)

CLIENT:
F.W.O.
Frontier Works Organization
(Headquarter) 509, Kashmir Road,R. A. Bazar

DESIGN CONSULTANT:
ZEERUK INTERNATIONAL
House # 7, Sahibzada Abdul Qayyum Road, Main Service Road Sector I-8/3, Islamabad Pakistan Ph: 051 4100114-5, Fax:051-4860029

REV	DATE	DESCRIPTION			
03			DESIGNED	NAVEED ALI	
02			PRLPARED	ASIM QURESHI	DRAFTSMAN
01			CHD VER	NAVEED ALI	
			APPROVED	INAM MINHAS	

PROJECT:
OVERLAY & MODERNIZATION OF LAHORE-ISLAMABAD MOTORWAY (M-2) ON B.O.T. BASIS

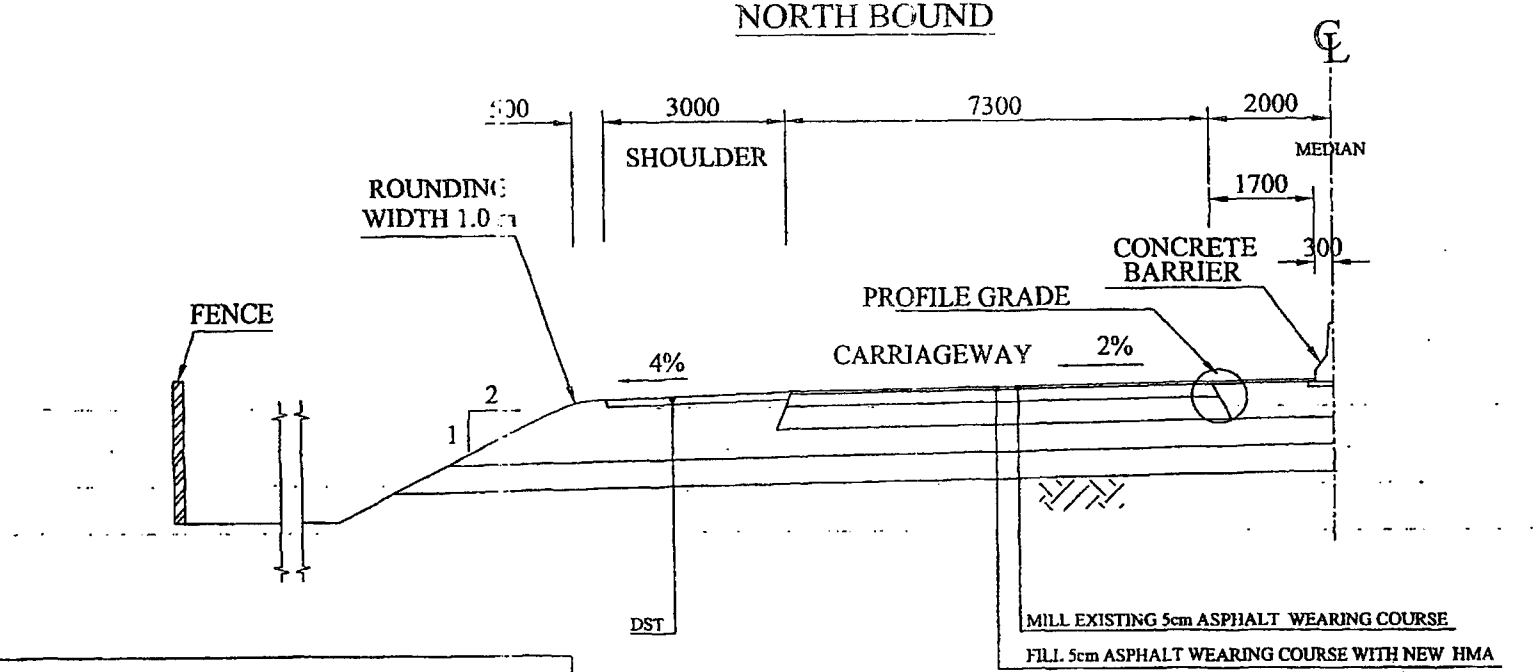
TITLE: TYPICAL CROSS SECTION

SCALE:

DATE: DEC,2014

DWG. NO. ZI/M-2/GEN/05-39

NORTH BOUND



TYPICAL CROSS SECTION

Km 350+000 to Km 357+000 (NB)

NOTES:

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10. A 3.5CM MSF TREATMENT IS RECOMMENDED FOR ALL SECTIONS WHERE THE EXISTING STRUCTURAL CAPACITY IS ADEQUATE ESPECIALLY ALONG THE INNER LANES. THE OBJECTIVE IS TO PROVIDE SMOOTH PAVEMENT SURFACE.
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15. IRI OF FINISHED SURFACE LEVEL SHOULD NOT BE MORE THAN 1.5m/KM

VETTED & APPROVED
AS PER DATA PROVIDED

Associated Consultancy Centre (Pvt) Ltd. Q.A.I. M2

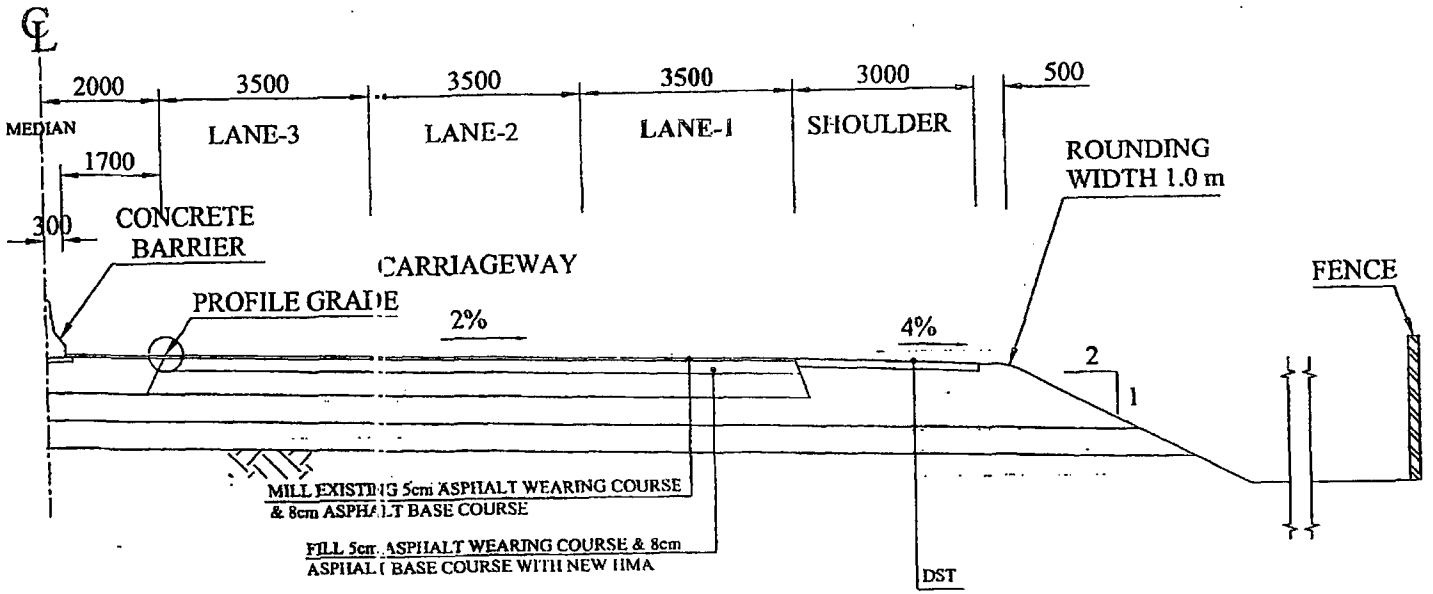
ZEERUK INTERNATIONAL ISLAMABAD (PVT)

CLIENT:	DESIGN CONSULTANT:						PROJECT:	TITLE:	SCALE
F.W.O. Frontier Works Organization (Headquarter) 509, Kashmir Road,R. A. Bazar	ZEERUK INTERNATIONAL House # 7, Sahibzada Al Jul Qayyum Road, Main Service Road Sector I-8... Islamabad-Pakistan Ph: 051-4100114-5 Fax:051-4860029	03			DESIGNED	NAVEED ALI		OVERLAY & MODERNIZATION OF LAHORE-ISLAMABAD MOTORWAY (M-2) ON B.O.T. BASIS	TYPICAL CROSS SECTION	
		02			PREPARED	ASIM QURESHI	DRAFTSMAN		DATE: DEC.2014	DWG. NO.: ZLM-2/GEN/05-40
		01			CHD/VER.	NAVEED ALI				
		REV	DATE	DESCRIPTION	APPROVED	IKAM MINHAS	—			

SOUTH BOUND

VETTED & APPROVED
AS PER DATA PROVIDED

SOUTH BOUND



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10. A 2.5CM MAF TREATMENT IS RECOMMENDED FOR ALL SECTIONS WHERE THE EXISTING STRUCTURAL CAPACITY IS ADEQUATE ESPECIALLY ALONG THE INNER LANES. THE OBJECTIVE IS TO PROVIDE SMOOTH PAVEMENT SURFACE.
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15. IRI OF FINISHED SURFACE LEVEL SHOULD NOT BE MORE THAN 1.5m/KM

TYPICAL CROSS SECTION LANE-1

Km 242+000 to Km 264+000 (SB)
Km 310+000 to Km 315+000 (SB)

