

PAKISTAN RAILWAYS
HEADQUARTERS OFFICE, LAHORE PAKISTAN

C O R R I G E N D U M

- I. **FEASIBILITY STUDY OF UP-GRADATION OF EXISTING RAILWAY LINE FROM ROHRI TO KOHI TAFTAN VIA QUETTA INCLUDING THE REALIGNMENT OF SIBI-SPEZAND SECTION (1022 KMS).**
- II. **FEASIBILITY STUDY OF RAIL LINK FROM QUETTA TO KOTLA JAM (538 KMS) (UPDATING OF EXISTING FEASIBILITY STUDY).**

As a result of pre-bid Conference held on July 05, 2017, Addendum No.1 to subject has been issued. Addendum No.1 and Minutes of meeting of pre-proposal conference held on 05-07-2017 can be downloaded from Pakistan Railway's official website: www.pakrail.com or PPRA's website www.ppra.prg.pk.

The date of submission of proposal has been extended upto August, 31, 2017 not later than 02:00 pm.

Technical proposals will be opened on the same date and venue at 02:30 pm

Basharat Waheed
Chief Engineer / Surveys & Constructions
Pakistan Railways, Headquarters Office,
Empress Road, Lahore.

Ph.(042) 99201625, Fax (042) 99201760

E-mail: censc@pakrail.com

No. 844-W/454(S&C) Tender

Dated: 29-07-2017

ADDENDUM NO.1 TO RFP

**FEASIBILITY STUDY OF RAIL LINK FROM QUETTA TO KOTLA JAM
(APPROX. 538 KM) (UPDATION OF EXISTING FEASIBILITY STUDY)**

As a result of pre-bid Conference held on July 05, 2017, this addendum is being issued to provide clarifications, additions, amendments and / or corrections to the above mentioned RFP. This addendum shall be deemed to form part of the RFP.

Request for Proposal:

Clause No. 2.20 (Public opening and evaluation of financial proposal):

1. The words “three top ranking” in second line of first paragraph under clause no. 2.20.1 is deleted.

Instructions to Consultants; Data Sheet

2. **Reference paragraph 2.17.5:** Last date for submission of Proposal is extended to “**21st August, 2017** not later than 2 pm”.

Appendix-1 to Data Sheet of RFP

3. **Mandatory Requirement:** Sub item No. (iii), The text is replaced with the following:

“iii) A Professional Expert will not be considered for Evaluation if he is already engaged in more than One (01) ongoing Consultancy Assignment.”

Clause No. 5.2 (Objective of Feasibility Study):

4. Second last paragraph of Clause No. 5.2 of TOR is appended with following text.

“To achieve above said objectives it is mandatory to foresee all possible upcoming traffic. In this regard the traffic influx from Central Asian Republic (CARs) states towards China – Pak Economic Corridor (CPEC) will not be negligible in coming future. Potential route for connecting CPEC to CARs is Chaman-Kandhar-Heraat.

In this regard a desk study is required to carry out to analyze the effect of upcoming traffic influx, from CARs on Economic and Financial viability of

up-grading/Rehabilitating Quetta-Bostan-Zhob-Kotlajam Section which will become significant after development of CPEC and Chaman-Kandhar-Herat Route,”

Part-A (Quetta – Bostan Section)

Clause No. 5.3.3 (Bridge Analysis for Extension/Reconstruction of Bridges)

5. The First paragraph is replaced and following table is added:

“The Client will provide available data of the bridges. The Consultant shall carryout detailed structural analysis of specified bridges(as mentioned in the table -A) on the basis of data provided by client and field reconnaissance survey. Consultant will draw their conclusions and recommendation along with comprehensive plan for reconstruction/ rehabilitation and strengthening, of all bridges along with the cost.”

Table - A

<u>Sr.No</u>	<u>Type of Bridges</u>	<u>Quetta - Bostan</u>	
		<u>Total</u>	<u>To be analyzed</u>
<i>i.</i>	<i>Girder Bridges</i>	18	3
<i>ii.</i>	<i>Brick Arch Bridges</i>	37	5
<i>iii.</i>	<i>RCC Slab Bridges</i>	6	1
<i>iv.</i>	<i>Hume Pipe/RCC Pipe etc,</i>	21	0
<i>v.</i>	<i>Others</i>	68	0
	<i>Total</i>	150	9

6. **Sub-Clause No. 5.3.3.2:** The words “The existing bridges” are replaced with “Specified Bridges as mentioned in the Table – A”

Clause No. 5.3.4.3 (Flood Studies):

7. The word “2, 5, 10, 20, 25, 50, 100, 500, 1000 and 10,000 years return period” appearing in 4th line of sub-clause (i) is changed to “2, 5, 10, 20, 25, 50 and 100, years return period”.

Clause No. 5.3.5.8 (Data Processing & Production of Drawings):

8. The word “1:2.500” where ever appear in above said clauses is replaced with “1:2500 for Horizontal and 1:100 for Vertical”.
9. The word “1:1.000” where ever appear in above said clauses is replaced with “1:1000”.
10. The words “1:1.000 / 100” where ever appear in above said clauses is replaced with “1:1000 for Horizontal and 1:100 for Vertical”.