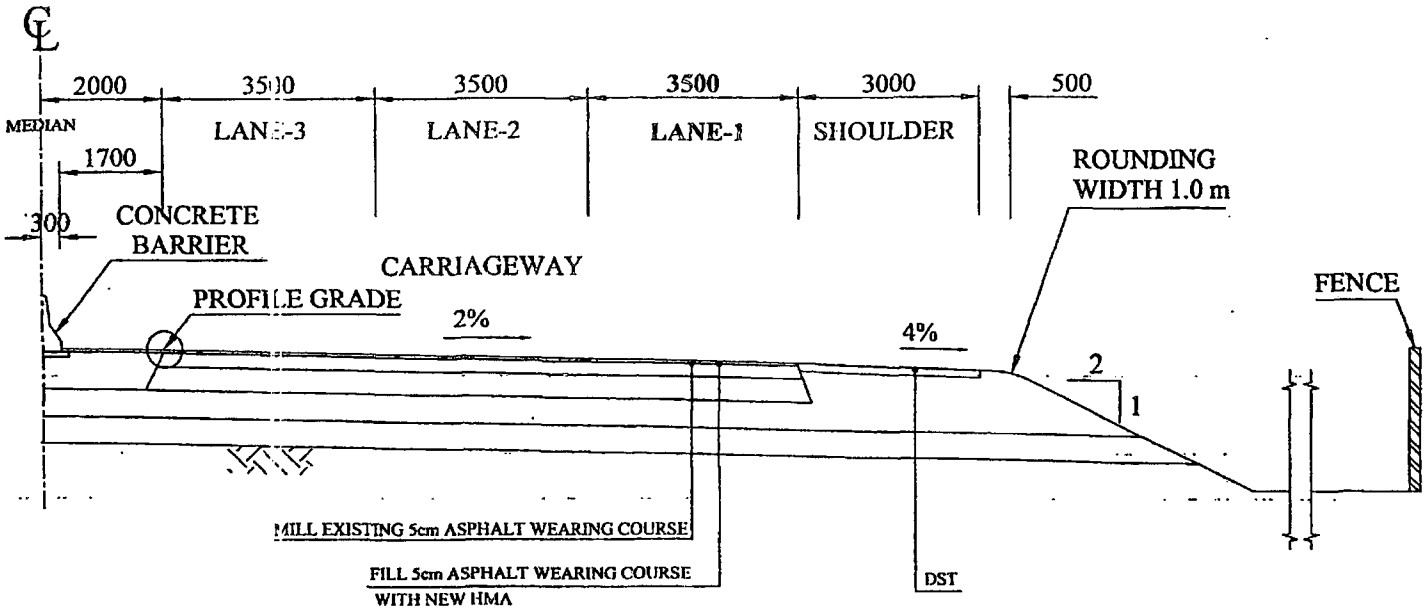
VETTED & APPROVED
AS PER DATA PROVIDED

Q.A.I. M2

ZEERUK INTERNATIONAL ISLAMABAD (PK)

CLIENT:	DESIGN CONSULTANT:						PROJECT:	TITLE:	SCALE
F.W.O. Frontier Works Organization (Headquarter) 509, Kashmir Road,R. A Bazar	ZEERUK INTERNATIONAL House # 7, Sahibzada Ayaz Qayyum Road, Main Service Road Sector I-8/2, Islamabad-Pakistan Ph: 051-4100114-5, Fax:051-4860029			DESIGNED	NAVEED ALI		OVERLAY & MODERNIZATION OF LAHORE-ISLAMABAD MOTORWAY (M-2) ON B.O.T. BASIS	TYPICAL CROSS SECTION	
				PREPARED	ASIM QURESHI	DRAFTSMAN		DATE: DEC.2014	DWG. NO.: ZI/M-2/GEN/05-41
				CHD./VER	NAVEED ALI				
	REV	DATE	DESCRIPTION	APPROVED	INAM MINHAS				

SOUTH BOUND



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15. IRI OF FINISHED SURFACE LEVEL SHOULD NOT BE MORE THAN 1.5m/KM

TYPICAL CROSS SECTION LANE-1

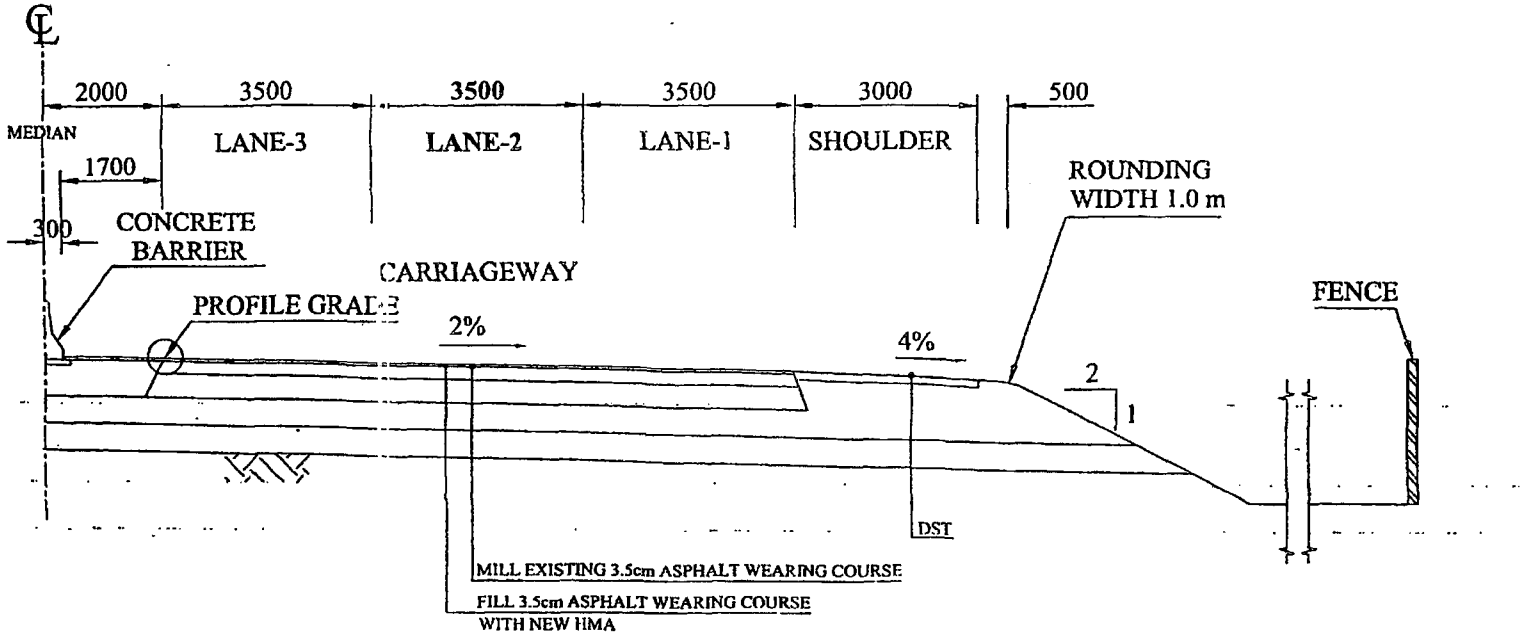
Km 264+000 to Km 310+000 (SB)
Km 315+000 to Km 350+000 (SB)

VETTED & APPROVED AS PER DATA PROVIDED

Q.A.I. M2

CLIENT:	DESIGN CONSULTANT					PROJECT:	TITLE:	SCALE
F.W.O. Frontier Works Organization (Headquarter) 509, Kashmir Road,R. A. Bazar FWO	ZEERUK INTERNATIONAL House # 7, Sahibzada Abdul Qayyum Road, Main Service Road Sector I-8/3, Islamabad-Pakistan Ph: 051-4100114-5, Fax:051-4860029	03		DESIGNED	NAVEED ALI	OVERLAY & MODERNIZATION OF LAHORE-ISLAMABAD MOTORWAY (M-2) ON B.O.T. BASIS	TYPICAL CROSS SECTION	
		02		PREPARED	ASIM QURESHI DRAFTSMAN			
		01		CHD /VER.	NAVEED ALI		DATE: DEC.2014	DWG. NO.: ZI/M-2/GEN.05-42
		REV	DATE DESCRIPTION	APPROVED	INAM MINHAS			

SOUTH BOUND



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10. A 3.5CM MAP TREATMENT IS RECOMMENDED FOR ALL SECTIONS WHERE THE EXISTING STRUCTURAL CAPACITY IS ADEQUATE ESPECIALLY ALONG THE INNER LANES. THE OBJECTIVE IS TO PROVIDE SMOOTH PAVEMENT SURFACE.
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TYPICAL CROSS SECTION LANE-2

Km 242+000 to Km 268+000 (SB)

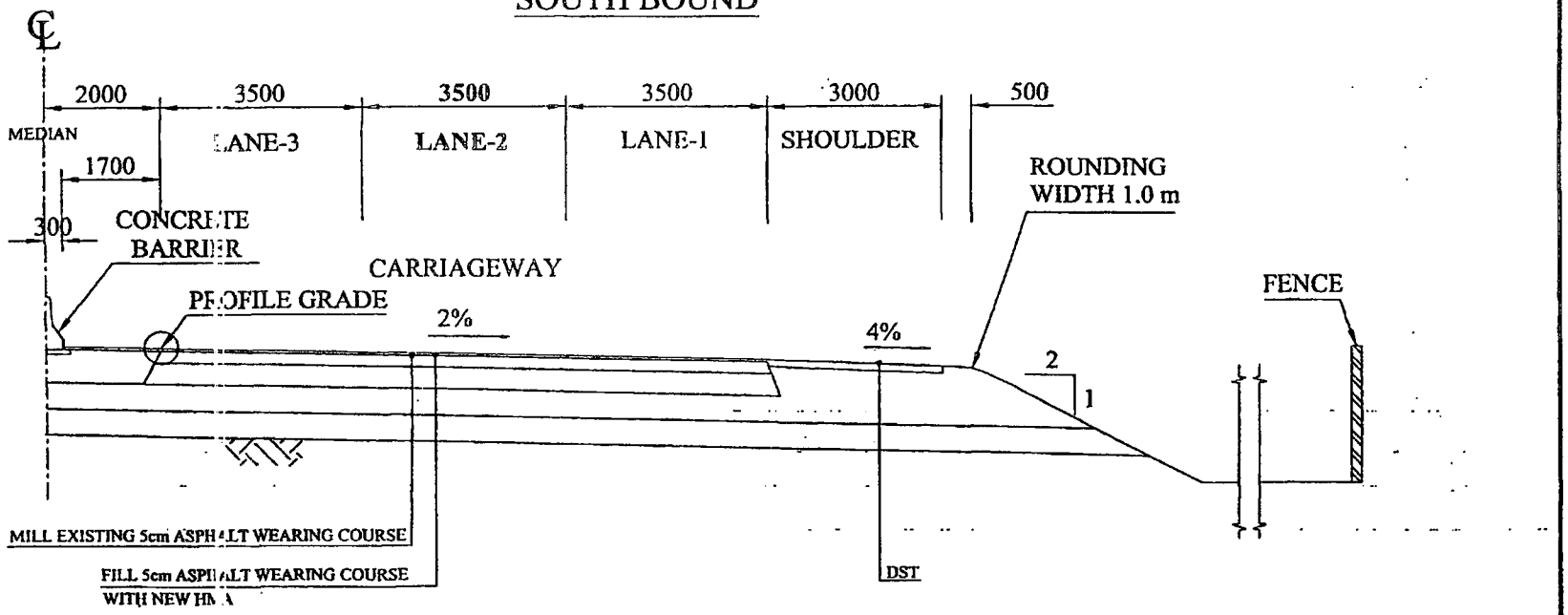
VETTED & APPROVED
AS PER DATA PROVIDED

Q.A.I. M2

ZEERUK INTERNATIONAL ISLAMABAD (PK)