Clause No. 5.3.5.5 (Plan and Profile of Entire Corridor):

11. The word “1/1000” where ever appear in the above said clauses is replaced with “1/2500”

Clause No. 5.3.6.1 (Finalization of Subsurface Investigation Programme):

12. The paragraph under Clause No. 5.3.6.1 of First Part of TOR is appended with the following text.

“Geotechnical Investigations shall be carried by drilling bore holes for identification of sub soil strata, Standard Penetration Test (SPT), Rock Quality Designation (RQD) including particular locations of Bridges and tunnels. However, total length of all boreholes has been estimated as 100 meter (assuming average borehole depth as 20 meter).”

Clause No. 5.3.7 (Study for Up-gradation / Conversion of Level Crossing):

13. Following text will be added at the end of second paragraph:

“ The road traffic census is not required to be carried out for all level crossings. The minimum number of level crossings for which traffic census of 72 hours is to be carried out is specified in Table-B below”.

Table - B

<i>Section</i>	<i>Manned</i>		<i>Un-Manned</i>	
	<i>Existing</i>	<i>Minimum No. for census</i>	<i>Existing</i>	<i>Minimum No. for census</i>
<i>Quetta-Bostan</i>	<i>6</i>	<i>2</i>	<i>15</i>	<i>5</i>

Part-B (Bostan – Zhob – Kotlajam)

Clause No. 5.4.4.3 (Final Alignment plans and profiles)

14. The word “1:2,500”, in second line of first paragraph, is replaced with “1:2500 for Horizontal and 1:100 for Vertical”

Common Clauses for Part – A & B

Clause No. 5.5.2 (Rolling Stock Report):

15. The heading of the Clause is replaced with “**Train Operation and Rolling Stock**”.
16. Following text is added at the end:

“Consultant will propose an efficient Train operation plan for attaining speed and axle load parameters as specified in the Annexure-A. Consultant will not only identify the limitation of available rolling stock and locomotives (that may become hurdles for attaining desired speed and axle load) but also propose suitable new models of rolling stock and locomotives(Diesel Electric) to achieve desired speed and axle load. Broad parameter for new models of rolling stock and locomotives (Diesel Electric) must be part of this Report.

If in case the desired speed, axle load and trailing load are impossible to attain concurrently with available rolling stock and locomotives due to steep gradient, Consultant will base feasibility study on new suitable models of rolling stock and locomotives with prior approval and mutual consultation with Client.

Consultant will also study the effect of traction type i.e. Diesel Electric and Electric Traction on recurring expenditures of Train operation. On the basis of this study Consultant will propose the type of rolling stock and locomotives.

However, it is important to note here that whatever the result of this study will be, this consultancy assignment must be base upon Diesel Electric Traction”

Clause No. 5.5.6 (Preliminary Engineering Design):

17. The heading of clause is changed to “**Preparation of Feasibility study level Design of the Infrastructure**”.

18. Following text is added at the start of first paragraph:

“The word “**Preliminary**” where ever appear will be read as “**Feasibility study level**”.

Clause No. 5.5.8 (Economic & Financial Analysis)

19. Last paragraph of Clause No. 5.5.8 is deleted and replaced with the following.

“The Economic & Financial Analysis for Quetta-Bostan section shall have to be added to the revised / updated Economic & Financial Analysis Report, besides analyzing the effect of traffic influx, from CARs, on Economic and Financial viability of Quetta-Bostan-Zhob-Kotlajam and include this analysis as separate scenario in final report of Economic and Financial viability”

New Clause No. 5.5.9 (Study of Yards, Water Supply, Drainage system, Building and Boundary wall)

20. Clause No. 5.5.9 is added which states as mentioned below.

“Study of Yards, Water Supply, Drainage system, Building and Boundary wall

The Consultant shall inspect and study following aspect of all station/ yards.

- a) Remodeling of yard to cater for speed and axle load as mentioned in Annexure-A.*
- b) To check sufficiency of existing water supply source for upcoming influx of passenger and suggest alternative water supply sources to cater for additional demand.*
- c) To check adequacy of existing drainage system for not only station/yards but also for sections where the height of rail top from Natural surface level is not adequate and propose remedial measures accordingly. Consultant will propose an efficient and environment friendly waste management system for Human and Mechanical (Locomotives) waste.*

- d) *To check structural health of building and to propose retrofitting or demolition (as the case may be) and suggest new buildings keeping in view the upcoming passenger and freight influx and modern passenger amenities. It is important to mention here that while proposing new structures (service and residential buildings) care should be taken for accommodating additional staff that will be required for forecasted train operation.*
- e) *To ensure security and safety in station/yards and to restrain the tress passers, Consultant will propose the boundary wall/fence around station, yards and in the block sections using location data of tress passing obtained during Topographic survey. Consultant will also propose boundary wall/fence on those sites where potential for encroachment of railway land is high due to increasing population near railway boundaries.*

Consultant shall carryout feasibility study level design and prepare cost estimates of all above mentioned components keeping in view forecasted passenger and freight traffic influx.

New Clause No. 5.5.10 (Study report on Slip and Catch sidings)

21. Clause no. 5.5.10 states following text:

“Consultant must analyze existing catch, slip and safety sidings and prepare a comprehensive report indicating their suitability(in terms of their design and location) to cater for at least a runaway speed of 120 Km/hr keeping in view the maximum attainable speed on this section in case of failure of Brakes.”

Clause No. 5.9.1 (Detail of Deliverables):

22. Following row is added between Serial No. 8 and 9 of table of deliverables

<i>S.No</i>	<i>Description /</i>	<i>Remarks</i>
-------------	----------------------	----------------

	<i>Deliverables</i>	
8A	<i>Study of Yards, Water Supply, Drainage system, Building and Boundary wall</i>	<i>Softcopies (5 sets minimum) of all models developed in different engineering, economics and finance related soft-wares used for analysis in all the study areas of the feasibility report should be provided on CDs for detailed scrutiny in addition to .Ten (10) copies of each report with editable Soft Copy on CD/DVD</i>

23. Description of Item No. 15 is replaced with “Train operation and Rolling Stock Study Report”.

24. Description of Item No. 18 is replaced with “Feasibility study level design Report”.

Clause No. 5.10 (Mode of Payment):

25. New row with Serial No. 8A is added between Serial No. 8 and 9 and row No. 9 is modified, in table mention under the Clause No. 5.10, as follows.

S.No	Submission of Deliverables (Payment will be done after approval of Deliverables)	%age Payment
8	Report of study of up-gradation / conversion of Level Crossings	1(One) %
8A	Study of Yards, Water Supply, Drainage system, Building and Boundary wall	1(One) %

26. Description of Item No. 15 is replaced with “Train operation and Rolling Stock Study Report”.

27. Description of Item No. 18 is replaced with “Feasibility study level design Report”.

Clause No. 5.10.1 (Mobilization Advance and Retention Money):

28. Clause No. 5.10.1 is added which states that

“Mobilization Advance and Retention Money

- i). Fifteen percent (15%) Mobilization Advance may be paid to the Consultant against 100% counter Bank guarantee from any schedule bank of Pakistan. Mobilization Advance shall be recovered from interim payments on pro-rata basis.*
- ii). Five percent (5%) Retention Money will be deducted from each interim payment. Retention Money will be returned after six months of completion of the assignment.”*

Appendix-B:

29. Item at Serial No. 3 & 4 of Appendix-B is replaced with the following

3	Proposed Speed of track infrastructure (For Passenger)	160 km/h (or maximum possible speed as advised by Consultant keeping in view the constraints due to terrain.)
	(For Freight)	To be proposed by Consultant for 3400 tons trailing load
4	Axle Load	For track 25 M. Tons, For Bridges HMBG Loading

CONSULTANCY SERVICES FOR
FEASIBILITY STUDY OF RAIL LINK FROM QUETTA TO KOTLA JAM (538 KMS)
(UPDATION OF EXISTING FEASIBILITY STUDY).

Minutes of Pre-Proposal Conference

A Pre-Proposal Conference was held in the office of the Chief Engineer/ Surveys & Constructions of Pakistan Railways Headquarter, Lahore on 05-07-2017 for subject feasibility study. Following were present:

A. Pakistan Railways (PR):

- i) Chief Engineer / S&C
- ii) Deputy Chief Engineer / S&C
- iii) AEN/S&C

B. Representatives of Firms:

- i) M/s ILF (Mr. M. Aslam Anwar, Mr. Ch. Abdul Rehman, Mr. Qasim Umar)
- ii) M/s Artelia International (Mr. Shoaib Ahmed)
- iii) M/s Geometrics & Engg Services (Pvt.) Ltd. (Mr. Mir)
- iv) M/s MM Pakistan (Mr. Tariz Mehmood & Mr. Pervaz Anjum)
- v) M/s TRADIMAX Private Limited (Mr. Uzair)
- vi) M/s PRACS (Mr. Muhammad Haroon Ghouri)
- vii) M/s MECAP (Mr. Amer Niazi)
- viii) M/s JERS (Mr. Sajid)

C. Quarries and Comments

Sr.No.	Queries/Comments	Reply/Comments
1.	Mobilization advance is mentioned in the RFP but not reflected in TOR.	Mobilization advance is added in the TOR. Respective corrections are issued in the Addendum No.1.
2.	Bullet No. (iii) of Mandatory Requirement states that a professional will not be considered in the evaluation if he has already been engaged in more than 1 Consultancy assignment. It seems from statement that if professional has ever been engaged in any Consultancy assignment in his life, he will not be considered for evaluation which is not correct. It is therefore requested to issue respective corrections.	Respective corrections are issued in the Addendum No. 1.
3.	Is Bullet No. (iii) of Mandatory Requirement applied to those assignments for which all deliverable along with final feasibility study has been submitted.	No. This clause will not apply to those assignments for which all deliverables along with final feasibility study has been submitted.
4.	The scope of traffic survey that is to be carried out for conversion of level crossing is not clear in the TOR	Necessary correction has been issued through Addendum No.1.
5.	Terms of reference for Train operation study should be added with separate heading	Necessary correction has been issued through Addendum No.1.
6.	Please clarify whether cost of Rolling stock and Locomotive is included in the Economic and Financial Analysis.	Cost of Rolling stock and Locomotive should not be included in the Financial and Economic Analysis.
7.	To carry out Bridge Analysis for all bridges is not possible. Please specify bridges to be analyzed	Agreed, Analysis is to be carried out for 50 bridges of different kinds. Necessary correction has been issued through Addendum No.1.
8.	Study for water supply, Yard and Buildings should be part of same deliverable.	Agreed, Necessary correction has been issued through Addendum No.1.
9.	For some cases it is not possible to re-align track in existing corridor for attaining speeds as mentioned in the TOR. In such case if length of detouring is too large then Reconnaissance, Route Selection and Topographic Survey of new route are required which is not part of respective TOR.	If detoured route is longer than 10 Km, there is no need to carry out Reconnaissance Survey, Geotechnical Investigation, and Topographic Survey etc. However Consultant shall carry out a desk study of new proposed alignment / route indicating the probable route and other features for this route including approximate