CLIENT: F.W.O. Frontier Works Organization (Headquarter) 509, Kashmir Road,R. A. Bazar	DESIGN CONSULTANT: ZEERUK INTERNATIONAL House # 7, Sahibzada Abdul Qayyum Road, Main Service Road Sector I-8/3, Islamabad-Pakistan Ph: 051-4100114-5, Fax-051-4360029	03			DESIGNED	NAVEED ALI		PROJECT: OVERLAY & MODERNIZATION OF LAHORE-ISLAMABAD MOTORWAY (M-2) ON B.O.T. BASIS	TITLE: TYPICAL CROSS SECTION	SCALE
		02			PREPARED	ASIM QURESHI	DRAFTSMAN			
		01			CHD VER	NAVEED ALI			DATE: DEC,2014	DWG. NO. ZI/M-2/GEN/05-43
		REV	DATE	DESCRIPTION	APPROVED	ISAM MINHAS				

SOUTH BOUND



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10. A 2.5CM MAF TREATMENT IS RECOMMENDED FOR ALL SECTIONS WHERE THE EXISTING STRUCTURAL CAPACITY IS ADEQUATE ESPECIALLY ALONG THE INNER LANES. THE OBJECTIVE IS TO PROVIDE SMOOTH PAVEMENT SURFACE.
11. THE CAPACITY OF THE ASPHALT MIXING PLANT SHOULD BE ADEQUATE TO PRODUCE ASPHALT MIXTURES IN CONTINUOUS SUPPLY.
12. FREQUENT STOPPING OF THE ROLLER BE AVOIDED AT ALL COSTS.
13. THE ASPHALT MIXTURES SHOULD BE DELIVERED TO THE HOPPER OF THE PAVER USING A SMOOTH TRANSITION MECHANISM SUCH AS CONVEYOR BELT. BUMPING ASPHALT MIXTURES SHOULD BE AVOIDED TO PREVENT SEGREGATION.
14. COMPACTION OF THE ASPHALT MIXTURES SHOULD BE ACCOMPLISHED IN A TIMELY FASHION TO AVOID TEMPERATURE SEGREGATION.
15. ROI OF FINISHED SURFACE LEVEL SHOULD NOT BE MORE THAN 1.5m/KM

TYPICAL CROSS SECTION LANE-2

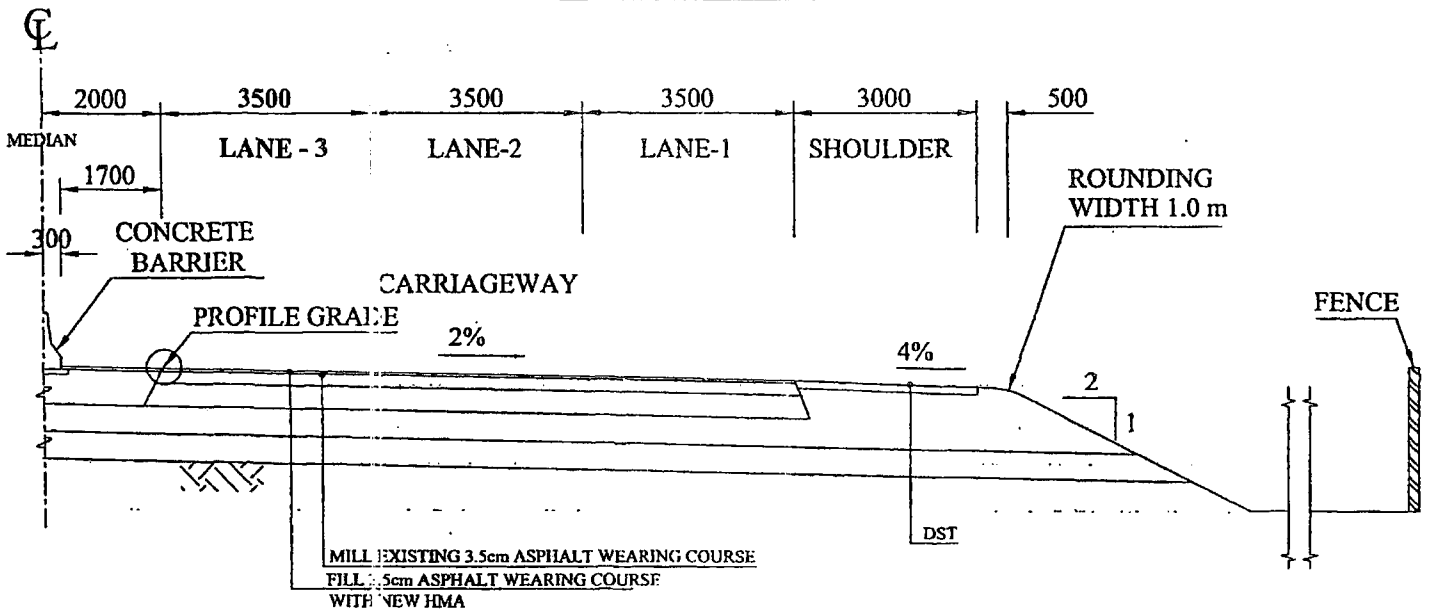
Km 268+000 to Km 350+000 (SB)

VETTED & APPROVED
AS PER DATA PROVIDED

Q.A.I. M2

CLIENT:	DESIGN CONSULTANT:					PROJECT:	TITLE:	SCALE
F.W.O. Frontier Works Organization (Headquarter) 509, Kashmir Road.R. A Bazar	ZEERUK INTERNATIONAL House # 7, Sahibzada Abdul Qayyum Road, Main Service Road Sector I-8/3, Islamabad-Pakistan Ph 051 4100114-5, Fax.051-4860029	03			DESIGNED: NAVEED ALI	OVERLAY & MODERNIZATION OF LAHORE-ISLAMABAD MOTORWAY (M-2) ON B.O.T. BASIS	TYPICAL CROSS SECTION	
		02			PREPARED: ASIM QURESHI (DRAFTSMAN)			
		01			CHD./VER.: NAVEED ALI		DATE: DEC,2014	DWG. NO.: ZI/M-2/GEN/05-44
		REV	DATE	DESCRIPTION	APPROVED: INAM MEHSAS			

SOUTH BOUND



NOTES:

1. DEEP PATCH IS A PART OF PRE-OVERLAY REPAIR IF BASE COURSE SHOW ANY SIGN OF CRACKING.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
3. AS-BUILT SURVEY OF MOTORWAY M-2 SHALL BE CONDUCTED JOINTLY WITH BOTH THE PARTIES BY TAKING CROSS SECTION AT AN INTERVAL OF 25m ON STRAIGHT PORTION AND 10m OR LESS IF REQUIRED AT SUPER-ELEVATION,SPIRAL AND TRANSITION SECTIONS.
4. CARE SHOULD BE TAKEN DURING THE MILLING PROCESS TO AVOID,AS MUCH AS POSSIBLE, DAMAGE OF THE HMA AND OTHER LAYERS ALONG THE INNER LANES.
5. EFFECTIVE AND SUPERIOR CONSTRUCTION PROCESS SHOULD BE ADOPTED DURING THE CONSTRUCTION PHASE.ALL PEOPLE INVOLVED IN CONSTRUCTION SHOULD RECEIVE CERTAIN DEGREES OF TRAINING ESPECIALLY THE OPERATORS OF THE PAVER, ROLLERS, AND THE DRIVERS OF THE DELIVERY TRUCK.
6. GOOD QUALITY CONTROL MEASURES BE DESIGNED AND IMPLEMENTED DURING THE CONSTRUCTION OF THE REHABILITATION ACTIONS.
7. FWD DEFLECTION TESTING OF THE NEWLY REHABILITED PAVEMENT SECTIONS BE ADOPTED AS A PART OF THE QUALITY CONTROL PROCESSES. THE DATA SHOULD BE USED TO EVALUATE CONSTRUCTION QUALITY AND THE EXPECTED PERFORMANCE.
8. THE FRESH ASPHALT BINDER AND ASPHALT MIXTURES SHOULD BE TESTED TO ENSURE THAT THEIR PROPERTIES ARE SIMILAR TO THOSE ASSUMED IN THE DESIGN OF THE PAVEMENT REHABILITATION ACTIONS.
9. TRIAL SECTIONS SHOULD BE CONSTRUCTED, IF POSSIBLE, TO EVALUATE THE DEGREE OF READINESS OF THE PAVEMENT AND OPERATORS.
10. A 2.5CM MAP TREATMENT IS RECOMMENDED FOR ALL SECTIONS WHERE THE EXISTING STRUCTURAL CAPACITY IS ADEQUATE ESPECIALLY ALONG THE INNER LANES. THE OBJECTIVE IS TO PROVIDE SMOOTH PAVEMENT SURFACE.
11. THE CAPACITY OF THE ASPHALT MIXING PLANT SHOULD BE ADEQUATE TO PRODUCE ASPHALT MIXTURES IN CONTINUOUS SUPPLY.
12. FREQUENT STOPPING OF THE ROLLER BE AVOIDED AT ALL COSTS.
13. THE ASPHALT MIXTURES SHOULD BE DELIVERED TO THE HOPPER OF THE PAVER USING A SMOOTH TRANSITION MECHANISM SUCH AS CONVEYOR BELT. DUMPING ASPHALT MIXTURES SHOULD BE AVOIDED TO PREVENT SEGREGATION.
14. COMPACTION OF THE ASPHALT MIXTURES SHOULD BE ACCOMPLISHED IN A TIMELY FASHION TO AVOID TEMPERATURE SEGREGATION.
15. IRI OF FINISHED SURFACE LEVEL SHOULD NOT BE MORE THAN 1.5m/KM

TYPICAL CROSS SECTION LANE-3

Km 242+000 to Km 350+000 (SB)

VETTED & APPROVED
AS PER DATA PROVIDED

Q.A.I. M2

ZEERUK INTERNATIONAL ISLAMABAD (PK)