Sr.No.	Queries/Comments	Reply/Comments
		cost implication and other significant features for decision making by the Client. If detailed study of new route is required by the Client same shall be treated as additional services.
10.	Length of Geotechnical Investigation is not mentioned in the TOR.	Necessary correction has been issued through Addendum No.1 .
11.	Are 3D scanners for Topographic survey allowed?	If requirements of TOR are not violated, Client has no observation for using 3D scanners in Topographic survey.
12.	Completion period is not sufficient for subject assignment.	Completion period is 8 months which is considered sufficient for carrying out subject assignment. Necessary correction has been issued through Addendum No.1 .
13.	Underpass and up-gradation of un-manned level crossings into manned level crossing besides shifting." Please clarify if the up-gradation of un-manned level crossings to manned level crossings is correct.	Yes, Consultant will carry out traffic survey and will propose conversion of un-manned level crossing to manned level crossing if required.
14.	"The Consultant shall perform the preliminary engineering design work. This design must include preliminary design of Track Structure along with preliminary design of retrofitting..." Please clarify, if the conceptual design is already finished and how it will be provided to the consultant.	It is not preliminary design. Necessary correction has been issued through Addendum No.1 . There is no Conceptual Level design available with the Client. Preparation of Feasibility study level design is part of this assignment
15.	"This design must include preliminary design of Track Structure along with preliminary design of retrofitting of existing bridges and preliminary design for Construction of new bridges." Please confirm that the consultant has to provide preliminary design within the feasibility study.	Preparation of Feasibility study level design is part of this assignment
16.	Please confirm that the consultant has to provide preliminary design for all bridges including surveys and provide information where such data are not available.	Preparation of Feasibility study level design is part of this assignment

Sr.No.	Queries/Comments	Reply/Comments
17.	<p>"Rainfall frequency analysis will be carried out for all stations which will be required for the estimation of flood values corresponding to various return periods. For this purpose, one day maximum rainfalls of each year will be used. Rainfalls corresponding to 2, 5, 10, 20, 25, 50, 100, 500 and 1000 years return period will be computed using five flood frequency distribution..."</p> <p>Please confirm that the rainfall frequency analysis has to take into account up to 1,000 years return period.</p>	<p>Rainfall corresponding to 2, 5, 10, 20, 25, 50, 100 year return period is sufficient. Necessary correction has been issued through Addendum No.1</p>
18.	<p>"For the purpose of Technical Evaluation, with a view to compare the cost of projects executed by the Consultants with this Consultancy assignment, the estimated cost of this consultancy assignment shall be considered as Rs. 120 Million."</p> <p>Please confirm that the estimated cost of this consultancy assignment shall be considered as Rs. 120 Million. How we have to interpret the available budget, for instance budget for bridge report (5% of Rs.120 Million = 6 Million) with the number of bridges (484) for which services has to be provided</p>	<p>Rupees 120 Million is not cost of assignment. This value is only for the sake of Technical Evaluation. This amount will only be used to evaluate financial out lay of Consultant's Experience.</p>
19.	<p>"Geotechnical Investigations shall be carried by drilling bore holes for identification of sub soil strata, Standard Penetration Test (SPT), Rock Quality Designation (RQD) at approximate (average) intervals of 5 km including particular locations of Bridges and tunnels. However, total length of all boreholes has been estimated as 600 meter (assuming average borehole depth as 20 meter)."</p> <p>Please advise how the consultant has to interpret the number of boreholes (30 boreholes) fit together with the length of the Project and number of bridges and tunnels.</p>	<p>At feasibility study level, detailed Geotechnical Investigation of whole section is not required. The given length of Bore hole is only for those spots where, in Consultant's opinion soil investigation is inevitable due to poor soil condition.</p> <p>It is wise to carry out geotechnical investigation for a particular section at the existing bridges or tunnels however if it is not possible then Geotechnical parameters for bridges & tunnels should be assumed as nearest borehole imply.</p>
20.	<p>"The Consultant will prepare the the tender level design. The tender design will be</p>	<p>Preparation of Feasibility study level design is part of this assignment</p>

Sr.No.	Queries/Comments	Reply/Comments
	sufficiently detailed to form the basis of the Construction design later on." Please confirm that the consultant has to provide tender design within the feasibility study.	
21.	Total 20 boreholes with approximate depth of each boreholes as 20 meter are proposed for soil investigations, the locations shall be decided in consultation with the Client." Please advise how we have to interpret the number of boreholes (20 boreholes) fit together with the length of the project and number of bridges and tunnels.	Location will be decided in Consultation with the successful Consultants.
22.	"Time for completion of the assignment shall be Eight (08) months after the mobilization period." Please can you confirm that the estimated time for completion of the assignment shall be Eight (08) months. How the consultant has to interpret the available time? For instance budget for bridge analysis report (8 Experts for 8 months ~ 1400 working days) with the number of bridge (768) for which survey, a preliminary design including finite element analysis to be provided by the consultant. This would less then 2 days for one bridge.	Completion period can't be enhanced at this stage.
23.	Due to the actual safety situation in Pakistan, please provide further information about, how the consultant can deliver the consultancy assignments without exposing our employees to unacceptable risks.	Client will provide full assistance to Successful Consultant for acquiring security from Security agencies. However Client will not take any responsibility in this regard.
24.	Item (1) b) of Appendix-I to data sheet - Value of Similar Assignment. At the end of the existing definition please add the words "Rs. 120 million or more", to bring it in conformance with the corresponding provision under Appendix-I to the Data Sheet.	It is not required.
25.	ITC Clause 2.15.2 - Payment of Consultancy & Services Fee According to the above quoted clause of the Instructions to Consultants: "15% Mobilization Advance	Mobilization advance is added in the TOR. Respective corrections are issued in the Addendum No.1.

Sr.No.	Queries/Comments	Reply/Comments
	<p>can be paid to the Consultant against 100% counter bank guarantee from any scheduled bank of Pakistan. In case of any guarantee from foreign bank same must be counter guaranteed by any scheduled bank of Pakistan. Mobilization Advance shall be recovered from interim payment on pro-rata basis". The above stated provision has however, not been included in the corresponding Clause 5.10 of the TOR-Mode of Payment. Since Instruction to Consultants does not form part of the Contract documents, the above stated provision may also please be added under Clause 5.10 of the TOR.</p>	
26.	<p>Clauses 5.5.2 of the TOR: Rolling Stock Study Report. In the deliverables, according to TOR only "Rolling Stock Study Report" is to be submitted and there is no mention of Train Operation which is an important subject for assessing the time and distance taken to achieve speed of 160 kmph and accordingly the journey time, number of trains, requirement of loco and rake links etc. to finally work out the number of locomotives and rolling stock. The deliverable may be accordingly named as "Train Operation and Rolling Stock Study Report" and scope of work amended in the light of the same.</p>	<p>Suggestion is acceptable and necessary amendments will be issued through Addendum No. 1.</p>
27.	<p>Appendix-B: Track Parameters i. In Appendix-B item 3, 160km/h has been proposed as speed of track infrastructure (freight). Please reconfirm this requirement. ii. In Appendix-B item 15 is has been indicated that "Consultant will suggest type of traction i-e diesel or electric. For electric traction, location of power stations must also be included in the respective report". It is itself a vast subject and which deliverable will contain this subject has not been shown. It is believed that it is a part of train operation and rolling stock report.</p>	<p>Necessary amendments will be issued through Addendum No. 1.</p>
28.	<p>Clauses 5.5.7 of the TOR: Cost Estimates.</p>	<p>The cost of Locomotive and Rolling</p>

Sr.No.	Queries/Comments	Reply/Comments
	In one of the previous studies it was suggested that since the locomotives and rolling stock would be utilized from the available fleet their cost may not be included in the Cost Estimates. Kindly clarify the same for this project also.	Stock should be included separately in Cost Estimate but should not be included in the Financial Analysis.
29.	<p>Clause 5.3.5.5 of the TOR - Plan and Profile of the entire corridor As per above stated clause of the TOR, the cross sections of railway embankment and profile shall be run at not more than 200 meters intervals and the Consultants shall prepare longitudinal profile at the center of the existing track and center of new alignment (where applicable) to be plotted on 1/1000 horizontal and 1/100 vertical scale. It was noticed by us during the plotting the above referred longitude profile on earlier projects that at the horizontal scale of 1/1000 only one cross section for profile leveling could be accommodated in one A3 sheet, and thus proper / meaningful longitudinal profile could not be drawn. In the circumstances, to ensure the plotting of a meaningful longitudinal profile the horizontal scale had to be reduced to 1/2500 so that at least three longitudinal profile readings at interval of 200m could be accommodated on one A3 sheet. Same 1:2500 scale has been mentioned under clause 5.4.4.3 of the TOR for Part B Bostan-Zhob-D.I.Khan-Kotla Jam Section. The existing sub-clause of the TOR may accordingly be replaced as under: "Consultants shall also prepare Longitudinal profile at the center of the existing track and center of new alignment (where application) to be plotted on 1/2500 horizontal and 1/100 vertical scale"</p>	Necessary amendments will be issued through Addendum No. 1.
30.	<p>Clause 5.3.5.8 of the TOR: Data Processing & Production of Drawings It has been specified in the above referred clause that "the layouts were prepared on scale 1:2.500 for the entire alignment and 1:1.000 for station areas. For major crossing</p>	Necessary amendments will be issued through Addendum No. 1.