CLIENT: F.W.O. Frontier Works Organization (Headquarter) 509, Kashmir Road,R. A Bazar	DESIGN CONSULTANT: ZEERUK INTERNATIONAL House # 7, Sahibzada Abdul Qayyum Road, Main Service Road Sector I-8/3, Islamabad-Pakistan Ph: 051-4100114-5. Fax:051-4860029	01			DESIGNED	NAVEED ALI		PROJECT: OVERLAY & MODERNIZATION OF LAHORE-ISLAMABAD MOTORWAY (M-2) ON B.O.T. BASIS	TITLE: TYPICAL CROSS SECTION	SCALE
		02			PREPARED	ASIM QURESHI	DRAFTSMAN			
		01			CHD VER	NAVEED ALI			DATE: DEC,2014	DWG NO. ZUM-2/GEN/05-45
		REV	DATE	DESCRIPTION	APPROVED	ASIM MEHMAS				

ANNEXURE – C

STANDARD CERTIFICATE FOR TECHNICAL SANCTION

INSERT CONSULTANT'S LETTER HEAD HERE

CERTIFICATE FOR TECHNICAL SANCTION

This is to certify for the project titled "**Name of Project**" "**(Length)**" that:

(i) The Cost of Final Engineer's Estimate is Rs. _____ based on NHA's CSR _____;

(ii) The provided design has been carried out in a professional manner and to the best abilities of the Consultant;

(iii) The design carried out is in compliance with the requirements of Terms of Reference provided by NHA and cognizant with the recommendations put forth in the reports and applicable codes;

(iv) The proposal is structurally sound and that the estimates are accurately calculated and based on adequate data.

For and on behalf of Consultant

Sign & Stamp: _____

Name of Authorized Representative: _____

Name of Consultant: _____

Dated: _____

ANNEX – D

TOR FOR ENVIRONMENTAL IMPACT ASSESSMENT

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 eco-systems, 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.

i) **Regulations and Standards.** Describe the pertinent legislation, regulations and standards, and environmental policies that are relevant and applicable to the proposed project, and identify the appropriate authority jurisdictions that will specifically apply to the project.

ii) **Project 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 (O_3) Carbon monoxide (CO) Sulphur dioxide (SO_2), Nitrogen dioxide (NO_2), and particulate matter (PM_{10}). 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-I 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 consultant 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 what so ever the reasons are.

APPENDIX B

(List of Supporting Documents)

S. No	Description	Page No
1.	Valid Registration Certificate of Pakistan Engineering Council with Project Profile Code of 1215. *In case of JV member, experts proposed by each consultant should have relevant project profile code of 1215 (ii) Highways/ Bridges*. In case of formation of JV with foreign consultant, in such case foreign consulting firms shall make JV in accordance with Byelaw 6(2) and Byelaw 9 of the Pakistan Engineering Council (Conduct and Practice of Consulting Engineers) Bye-Laws 1986. Failure to comply with the above will result in rejection of proposal.	
2.	Audit Reports (minimum 03 Nos) of the firm(s) during last five years, prepared by registered Chartered Accountant (signed/stamped) appearing on list of firms on ICAP directory (To be attached with Technical Proposal). (Refer **Annexure-II** at the end of RFP).	
3.	Lists of facilities available with the Consultant to perform their functions effectively (software, hardware, etc.). In case of JV, the same will be provided by the lead firm only.	
4.	Client's satisfaction certificates (Performance Reports) for the last three relevant assignments from the respective Clients.	
5.	Affidavit on stamp paper duly attested by the Oath Commissioner to the effect that the firm has neither been blacklisted nor any contract rescinded in the past for non-fulfillment of contractual obligations	
6.	Firm affidavit for availability of personnel.	
7.	Letter of Intention on lead firm's letter head along with original letter of intention of all JV members.	
8.	Power of attorney or authorization letter of authorized person of the lead firm.	
9.	Declaration of inclusion of new/ less experienced firm(s) in association (as sub-consultant) by sharing upto 7.5% of Assignment with them for promoting the consultancy industry in the country.	
10.	While engaging in Public Procurement contracts worth **Rs. 50 million and above**, each Consultant (lead and their JV Members) shall provide duly filled Performa of "Declaration of Ultimate Beneficial Owners Information for Public Procurement Contracts", in their Financial Proposals, which is attached as **Annexure-I** at the end of this RFP.	
11.	Any other document.	

APPENDIX C

MAN-MONTH AND ACTIVITY SCHEDULE

To estimate Consultant's inputs and costs for the assignment, man-month and activity schedules are to be provided as per enclosed format (Forms A7 and A8). These two schedules should correlate.

APPENDIX D

CLIENT'S REQUIREMENTS FROM THE CONSULTANTS

CLIENT'S REQUIREMENTS FROM THE CONSULTANTS

Some important requirements are:

1. Selecting a Consulting Engineer is one of the most important decisions an owner or Client makes. The most important standards for this are technical competence, managerial ability, professional integrity and fairness of fee structure. The Client will seek information on all these aspects by:

   a. Obtaining comprehensive written information from the Consultant in form of RFPs and should be completed in full providing all details as correctly known as possible. It has been experienced that some Consultants try to hide their deficiencies viz-a-viz the requirements of TOR by making unclear and vague statement. It will be policy of evaluators that vague statement and lack of clarity in proposals on specific issues may be reason to downgrade the rating.

   b. Talking to the senior personnel of the Consultants.

   c. Consulting their Clients.

   d. Viewing the projects that they have accomplished and visit the users.

   e. Visiting the premises of the Consultant and examining systems and method of works as well as hardware and software abilities available. **Senior Management (minimum Director level) shall regularly visit** the site at least once a month and hold meeting with the Client's representative.

   f. The approach and methodology proposed including work plan, activity and man-month schedule should be meaningful and fully coordinated to judge the understanding of the proposed assignment by the Consultant.

2. For Items (b) to (e), the inspection can be held any time prior to or after award of work to the Consultants. During the inspection if the scenario found is not compatible with what is presented during presentations or as per Contract, the Consultant is liable for action debarring for two (2) years for future projects which may or may not include black listing action (in accordance with Rule 19 of the Public Procurement Rules, 2004).

APPENDIX E

PERSONNEL, EQUIPMENT, FACILITIES AND OTHERS SERVICES TO BE PROVIDED BY THE CLIENT.

AS PER TOR

APPENDIX-F

COPY OF MODEL AGREEMENT
(To be finalized during Negotiations)

Contract for Engineering Consultancy Services (Lump Sum)

Between

(NATIONAL HIGHWAY AUTHORITY)

And

(NAME OF THE CONSULTANTS)

FOR

Consultancy Services for Feasibility Study & Detailed Design for Realignment of Motorway M-2 in Salt Range Area (Approx. 10 km).

Month and Year

TABLE OF CONTENTS

Appendix F-Services and Facilities to be Provided by the Client
Appendix G-Integrity Pact
Appendix H-Minutes of Pre-Proposal Meeting along with addendum

V ALTERNATE TITLE PAGE IN CASE OF JV
ALTERNATE FORM OF CONTRACT IN CASE OF JV

FORM OF CONTRACT

[Notes: 1. Use this Form of Contract when the Consultants perform Services as Sole Consultants.

2. In case the Consultants perform Services as a Member of the joint venture, use the Form included at the end.

3. All notes should be deleted in the final text.]

This CONTRACT (hereinafter called the "Contract") is made on the __ day of __ month) of ___ (year), between, on the one hand _____
(Hereinafter called the "Client" which expression shall include the successors, legal representatives and permitted assigns) and, on the other hand, _____ (hereinafter called the "Consultants" which expression shall include the successors, legal representatives and permitted assigns).

WHEREAS

(a) the Client has requested the Consultants to provide certain consulting services as defined in the General Conditions of Contract attached to this Contract (hereinafter called the "Services"); and

(b) the Consultants, having represented to the Client that they have the required professional skills, and personnel and technical resources, have agreed to provide the Services on the terms and conditions set forth in this Contract;

NOW THEREFORE the Parties hereby agree as follows:

1. The following documents attached hereto shall be deemed to form an integral part of this Contract:

   (a) the General Conditions of Contract;
   (b) the Special Conditions of Contract;
   (c) the following Appendices:

   [Note: If any of these Appendices are not used, the words "Not Used" should be inserted below/next to the title of the Appendix and on the sheet attached hereto carrying the title of that Appendix.]

   Appendix A: Description of the Services
   Appendix B: Reporting Requirements
   Appendix C: Key Personnel and Sub consultants
   Appendix D: Breakdown of Contract Price in Foreign Currency
   Appendix E: Breakdown of Contract Price in Local Currency
   Appendix F: Services & Facilities to be Provided by the Client
   Appendix G: Integrity Pact (for Services above Rs.10 million)

2. The mutual rights and obligations of the Client and the Consultants shall be as set forth in the Contract, in particular:

(a) the Consultants shall carry out the Services in accordance with the provisions of the Contract; and

(b) the Client shall make payments to the Consultants in accordance with the provisions of the Contract.

IN WITNESS WHEREOF, the Parties hereto have caused this Contract to be signed in their respective names in two identical counterparts, each of which shall be deemed as the original, as of the day, month and year first above written.

For and on behalf of

_____

Witness (CLIENT)

Signatures_____ Signatures _____

Name _____ Name _____

Title _____ Title _____

(Seal)

For and on behalf of

_____

Witness (CONSULTANTS)

Signatures_____ Signatures _____

Name _____ Name _____

Title _____ Title _____

(Seal)

II. GENERAL CONDITIONS OF CONTRACT

1. GENERAL PROVISIONS

1.1 Definitions

Unless the context otherwise requires, the following terms whenever used in this Contract have the following meanings:

(a) "Applicable Law" means the laws and any other instruments having the force of law in the Islamic Republic of Pakistan, as those may be issued and in force from time to time;

(b) "Contract" means the Contract signed by the Parties, to which these General Conditions of Contract (GC) are attached, together with all the documents listed in Clause 1 of such signed Contract;

(c) "Contract Price" means the price to be paid for the performance of the Services, in accordance with Clause 6;

(d) "Effective Date" means the date on which this Contract comes into force and effect pursuant to Sub-Clause 2.1;

(e) "GC" means these General Conditions of Contract;

(f) "Government" means the Government of the Islamic Republic of Pakistan and/or Provincial Government(s);

(g) "Foreign Currency" means currency other than the currency of Islamic Republic of Pakistan.;

(h) "Local Currency" means the currency of the Islamic Republic of Pakistan;

(i) "Member" in case the Consultants consist of a joint venture of more than one entity, means any of the entities, and "Members" means all of these entities;

(j) "Party" means the Client or the Consultants, as the case may be, and "Parties" means both of them;

(k) "Personnel" means persons hired by the Consultants or by any Sub consultant as employees and assigned to the performance of the Services or any part thereof;

(l) "SC" means the Special Conditions of Contract by which the GC are amended or supplemented;

(m) "Services" means the work to be performed by the Consultants pursuant to this Contract, as described in Appendix A;

(n) "Sub consultant" means any entity to which the Consultants subcontract any part of the Services in accordance with the provisions of Sub-Clause 3.6;

(o) "Third Party" means any person or entity other than the Client, the Consultants or a Sub consultant; and

(p) "Project" means the work specified in SC for which engineering consultancy services are desired.