Sr.No.	Queries/Comments	Reply/Comments
	<p>of roads and highways longitudinal profiles at scale 1:1.000/100 will be submitted. All drawings will be prepared in A3 format." To ensure the plotting of meaningfully plan & Profile it is suggested that existing track and center of new alignment (where application) to be plotted on 1/2500 horizontal and 1/100 vertical scale.</p>	
<p>31.</p>	<p>Clause 5.3.3.2 of the TOR: Structural Analysis of Selected Bridges i. Scope of work given in the above stated clause of the TOR states that "Based on the bridge data, provided by Client and field survey, fully integrated models of bridge shall be developed and analyzed by the Consultant for both super structure and sub structure." If the exiting steel girders are to be analyzed, the present scope needs elaboration, because these girders have been manufactured/ fabricated/ strengthened by Pakistan Railways from the structural steel sections procured by them according to their own specifications and is based on Steel Bridge Code, which is presumably more than 70 years old. On the contrary most of the available international codes of practice and the software used for analysis of steel girders/trusses are based on new researches on the design of steel structures and different standard steel sections. ii. Scope of services given in the above stated clause of the TOR states that "The Consultant shall carryout detailed structural analysis of all the bridges on the basis of data provided by Client and field survey." Based on our experience from previous projects, sub-structure drawings for most of the bridges are not available with Pakistan Railways so it is suggested that it should clearly be specified that structural analysis of the bridges for which structural drawings (sub structure & Super structure) are provided by Pakistan Railways is to be carried out.</p>	<p>Necessary amendments will be issued through Addendum No. 1.</p>

Sr.No.	Queries/Comments	Reply/Comments
32.	<p>Clause 5.3.6 of the TOR: Geological and Geo-technical Investigations The total length of drilling and the number of test pits have not been mentioned anywhere in the document. The same should be mentioned to so that all the bidders are on the same page for the preparation of Financial Proposals.</p>	<p>Necessary amendments will be issued through Addendum No. 1.</p>



PAKISTAN RAILWAYS

Headquarters Office, Lahore

REQUEST FOR PROPOSAL (RFP) FOR APPOINTMENT OF NATIONAL/INTERNATIONAL CONSULTANTS

- 1. Feasibility study of up-gradation of existing railway line from Rohri to Kohi-Taftan via Quetta including the realignment of Sibi- Spezand section (1022 kms).**
- 2. Feasibility study of rail link from Quetta to Kotla jam (538 kms) (Updation of existing feasibility study).**

Pakistan Railways intends to hire the services of reputed Consultants or consortium of Consultants, for carrying out following Feasibility Studies.

1. Feasibility study of up-gradation of existing railway line from Rohri to Kohi-Taftan via Quetta including the realignment of Sibi- Spezand section (1022 kms).
2. Feasibility study of rail link from Quetta to Kotla jam (538 kms) (Updation of existing feasibility study).

Above mentioned studies will be dealt as separate Consultancy assignments. The interested firms can download RFP documents of each assignment from Pakistan Railways website (**www.Pakrail.com**) or PPRA website (**www.ppra.org.pk**) consisting of TOR, consultant's evaluation criteria and format of Technical & Financial proposals for this project.

Interested National/International leading Consulting firms or Joint Ventures having international experience of carrying out Feasibility Studies particularly in Railway Sector are invited to participate for the bidding of this project.

Technical and financial proposals shall be submitted in TWO separate envelopes.

A pre-proposal conference for both assignments shall be held on **5th July, 2017** at **02:00 pm** at under mentioned address for which prospective Consultants are requested to attend. Any further information can be obtained from the office of undersigned or through email **censc@pakrail.com**.

The prospective consultants will submit their proposals only on prescribed format, at following address on or before **7th August, 2017** up to **2:00 pm**. Technical proposals will be opened on same date and venue at **2:30 pm** in the presence of representative of firms, who choose to witness.

Basharat Waheed

Chief Engineer (Surveys & Constructions)
Pakistan Railways, Headquarters Office,
Empress Road, Lahore.
Ph.(042) 99201625, Fax (042) 99201760

Email: censc@pakrail.com



Pakistan RAILWAYS

Request for proposal (RFP)

For

**FEASIBILITY STUDY OF RAIL LINK FROM QUETTA TO KOTLA
JAM
(Approx. 538 km)**

(UPDATION OF EXISTING FEASIBILITY STUDY)

JUNE, 2017

**Chief Engineer / Survey & Construction
Headquarters Office
Lahore, Pakistan.
Ph: +92-42-9201625 Fax: +92-42-9201760**

CONTENTS

1	SECTION 1: INVITATION FOR RFP	- 1 -
1.1	General Information	- 3 -
1.2	Form General-1 – Basic Information	- 4 -
1.3	Form General-2 - Litigation History	- 5 -
2	SECTION 2: INSTRUCTIONS TO CONSULTANTS	- 6 -
2.1	Definitions	- 6 -
2.2	Introduction	- 7 -
2.3	Conflict of Interest	- 8 -
2.4	Conflicting activities	- 8 -
2.5	Conflicting assignments	- 9 -
2.6	Conflicting relationships	- 9 -
2.7	Unfair Advantage	- 10 -
2.8	Fraud and corruption	- 10 -
2.9	Only one Proposal	- 12 -
2.10	Proposal Validity	- 12 -
2.11	Clarification and Amendment of RFP Documents	- 12 -
2.12	Preparation of Proposal	- 13 -
2.13	Technical Proposal Format and Content	- 13 -
2.14	Financial Proposal	- 15 -
2.15	Payment of Consultancy & Services Fee	- 15 -
2.16	Taxes	- 15 -
2.17	Submission, Receipt and Opening of Proposal	- 16 -
2.18	Proposal evaluation	- 17 -
2.19	Evaluation of Technical Proposal	- 17 -
2.20	Public Opening and evaluation of financial proposals	- 18 -
2.21	Technical Negotiations	- 19 -

2.22	Availability of professional staff / experts	- 19 -
2.23	Conclusion of the negotiations	- 20 -
2.24	Award of Agreement	- 20 -
2.25	Confidentiality	- 20 -
2.26	Integrity Pact	- 21 -
2.27	Registration of Foreign Firms with Pakistan Engineering Council (PEC)	- 21 -
2.28	Bankable Feasibility Study	- 21 -
2.29	Time for Completion	- 21 -
3	SECTION 3: TECHNICAL PROPOSAL – STANDARD FORMS	- 31 -
3.1	Form Tech-2 Consultant’s Organization and Experience	- 33 -
3.2	Form Tech-2 Consultant’s Organization And Experience	- 34 -
3.3	Form Tech-3	- 35 -
3.4	Form Tech-4 Description Of Approach, Methodology And Work Plan For Performing The Assignment	- 36 -
3.5	Form Tech – 5 Composition of Professional Staff Team To Be Deployed For this Assignment And Task Assigned	- 37 -
3.6	Form Tech-6 Curriculum Vitae (CV) Of Proposed Professional Staff	- 38 -
3.7	Form Tech-8 Financial Capabilities	- 43 -
4	SECTION 4: FINANCIAL PROPOSAL - STANDARD FORMS	- 44 -
4.1	Form Fin-2 Summary of Costs	- 46 -
4.2	Form Fin-3 Breakdown of Cost for Local Component And Foreign Remittance	- 47 -
4.3	Form Fin-4 Breakdown of Remuneration of Staff Deployed For Feasibility Study	- 48 -
4.4	Form Fin-5 Breakdown Of Reimbursable Expenses	- 49 -
5	TERMS OF REFERENCE (TOR)	- 52 -
5.1	Project Background	- 52 -
5.2	Objectives of the Feasibility Study	- 53 -
5.3	Scope of Services- Part A: Quetta-Bostan Section	- 54 -
5.3.1	Data / Information to be provided by the Client	- 57 -

5.3.2	Preparation & Submission of Track Condition Survey Report	- 59 -
5.3.3	Bridge Analysis for Extension / Reconstruction of Bridges.	- 60 -
5.3.4	Hydrological Studies.	- 62 -
5.3.5	Topographic Survey / Plan & Profile of the Entire Corridor	- 65 -
5.3.6	Geological and Geo-technical Investigations.	- 71 -
5.3.7	Study for Up-gradation/conversion of Level Crossings	- 80 -
5.3.8	Easement of sharp curves and grades (where possible) to achieve the design speed	- 80 -
5.4	Scope of Services-Part B Bostan-Zhob-D.I. Khan-Kotla Jam Section	- 81 -
5.4.1	Selection of the Alignment	- 81 -
5.4.2	Re-design of Alignment for 160 km/hr	- 83 -
5.4.3	Topographic Survey Up-dation / Revalidation.	- 84 -
5.4.4	Design of the Selected Railway Alignment	- 88 -
5.4.5	Up-dation / revalidation of Geotechnical and Geological Study	- 90 -
5.4.6	Up-dation / re-validation of Hydrological Study Report	- 91 -
5.4.7	Up-dation of Environmental Impact Assessment (EIA) Report	- 91 -
5.5	Scope of Services-Part A&B Quetta-Bostan-Zhob-D.I. Khan-Kotla Jam Section-	92 -
5.5.1	Study for improvement of Signalling and Telecommunication System	- 92 -
5.5.2	Rolling Stock Report	- 93 -
5.5.3	Passenger & Freight Traffic forecasting	- 94 -
5.5.4	Estimating Land Requirements	- 98 -
5.5.5	Electric Power Study Report and Improvement of the Existing Electric Power Supply on Quetta-Bostan Section	- 98 -
5.5.6	Preliminary Engineering Design	- 99 -
5.5.7	Preparation of Cost Estimates	- 101 -
5.5.8	Economic & Financial Analysis	- 102 -
5.6	Draft Feasibility Report	- 106 -
5.7	Final Feasibility Report	- 106 -
5.8	Time for Completion	- 106 -

5.9	Deliverables	- 106 -
5.9.1	Detail of Deliverables	- 106 -
5.9.2	Approval of Inception Report	- 107 -
5.10	Mode of Payment	- 107 -
5.11	Provision of Transport to Client:	- 109 -
5.12	Time for Completion of Assignment	- 109 -
5.13	General Requirements	- 109 -
5.13.1	Integrity Pact	- 109 -
5.13.2	Registration of Foreign Firms with Pakistan Engineering Council (PEC)	- 109 -
5.13.3	Security:	- 109 -

1 SECTION 1: INVITATION FOR RFP

No. 844-W/455(S&C) Tender

Date: _____, 2017

SUBJECT: FEASIBILITY STUDY OF RAIL LINK FROM QUETTA TO KOTLA JAM (Approx. 538 km), (UPDATION OF EXISTING FEASIBILITY STUDY)

The Chief Engineer/Survey & Construction (S&C) invites Technical and Financial proposals to provide the following consultancy services:

Feasibility Study of Rail Link from Quetta to Kotla Jam (Approx. 538km)
(Up-dation of Existing Feasibility Study)

Consultants will be selected under Selection Method: Quality and Cost Based Selection (QCBS) as described in this RFP in accordance with PPRA Rule 2004 and PPRA Procurement of Consultancy Services Regulations 2010.