1.2 Law Governing the Contract

This Contract, its meaning and interpretation, and the relation between the Parties shall be governed by the Applicable Law.

1.3 Language

This Contract has been executed in the English language which shall be the binding and controlling language for all matters relating to the meaning or interpretation of this Contract. All the reports and communications shall be in the English language.

1.4 Notices

Any notice, request, or consent made pursuant to this Contract shall be in writing and shall be deemed to have been made when delivered in person to an Authorized Representative of the Party to whom the communication is addressed, or when sent by registered mail, telex, or facsimile to such Party at the address of the Authorized Representatives specified under Sub-Clause SC 1.6. A Party may change its address for notice hereunder by giving the other Party notice of such change.

1.5 Location

The Services shall be performed at such locations as are specified in Appendix A and, where the location of a particular task is not so specified, at such locations as mutually agreed by the Parties.

1.6 Authorized Representatives

Any action required or permitted to be taken, and any document required or permitted to be executed, under this Contract by the Client or the Consultants shall be taken or executed by the Authorized Representatives specified in the SC.

1.7 Taxes and Duties

Unless specified in the SC, the Consultants, Sub consultants, and their Personnel shall pay such taxes, duties, fees, and other impositions as may be levied under the Applicable Law, the amount of which is deemed to have been included in the Contract Price.

1.8 Leader of Joint Venture

In case the Consultants consist of a joint venture of more than one entity, the Consultants shall be jointly and severally bound to the Client for fulfillment of the terms of the Contract and

designate the Member named in the SC to act as leader of the Joint Venture, for the purpose of receiving instructions from the Client.

2. COMMENCEMENT, COMPLETION, MODIFICATION, AND TERMINATION OF CONTRACT

2.1 Effectiveness of Contract

This Contract shall come into force and effect on the date (the "Effective Date") of the Client's notice to the Consultants instructing the Consultants to begin carrying out the Services. This notice shall confirm that the effectiveness conditions, if any, listed in the SC have been met.

2.2 Termination of Contract for Failure to Become Effective

If this Contract has not become effective within such time period after the date of the Contract signed by the Parties as shall be specified in the SC, either Party may, by not less than twenty eight (28) days written notice to the other Party, declare this Contract to be null and void, and in the event of such a declaration by either Party, neither Party shall have any claim against the other Party except for the work (if any) already done or costs already incurred by a Party at the request of the other Party.

2.3 Commencement of Services

The Consultants shall begin carrying out the Services at the end of such time period after the Effective Date as shall be specified in the SC.

2.4 Expiration of Contract

Unless terminated earlier pursuant to Sub-Clause 2.9, this Contract shall expire when, pursuant to the provisions hereof, the Services have been completed and the payments of remunerations including the direct costs if any, have been made. The Services shall be completed within a period as is specified in the SC, or such extended time as may be allowed under Sub-Clause 2.6.

The term "Completion of Services" is as specified in the SC.

2.5 Modification

Modification of the terms and conditions of this Contract, including any modification of the scope of the Services or of the Contract Price, may only be made in writing, which shall be signed by both the Parties.

2.6 Extension of Time for Completion

If the scope or duration of the Services is increased:

(a) the Consultants shall inform the Client of the circumstances and probable effects;

(b) the increase shall be regarded as Additional Services; and

(c) the Client shall extend the time for Completion of the Services accordingly.

2.7 Force Majeure

2.7.1 Definition

(a) For the purposes of this Contract, "Force Majeure" means an event which is beyond the reasonable control of a Party and which makes a Party's performance of its obligations under the Contract impossible or so impractical as to be considered impossible under the circumstances, and includes, but is not limited to, war, riots, civil disorder, earthquake, fire, explosion, storm, flood or other adverse weather conditions, strikes, lockouts or other industrial actions (except where such strikes, lockouts or other industrial actions are within the power of the Party invoking Force Majeure to prevent), confiscation or any other action by government agencies.

(b) Force Majeure shall not include (i) any event which is caused by the negligence or intentional action of a Party or such Party's Sub consultants or agents or employees, nor (ii) any event which a diligent Party could reasonably have been expected to both (A) take into account at the time of the conclusion of this Contract and (B) avoid or overcome in the carrying out of its obligations hereunder.

(c) Force Majeure shall not include insufficiency of funds or failure to make any payment required hereunder.

2.7.2 No Breach of Contract

The failure of a Party to fulfill any of its obligations under the Contract shall not be considered to be a breach of, or default under this Contract insofar as such inability arises from an event of Force Majeure, provided that the Party affected by such an event; (a) has taken all reasonable precautions, due care and reasonable alternative measures in order to carry out the terms and conditions of this Contract; and (b) has informed the other Party in writing not later than fifteen (15) days following the occurrence of such an event.

2.7.3 Extension of Time

Any period within which a Party shall, pursuant to this Contract, complete any action or task, shall be extended for a period equal to the time during which such Party was unable to perform such action as a result of Force Majeure.

2.7.4 Payments

During the period of their inability to perform the Services as a result of an event of Force Majeure, the Consultants shall be entitled to continue to be paid under the terms of this Contract, as well as to be reimbursed for additional costs reasonably and necessarily incurred by them during such period for the purpose of the Services and in reactivating the Services after the end of such period.

2.8 Suspension of Payments by the Client

The Client may, by written notice of suspension to the Consultants, suspend all payments to the Consultants hereunder if the Consultants fail to perform any of their obligations under this Contract, including the carrying out of the Services, provided that such notice of suspension

(i) shall specify the nature of the failure, and (ii) shall request the Consultants to remedy such failure within a period not exceeding thirty (30) days after receipt by the Consultants of such notice of suspension.

2.9 Termination

2.9.1 By the Client

The Client may terminate this Contract, by not less than thirty (30) days written notice of termination to the Consultants, to be given after the occurrence of any of the events specified in paragraphs (a) through (e) of this Sub-Clause 2.9.1 and sixty (60) days' in the case of the event referred to in paragraph (f):

(a) if the Consultants do not remedy a failure in the performance of their obligations under the Contract, within thirty (30) days after being notified or within any further period as the Client may have subsequently approved in writing;

(b) if the Consultants become (or, if the Consultants consist of more than one entity, if any of their Members becomes) insolvent or bankrupt or enter into any agreements with their creditors for relief of debt or take advantage of any law for the benefit of debtors or go into liquidation or receivership whether compulsory or voluntary;

(c) if the Consultants fail to comply with any final decision reached as a result of arbitration proceedings pursuant to Clause 7 hereof;

(d) if the Consultants submit to the Client a statement which has a material effect on the rights, obligations or interests of the Client and which the Consultants know to be false;

(e) if, as the result of Force Majeure, the Consultants are unable to perform a material portion of the Services for a period of not less than sixty (60) days;

(f) if the Client, in its sole discretion, decides to terminate this Contract.

2.9.2 By the Consultants

The Consultants may terminate this Contract, by not less than thirty (30) days written notice to the Client, such notice to be given after the occurrence of any of the events specified in paragraphs (a) through (d) of this Sub-Clause 2.9.2:

(a) if the Client fails to pay any monies due to the Consultants pursuant to this Contract and not subject to dispute pursuant to Clause 7 within forty-five (45) days after receiving written notice from the Consultants that such payment is overdue;

(b) if the Client is in material breach of its obligations pursuant to this Contract and has not remedied the same within forty-five (45) days (or such longer period as the Consultants may have subsequently approved in writing) following the receipt by the Client of the Consultants' notice specifying such breach;

(c) if, as a result of Force Majeure, the Consultants are unable to perform a material portion of the Services for a period of not less than sixty (60) days;

(d) if the Client fails to comply with any final decision reached as a result of arbitration proceedings pursuant to Clause 7 hereof.

2.9.3 Cessation of Services

Upon receipt of notice of termination under Sub-Clause 2.9.1, or giving of notice of termination under Sub-Clause 2.9.2, the Consultants shall take all necessary steps to bring the Services to a close in a prompt and orderly manner and shall make every reasonable effort to keep expenditures for this purpose to a minimum. With respect to documents prepared by the Consultants, and equipment and materials furnished by the Client, the Consultants shall proceed as provided, respectively, by Sub-Clauses 3.8 or 3.9.

2.9.4 Payment upon Termination

Upon termination of this Contract pursuant to Sub-Clauses 2.9.1 or 2.9.2, the Client shall make the following payments to the Consultants:

(a) Remuneration and reimbursable direct costs expenditure pursuant to Clause 6 for Services satisfactorily performed prior to the effective date of termination. Effective date of termination for purposes of this Sub-Clause means the date when the prescribed notice period would expire;

(b) except in the case of termination pursuant to paragraphs (a) through (d) of Sub-Clause 2.9.1, reimbursement of any reasonable cost incidental to the prompt and orderly termination of the Contract, including the cost of the return travel of the Personnel, according to Consultants Traveling Allowance Rules.

In order to compute the remuneration for the part of the Services satisfactorily performed prior to the effective date of termination, the respective remunerations shall be proportioned.

2.9.5 Disputes about Events of Termination

If either Party disputes whether an event specified in paragraphs (a) through (e) of Sub-Clause 2.9.1 or in paragraph (a) through (d) of Sub-Clause 2.9.2 hereof has occurred, such Party may, within forty-five (45) days after receipt of notice of termination from the other Party, refer the matter to arbitration pursuant to Clause 7 hereof, and this Contract shall not be terminated on account of such event except in accordance with the terms of any resulting arbitral award.

3. OBLIGATIONS OF THE CONSULTANTS

3.1 General

The Consultants shall perform the Services and carry out their obligations with all due diligence, efficiency, and economy, in accordance with generally accepted professional techniques and practices, and shall observe sound management practices, and employ appropriate advanced technology and safe methods. The Consultants shall always act, in respect of any matter relating to this Contract or to the Services, as faithful advisers to the Client, and shall at all times support and safeguard the Client's legitimate interests in any dealings with Sub consultants or third parties.

3.2 Consultants Not to Benefit from Commissions, Discounts, etc.

The remuneration of the Consultants pursuant to Clause 6 shall constitute the Consultants' sole remuneration in connection with this Contract or the Services, and the Consultants shall not accept for their own benefit any trade commission, discount, or similar payment in connection with activities pursuant to this Contract or to the Services or in the discharge of their obligations under the Contract, and the Consultants shall use their best efforts to ensure that the Personnel, any Sub consultants, and agents of either of them similarly shall not receive any such additional remuneration.

3.3 Confidentiality

The Consultants, their Sub consultants, and the Personnel of either of them shall not, either during the term or after the expiration of this Contract, disclose any proprietary or confidential information relating to the Project, the Services, this Contract, or the Client's business or operations without the prior written consent of the Client.

3.4 Professional Liability

The Consultants are liable for the consequence of errors and omissions on their part or on the part of their employees in so far as the design of the Project is concerned to the extent and with the limitations as specified herein below.

If the Client suffers any losses or damages as a result of proven faults, errors or omissions in the design of a project, the Consultants shall make good such losses or damages, subject to the conditions that the maximum liability as aforesaid shall not exceed twice the total remuneration of the Consultants for design phase in accordance with the terms of the Contract.

The liability of the Consultants expires after one (1) year from the stipulated date of completion of construction or after three (3) years from the date of final completion of the design whichever is earlier.

The Consultants may, to protect themselves, insure themselves against their liabilities but this is not obligatory. The extent of the insurance shall be up to the limit specified in second para above. The Consultants shall procure the necessary cover before commencing the Services and the cost of procuring such cover shall be borne by the Consultants up to a limit of one percent of the total remuneration of the Consultants for the design phase for every year of keeping such cover effective.

The Consultants shall, at the request of the Client, indemnify the Client against any or all risks arising out of the furnishing of professional services by the Consultants to the Client, not covered by the provisions contained in the first para above and exceeding the limits set forth in second para above provided the actual cost of procuring such indemnity as well as costs exceeding the limits set forth in fourth para above shall be borne by the Client.

3.5 Other Insurance to be taken out by the Consultants

The Consultants (a) shall take out and maintain, and shall cause any Sub consultants to take out and maintain, at their (or the Sub consultants', as the case may be) own cost but on terms and conditions approved by the Client, insurance against the risks, and for the coverage, as are specified in the SC; and (b) at the Client's request, shall provide evidence to the Client showing that such insurance has been taken out and maintained and that the current premiums have been paid.

3.6 Consultants' Actions Requiring Client's Prior Approval

The Consultants shall obtain the Client's prior approval in writing before taking any of the following actions:

(a) Appointing such Personnel as are listed in Appendix-C merely by title but not by name;

(b) entering into a subcontract for the performance of any part of the Services, it being understood (i) that the selection of Sub consultants and the terms and conditions of the subcontract shall have been approved in writing by the Client prior to the execution of the subcontract, and (ii) that the Consultants shall remain fully liable for the performance of the Services by the Sub consultants and its Personnel pursuant to this Contract;

(c) any other action that may be specified in the SC.

3.7 Reporting Obligations

The Consultants shall submit to the Client the reports and documents specified in Appendix B in the form, in the numbers, and within the periods set forth in the said Appendix.

3.8 Documents Prepared by the Consultants to be the Property of the Client

All plans, drawings, specifications, reports, and other documents and software prepared by the Consultants in accordance with Sub-Clause 3.7 shall become and remain the property of the Client, and the Consultants shall, not later than upon termination or expiration of this Contract, deliver (if not already delivered) all such documents and software to the Client, together with a detailed inventory thereof. The Consultants may retain a copy of such documents and software.

Restriction(s) about the future use of these documents is specified in the SC.

3.9 Equipment and Materials Furnished by the Client

Equipment and materials made available to the Consultants by the Client or purchased by the Consultants with funds provided exclusively for this purpose by the Client, shall be the property of the Client and shall be marked accordingly. Upon termination or expiration of this Contract, the Consultants shall make available to the Client an inventory of such equipment and materials and shall dispose of such equipment and materials in accordance with the Client's instructions or afford salvage value of the same. While in possession of such equipment and materials, the Consultants, unless otherwise instructed by the Client in writing,

shall insure them at the expense of the Client in an amount equal to their full replacement value.

3.10 Accounting, Inspection and Auditing

The Consultants (i) shall keep accurate and systematic accounts and records in respect of the Services hereunder, in accordance with internationally accepted accounting principles and in such form and detail as will clearly identify all relevant time charges, and cost, and the basis thereof, and (ii) shall permit the Client or its designated representatives periodically, and up to one year from the expiration or termination of this Contract, to inspect the same and make copies thereof as well as to have them audited by auditors appointed by the Client.

4. CONSULTANTS' PERSONNEL AND SUBCONSULTANTS

4.1 Description of Personnel

The titles, agreed job descriptions, minimum qualifications, and estimated periods of engagement in the carrying out of the Services of the Consultants' Key Personnel are described in Appendix C. The Key Personnel and Sub consultants listed by title and/or by name, as the case may be, in Appendix C are deemed to be approved by the Client.

4.2 Removal and/or Replacement of Personnel

(a) Except as the Client may otherwise agree, no changes shall be made in the Key Personnel. If, for any reason beyond the reasonable control of the Consultants, it becomes necessary to replace any of the Key Personnel, the Consultants shall provide as a replacement a person of equivalent or better qualifications;

(b) If the Client, (i) finds that any of the Personnel have committed serious misconduct or have been charged with having committed a criminal action; or (ii) has reasonable cause to be dissatisfied with the performance of any of the Personnel, then the Consultants shall, at the Client's written request specifying the grounds therefore, provide as a replacement a person with qualifications and experience acceptable to the Client.

(c) Except as the Client may otherwise agree, the Consultants shall; (i) bear all the additional travel and other costs arising out of or incidental to any removal and/or replacement; and (ii) bear any additional remuneration, to be paid for any of the Personnel provided as a replacement to that of the Personnel being replaced.

5. OBLIGATIONS OF THE CLIENT

5.1 Assistance, Coordination and Approvals

5.1.1 Assistance

The Client shall use its best efforts to ensure that the Client shall:

(a) provide at no cost to the Consultants, Sub consultants and Personnel such documents prepared by the Client or other consulting engineers appointed by the Client as shall be necessary to enable the Consultants, Sub consultants or Personnel to perform the

Services. The documents and the time within which such documents shall be made available, are as specified in the SC;

(b) Assist to obtain the existing data pertaining or relevant to the carrying out of the Services, with various Government and other organizations. Such items unless paid for by the Consultants without reimbursement by the Client, shall be returned by the Consultants upon completion of the Services under this Contact;

(c) issue to officials, agents and representatives of the concerned organizations, all such instructions as may be necessary or appropriate for prompt and effective implementation of the Services;

(d) Assist to obtain permits which may be required for right-of-way, entry upon the lands and properties for the purposes of this Contract;

(e) Provide to the Consultants, Sub consultants, and Personnel any such other assistance and exemptions as may be specified in the SC.

5.1.2 Co-ordination

The Client shall:

(a) co-ordinate and get or expedite any necessary approval and clearances relating to the work from any Government or Semi-Government Agency, Department or Authority, and other concerned organization named in the SC.

(b) Co-ordinate with any other consultants employed by him.

5.1.3 Approvals

The Client shall accord approval of the documents within such time as specified in the SC, whenever these are applied for by the Consultants.

5.2 Access to Land

The Client warrants that the Consultants shall have, free of charge, unimpeded access to all land of which access is required for the performance of the Services.

5.3 Changes in the Applicable Law

If, after the date of this Contract, there is any change in the Applicable Law which increases or decreases the cost of the Services rendered by the Consultants, then the remunerations and direct costs otherwise payable to the Consultants under this Contract shall be increased or decreased accordingly, and corresponding adjustment shall be made to the amounts referred to in Sub-Clause 6.2 (a) or (b), as the case may be.

5.4 Services and Facilities

The Client shall make available to the Consultants, Sub consultants and the Personnel, for the purpose of the Services and free of any charge, the services, facilities and property described in Appendix F at the times and in the manner specified in said Appendix F,

provided that if such services, facilities and property shall not be made available to the Consultants as and when so specified, the Parties shall agree on; (i) any time extension that it may be appropriate to grant to the Consultants for the performance of the Services; (ii) the manner in which the Consultants shall procure any such services, facilities and property from other sources; and (iii) the additional payments, if any, to be made to the Consultants as a result thereof pursuant to Clause 6 hereinafter.

5.5 Payments

In consideration of the Services performed by the Consultants under this Contract, the Client shall make to the Consultants such payments and in such manner as is provided by Clause 6 of this Contract.

6. PAYMENTS TO THE CONSULTANTS

6.1 Lump Sum Remuneration

The Consultants' total remuneration shall not exceed the Contract Price and shall be a fixed lump sum including all staff costs, incurred by the Consultants in carrying out the Services described in Appendix A. Other reimbursable direct costs expenditure, if any, is specified in the SC. Except as provided in Sub-Clause 5.3, the Contract Price may only be increased above the amounts stated in Sub-Clause 6.2 if the Parties have agreed to additional payments in accordance with Sub-Clauses 2.5, 2.6, 5.4 or 6.6.

6.2 Contract Price

(a) Foreign currency payment shall be made in the currency or currencies specified as foreign currency or currencies in the SC, and local currency payment shall be made in Pakistani Rupees.

(b) The SC shall specify the breakup of remuneration to be paid, respectively, in foreign and in local currencies.

6.3 Terms and Conditions of Payment

Payment will be made to the account of the Consultants and according to the payment schedule stated in the SC. Payments shall be made after the conditions listed in the SC for such payments have been met, and the Consultants have submitted an invoice to the Client specifying the amount due.

6.4 Period of Payment

(a) Advance payment to the Consultants shall be affected within the period specified in the SC, after signing of the Contract Agreement between the Parties.

(b) Any other amount due to the Consultants shall be paid by the Client to the Consultants within twenty-eight (28) days in case of local currency and fifty-six (56) days in case of foreign currency after the Consultants' invoice has been delivered to the Client.

6.5 Delayed Payments

If the Client has delayed payments beyond the period stated in paragraph (b) of Sub-Clause 6.4, financing charges shall be paid to the Consultants for each day of delay at the rate specified in the SC.

6.6 Additional Services

Additional Services means:

(a) Services as approved by the Client outside the Scope of Services described in Appendix A;

(b) Services to be performed during the period extended pursuant to Sub-Clause 2.6, beyond the original schedule time for completion of the Services; and

(c) any re-doing of any part of the Services as a result of Client's instructions.

If, in the opinion of the Client, it is necessary to perform Additional Services during the currency of the Contract for the purpose of the Project, such Additional Services shall be performed with the prior concurrence of both the Parties. The Consultants shall inform the Client of the additional time (if any), and the additional remuneration and reimbursable direct costs expenditure for such Additional Services. If there is no disagreement by the Client within two weeks of this intimation, such additional time, remuneration and reimbursable direct costs expenditure shall be deemed to become part of the Contract. Such remuneration and reimbursable direct costs expenditure shall be determined on the basis of rates provided in Appendices D and E, in case the Additional Services are performed during the scheduled period of the Services, otherwise remuneration for Additional Services shall be determined on the basis of Consultants' billing rates prevailing at the time of performing the Additional Services.

6.7 Consultants' Entitlement to Suspend Services

If the Client fails to make the payment of any of the Consultants' invoice (excluding the advance payment), within twenty-eight (28) days after the expiry of the time stated in paragraph (b) of Sub-Clause 6.4, within which payment is to be made, the Consultants may after giving not less than fourteen (14) days' prior notice to the Client, suspend the Services or reduce the rate of carrying out the Services, unless and until the Consultants have received the payment.

This action will not prejudice the Consultants entitlement to financing charges under Sub-Clause 6.5.

7. SETTLEMENT OF DISPUTES

7.1 Amicable Settlement

The Parties shall use their best efforts to settle amicably all disputes arising out of or in connection with this Contract or its interpretation.

7.2 Dispute Settlement

Any dispute between the Parties as to matters arising pursuant to this Contract which cannot be settled amicably within thirty (30) days after receipt by one Party of the other Party's request for such amicable settlement may be submitted by either Party for settlement in accordance with the provisions of the Arbitration Act, 1940 (Act No x of 1940) and of the Rules made there under and any statutory modifications thereto.

Services under the Contract shall, if reasonably possible, continue during the arbitration proceedings and no payment due to or by the Client shall be withheld on account of such proceedings.

8. INTEGRITY PACT

8.1 If the Consultant or any of his Sub consultants, agents or servants is found to have violated or involved in violation of the Integrity Pact signed by the Consultant as Appendix-G to this Form of Contract, then the Client shall be entitled to:

(a) recover from the Consultant an amount equivalent to ten times the sum of any commission, gratification, bribe, finder's fee or kickback given by the Consultant or any of his Sub consultant, agents or servants;

(b) terminate the Contract; and

(c) Recover from the Consultant any loss or damage to the Client as a result of such termination or of any other corrupt business practices of the Consultant or any of his Sub consultant, agents or servants.

On termination of the Contract under Sub-Para (b) of this Sub-Clause, the Consultant shall proceed in accordance with Sub-Clause 2.9.3. Payment upon such termination shall be made under Sub-Clause 2.9.4 (a) after having deducted the amounts due to the Client under Sub-Para (a) and (c) of this Sub-Clause.

III. SPECIAL CONDITIONS OF CONTRACT

No. Amendments of, and Supplements to, Clauses in the General Conditions of contract of GC Clause.

1.1 Definitions

(p) "Project means "*Consultancy Services for Feasibility Study & Detailed Design for Realignment of Motorway M-2 in Salt Range Area (Approx. 10 km)*"

1.2 Law Governing the Contract

The Consultants personnel shall at all times endeavor to observe and respect all laws, rules, regulations and customs prevailing within the Islamic Republic of Pakistan.

1.6 Authorized Representatives

The Authorized Representatives are the following:

For the Client:

General Manager (Design)
National Highway Authority
Plot No. 28, Mauve Area, G-9/1 P.O. Box 1205,
Islamabad.
Telephone: (+92) 51-9032901

For the Consultants: **(To be Finalized during Contract Negotiation)**

_____ (Name of Project Manager)
_____ (Project)
_____ (Address)
_____
Telephone : _____
Facsimile : _____
E-Mails : _____

1.7 Taxes and Duties

Payment of Taxes will be the responsibility of the Consultants in accordance with Pakistan Tax Laws.

[All notes should be deleted in final text. All blanks should be filled in.]

1.8 Leader of the Joint Venture

The leader of the Joint Venture is..... (Name of the Member of the Joint Venture).

[Note: If the Consultants do not consist of more than one entity, the Sub-*Clause1.8 should be deleted.]*

2.1 Effectiveness of Contract

The date on which this Contract shall come into effect is the date when the Contract is signed by both the Parties.

2.2 Termination of Contract for Failure to Become Effective

The time period shall be thirty (30) days, or such other period as the Parties may agree in writing.

2.3 Commencement of Services

The Consultant shall commence the services immediately after signing of the Contract Agreement or such other time as the Parties may agree in writing.

2.4 Expiration of Contract

The services specified in the TOR shall be completed and all relevant reports submitted in the form and format acceptable to the Employer, within Six (06) Months from the date of signing of Contract Agreement or such other period as the Parties may agree in writing.

2.7.4 Payments

Following text is added at the end of the Para:

"Excluding overheads and profits."

3.4 Professional Liability

Professional indemnity bond for twice the remuneration in the joint name of Client and Consultants shall be provided as per last paragraph of GC 3.4 within 30 days after the issuance of Letter of Acceptance. The Consultants is to cover this cost in its overheads.

3.5 Insurance to be taken out by the Consultants

The risks and the coverages shall be as follows:

(a) Third Party motor vehicle liability insurance in respect of motor vehicles operated in Pakistan by the Consultants or their Personnel or any Sub-consultants or their Personnel, with a minimum coverage of Rs. 100,000/-.

(b) Insurance against loss of or damage to equipment purchased in whole or in part with funds provided under the Contract.

(c) The Consultants are required to insure their Employees and Professionals for Hospitalization/ Medical, Travel and Accident Cover for the duration of the Contract.

3.7 Reporting Obligations

Moreover, along with the hard copies "contractor/ consultant" etc. must provide duly certified Soft/ scanned copies of the all the documents prepared/ used/ referred etc. during the contract period. The soft/ scanned copies shall be stored in the appropriate storage media like external hard disk in a secure and structured manner. The scanned copies must have proper file names/ titles etc in appropriate folders for quick retrieval. The soft/ scanned copies provided by the contractor/ consultant must have third party certification and traceability.

3.8 Documents Prepared by the Consultants to be the Property of the Client

The Client and the Consultants shall not use these documents for purposes unrelated to this Contract without the prior written approval of the other Party.

5.1.1 Assistance

(a) The Client shall make available within 14 days from the Commencement Date, the documents namely: to be inserted as and when required.

5.1.2 Coordination

(a) The departments and agencies include as per requirement from time to time.

5.1.3 Approvals

The Client shall accord approval of the documents immediately but not later than fourteen (14) days from the date of their submission by the Consultants.

6.1 Lump Sum Remuneration

[Note: In case there are other expenditures in respect of which reimbursement is allowed in addition to the lump sum remuneration, details of such reimbursable direct costs expenditure which may include Sub consultants' costs, printing, communications, travel, accommodation etc., may be indicated herein. Each item shall be specified whether it is payable on the basis of (a) lump sum monthly rate; or (b) reimbursement of actual expenditures.].

6.2 Contract Price

(a) The amount in foreign currency is.....
The amount in local currency is Pakistani Rupees.....
(b) The breakup of foreign and local currencies shall be as under:
- For Planning and Designing, total foreign currency comprising.... (Name the currency/currencies) is ..... and total Pak Rs. is

6.3 Terms and Conditions of Payment

A lump sum amount in local currencies against services referred under SC 6.2 shall be paid to the Consultants for the Services to be completed within the period specified in SC 2.4. Payments shall be made according to the following schedule:

AS PER TOR

6.4 Period of Payment

(a) The time period for advance payment shall be .....() days after signing of Contract Agreement by both the Parties. (Fill in the time period e.g., thirty (30) days).

6.5 Delayed Payments

Financing charges are as under:

(ii) for local currency = Eight percent (08%) per annum.

6.6 Additional Services

The Consultants shall be prepared at any time during the project to provide expert technical advice and skill to the Client who may ask and need such assistance on any phase or specific feature of the Project. The Consultants will be separately compensated for all such services not covered in the original Services.

9. Priority of Documents

Following is to indicate priority of documents forming part of this Contract to resolve an ambiguity or non-clarity in the provision:

- ✓ Contract Agreement;
- ✓ Minutes of Contract Negotiation Meeting;
- ✓ The Special Conditions of Contract;
- ✓ The General Conditions of Contract;
- ✓ Minutes of Pre-Proposal Meeting and Addenda;
- ✓ Scope of Services/ Terms of Reference;
- ✓ Other documents including Integrity Pact and JV agreement (if any).

10. Royalties

The Consultants shall save harmless and indemnify the Client from and against all claims and proceedings on account of or for infringement of any patent right, design, trademark or name or other protected rights in respect to any patented designs, features or equipment they may use for carrying out the Services, and shall pay all royalties etc. thereto.

11. Penalty

If the Consultants fails to comply with the time to completion as given in the Contract, the Client will impose a penalty at the rate of 0.05% of the fee for incomplete portion of work as per Appendix-E for each day of delay up to a maximum of 10% of the same amount.

IV APPENDICES

Appendix A

Description of the Services

[Give detailed descriptions of the Services to be provided, dates for completion of various tasks, place of performance for different tasks, specific tasks to be approved by Client, etc.]

Appendix B

Reporting Requirements

Pursuant to Sub-Clause GC-3.7, the Consultants shall submit the following reports:

[List format, frequency, and contents of reports; persons to receive them; dates of submission and the number of copies of each submittal; etc. If no reports are to be submitted, state here "Not applicable".]

Appendix C

Key Personnel and Sub consultants

[List under: C-1 Title [and names, if already available], activities of job descriptions of key Personnel to be assigned to work and staff-months for each.

C-2 List of approved Sub consultants (if already available); same information with respect to their Personnel as in C-1.]

Appendix D

Breakdown of Contract Price in Foreign Currency

[List here the elements of cost used to arrive at the breakdown of the Contract Price-foreign currency portion:

1. Remuneration for various items on the basis of r[illegible]s as mutually agreed.

2. Other reimbursable direct costs expenditure.

3. Total, remuneration and reimburs[illegible]ct costs expend[illegible] + 2)

Note:

This appendix will exclusively be used for det[illegible]mining [illegible]emuneration for Additional Services in accordance with Sub-Clause GC 6.6.]

Appendix E

Breakdown of Contract Price in Local Currency

[List here the elements of cost used to arrive at the breakdown of the Contract Price-local currency portion:

1. Remuneration for various items on the basis of rates as mutually agreed.

2. Other reimbursable direct costs expenditure related to:

   (a) Support staff, and work charged staff;

   (b) Office expenditures related to:

      (i) rentals;

      (ii) furnishing and equipment;

      (iii) operation and maintenance of office, office equipment and furniture, office supplies.

   (c) Transport including running and maintenance, and other associated costs;

   (d) Traveling etc.

   (e) Other costs

3. Total, remuneration and reimbursable direct costs expenditure = (1 + 2).

   Note:

   1. Each item of reimbursable direct costs expenditure shall be specified whether it is payable on the basis of (a) lump sum monthly rate; or (b) reimbursement of actual expenditures.

   2. This appendix will exclusively be used for determining remuneration for Additional Services in accordance with Sub-Clause GC 6.6.]

Appendix F

Services and Facilities to be provided by the Client

As Per TOR

Appendix G
(INTEGRITY PACT)

Declaration of Fees, Commission and Brokerage etc. Payable by the Suppliers of Goods, Services & Works in Contracts Worth Rs.10.00 million or More

Contract No._____ Dated: _____ Contract Value: _____

Contract Title: ..... [name of Supplier] hereby declares that it has not obtained or induced the procurement of any contract, right, interest, privilege or other obligation or benefit from Government of Pakistan (GOP) or any administrative subdivision or agency thereof or any other entity owned or controlled by GOP through any corrupt business practice. Without limiting the generality of the foregoing, [name of Supplier] represents and warrants that it has fully declared the brokerage, commission, fees etc. paid or payable to anyone and not given or agreed to give and shall not give or agree to give to anyone within or outside Pakistan either directly or indirectly through any natural or juridical person, including its affiliate, agent, associate, broker, consultant, director, promoter, shareholder, sponsor or subsidiary, any commission, gratification, bribe, finder's fee or kickback, whether described as consultation fee or otherwise, with the object of obtaining or inducing the procurement of a contract, right, interest, privilege or other obligation or benefit in whatsoever form from GOP, except that which has been expressly declared pursuant hereto.

[name of Supplier] certifies that it has made and will make full disclosure of all agreements and arrangements with all persons in respect of or related to the transaction with GOP and has not taken any action or will not take any action to circumvent the above declaration, representation or warranty.

[name of Supplier] accepts full responsibility and strict liability for making any false declaration, not making full disclosure, misrepresenting facts or taking any action likely to defeat the purpose of this declaration, representation and warranty. It agrees that any contract, right, interest, privilege or other obligation or benefit obtained or procured as aforesaid shall, without prejudice to any other rights and remedies available to GOP under any law, contract or other instrument, be voidable at the option of GOP.

Notwithstanding any rights and remedies exercised by GOP in this regard, [name of Supplier] agrees to indemnify GOP for any loss or damage incurred by it on account of its corrupt business practices and further pay compensation to GOP in an amount equivalent to ten time the sum of any commission, gratification, bribe, finder's fee or kickback given by [name of Supplier] as aforesaid for the purpose of obtaining or inducing the procurement of any contract, right, interest, privilege or other obligation or benefit in whatsoever form from GOP.

Name of Buyer: National Highway Authority	Name of Seller/Supplier: .....
Signature:	Signature: .....
[Seal]	[Seal]

CONTRACT FOR ENGINEERING CONSULTANCY SERVICES

Between

_____

(NAME OF THE CLIENT)

And

_____

(NAME OF THE JOINT VENTURE OF THE CONSULTANTS)

For

_____ **(BRIEF SCOPE OF SERVICES)**

OF_____ **(NAME OF PROJECT)**

_____

Month and Year

_____ **(NAME OF THE JOINT VENTURE OF THE CONSULTANTS)**
_____ **(Name of Individual Consultants)**
_____ **(Name of Individual Consultants)**

FORM OF CONTRACT

[Note: Use this Form of Contract when the Consultants perform Services as a Joint Venture.

This CONTRACT (hereinafter called the "Contract") is made on the _____ day of ___ (month) of ____ (year), between, on the one hand, _____

_____

(Hereinafter called the "Client" which expression shall include the successors, legal representatives and permitted assigns) and, on the other hand, a joint venture consisting of the following entities, each of which will be jointly and severally liable to the Client for all the Consultants' obligations under this Contract, namely:

_____

_____

_____

(Hereinafter collectively called the "Consultants" which expression shall include its successors, legal representatives and permitted assigns).

WHEREAS

(a) the Client has requested the Consultants to provide certain consulting services as defined in the General Conditions of Contract attached to this Contract (hereinafter called the "Services"); and

(b) the Consultants, having represented to the Client that they have the required professional skills, and personnel and technical resources, have agreed to provide the Services on the terms and conditions set forth in this Contract;

NOW THEREFORE the Parties hereby agree as follows:

1. The following documents attached hereto shall be deemed to form an integral part of this Contract:

   (a) the General Conditions of Contract;
   (b) the Special Conditions of Contract;
   (c) the following Appendices:

   [Note: If any of these Appendices are not used, the words "Not Used" should be inserted below next to the title of the Appendix and on the sheet attached hereto carrying the title of that Appendix.]

   Appendix A: Description of Services
   Appendix B: Reporting Requirements
   Appendix C: Key Personnel and Sub-consultants
   Appendix D: Breakdown of Contract Price in Foreign Currency
   Appendix E: Breakdown of Contract Price in Local Currency
   Appendix F: Services & Facilities to be Provided by the Client and Counterpart Personnel to be Made Available to the Consultants by the Client.
   Appendix G: Integrity Pact (for Services above Rs. 10 Million)

2. The mutual rights and obligations of the Client and the Consultants shall be as set forth in the Contract, in particular:

(a) The Consultants shall carry out the Services in accordance with the provisions of the Contract; and

(b) The Client shall make payments to the Consultants in accordance with the provisions of the Contract.

IN WITNESS WHEREOF, the Parties hereto have caused this Contract to be signed in their respective names in two identical parts each of which shall be deemed as the original, as of the day, month and year first above written.

For and on behalf of

_____

CLIENT'S NAME

Witness

Signature _____ Signature _____

Name _____ Name _____

Title _____ Title _____

(Seal)

For and on behalf of

_____

NAME OF THE JOINT VENTURE OF THE CONSULTANTS

_____

_____

Name of Member No. 1

Witness

Signature _____ Signature _____

Name _____ Name _____

Title _____ Title _____

(Seal)

_____

Name of Member No. 2

Witness

Signature _____ Signature _____

Name _____ Name _____

Title _____ Title _____

(Seal)

Name of Member No. 3

Witness

Signature _____
Name _____
Title _____

Signature _____
Name _____
Title _____
(Seal)

Annexure-I

Declaration of Ultimate Beneficial Owners Information for Public Procurement Contracts

(For contracts worth Rs. 50 million and above)

1. Name
2. Fathers Name/Spouse's Name
3. CINIC/NICOP/Passport No.
4. Nationality
5. Residential address
6. Email Address
7. Date on which shareholding, control or interest acquired in the business.
8. In case of indirect shareholding, control or interest being exercised through intermediary companies entries or other legal person or legal arrangements in the chain of ownership or control, following additional particulars to be provided:

1	2	3	4	5	6	7	8	9	10
Name	Legal form (company/ Limited Liability Partnership/ Association of Persons/Single Member Company/ partnership Firm/ Trust/ Any other individual, body corporate (to be specified)	Date of incorporation/registration	Name of registering authority	Business Address	Country	Email Address	Percentage of shareholding, control or interest of BO in the Legal person or legal arrangement	Percentage of shareholding, control or interest of legal person or legal arrangement in the company	Identify of natural person who ultimately owns or controls the legal person or arrangement

9. Information about Board of Directors (Details Shall be provided regarding number of shares in the capital of the company as set opposite respective names).

1	2	3	4	5	6	7	8
Name and surname (in Block Letters)	CINIC No.(in case of foreigner, Passport No.)	Father's/ Husband's Name in full	Current Nationality	Any other Nationality (ies)	Occupation	Residential address in full or the registered/ principal office address for a subscribers other than natural person	Number of share taken by cash subscriber (in figures and words)
			Total Number of shares taken (in figures and words)				

10. Any other information incidental to or relevant to Beneficial owner(s)

Name and signature
(Person authorized to issue notice on behalf of the company)

REQUIREMENTS OF AUDIT REPORTS

Sr. No.	Types of Organization	Minimum requirement of auditors	Basis of Preparation of Audit Reports	Basis of preparation of Financial Statements
1.	Corporate entities (duly registered with Securities and Exchange Commission of Pakistan)	Licensed Chartered Accountant Firms (Minimum Partnership Firm with international affiliation) enlisted and appearing on the list of firms in ICAP directory as at the finalization of procurement.	International auditing standards as applicable in Pakistan.	i. Companies Ordinance 1984 or Companies Act 2017 (Whichever is applicable). ii. International accounting and financial reporting standards as applicable in Pakistan at the time of issuance of the reports.
2.	Partnership Firm/ AOPs/ Joint Ventures	Licensed Chartered Accountant Firms (Minimum Partnership Firm) enlisted and appearing on the list of firms in ICAP directory as at the finalization of procurement.		International accounting and financial reporting standards as applicable in Pakistan at the time of issuance of the reports.
3.	Individuals/ Sole Proprietorship	Licensed Cost & Management Accountant Firms enlisted and appearing on the list of firms in ICMAP directory as at the finalization of procurement for organization of net worth up to 10 million only. In all other cases Licensed Chartered Accountant Firms enlisted and appearing on the list of firms in ICAP directory as at the finalization of procurement.		Consistent and acceptable Accounting policies.