The RFP includes the following documents:

- Section 1: General Information
- Section 2: Instructions to Consultants (including Data Sheet)
- Section 3: Technical Proposal – Standard Forms
- Section 4: Financial Proposal – Standard Forms
- Section 5: Terms of Reference

It is mandatory for proposals to be prepared using Standard Forms of RFP. Any proposal not prepared according to prescribed format may be rejected. If any information required in the Forms is found missing or written elsewhere, no credit will be given in the relevant section of the evaluation.

The Consultants / Firms should submit details of **Five (5)** of their most relevant assignments of similar projects for technical evaluation using the prescribed format. Assignment (s) given beyond the given number will not be considered.

CVs of key personnel corresponding to the list given in Data Sheet should provide details of **Five (5)** projects done by each individual in the past.

The Consultant can be single entity or Joint Venture / Consortium of International and national firms, with total number of firms in JV not more than three.

The Technical and Financial proposals are to be submitted in separate sealed envelopes at following address not later than, **2017 till 2:00 pm.**

(Basharat Waheed)
Chief Engineer / S&C
Pakistan Railways, Headquarter Office
Lahore.
042 – 99201776
Email: censc@pakrail.com

1.1 General Information

The Consultants are required to provide following information which is necessary for further processing of the proposals:

Applied as Single Entity or Joint Venture, please specify.

In case of Single Entity specify the name of Firm and provide the information as per prescribed Form **General-1** attached.

In case of Joint Venture provide the following information for each partner, as well as that prescribed in attached Form **General-1** for all JV partners.

S.No.	Name of JV partners	% share proposed for this assignment
1.	Lead Partner	
2.	Partner No.1	
3.	Partner No.2	

The Consultants are required to provide accurate information on any litigation or arbitration, arising out of the assignments completed or in progress over the last five years in the manner as prescribed in the Form **General-2**

Certificate / affidavit that the Firm is not blacklisted by any government department / authority.

For local firms National Income Tax number (NTN) of Pakistan and for foreign firms Tax Registration Number of parent country.(please attach copies of valid registration)

For local firms Registration with Pakistan Engineering Council (PEC) and for foreign firms relevant registration with relevant engineering bodies of parent country. (please attach copies of valid registration)

Last three years audited reports of accounts of the firm.

Power of attorney to sign the proposals.

Joint Venture agreement (if applicable).

1.2 Form General-1 – Basic Information

Name of Firm.

Office address in Pakistan.

Office address overseas (if applicable).

Organization Chart.

Telephone & Fax

e-mail

Contact person

Place of incorporation / registration

Year of incorporation / registration

Country of origin (if other than Pakistan)

Type of organization (whether partnership / sole proprietorship / public limited company / private limited company (Attach copy of Memorandum of Article, Memorandum of Association and registration certificate with Security Exchange or Registrar of Firm)

In case of JV above information should be provided for all partners.

1.3 Form General-2 - Litigation History

Consultants, including each of the partners of a joint venture, should provide information on any history of litigation or arbitration resulting from contracts executed in the last five years or currently under execution. A separate sheet should be used for each partner of joint venture.

Party / Parties of the claim / dispute	Nature of Claim / Dispute	Amount of the claim / dispute.	Date initiated	Status (Award FOR or AGAINST Consultant)

2 SECTION 2: INSTRUCTIONS TO CONSULTANTS

2.1 Definitions

“Government of Pakistan” means the Government of Pakistan and all its associated departments, agencies, autonomous/semi- autonomous bodies, boards, universities and similar other organizations.

“Client” means Chief Engineer / S&C, Pakistan Railways, Headquarter Office, Lahore.

“Consultants” means any entity / firm / Joint venture of firms that may provide the Services to the Client under the Agreement. The Consultant can be single entity or Joint Venture / consortium of International and national firms, with total number of firms in JV not more than three.

“Agreement” means the Agreement signed by the Client and the Consultants and all the attached documents.

“Data Sheet” means such part of the Instructions to Consultants used to reflect specific conditions.

“Day” means calendar day.

“Instructions to Consultants” means the document which provides Consultants with all information needed to prepare their Proposals.

“Personnel” means professionals and support staff provided by the Consultant or by any Sub-Consultant and perform the Services or any part thereof; “Foreign Personnel” means such professionals and support staff who at the time of being so provided had their domicile outside Pakistan; ‘Local Personnel” means such professionals and support staff who at the time of being so provided had their domicile inside Pakistan.

“Proposal” means the Technical Proposal and the Financial Proposal.

“RFP” means the Request for Proposal issued by the Client for the selection of Consultants.

2.1.11“Services” means the work to be performed by the Consultants pursuant to the Agreement.

“Sub-Consultant” means any person or entity with whom the Consultants enter into sub-agreement(s) for any part of the Services.

“Terms of Reference” (TOR) means the document included in the RFP which explains the objectives, scope of work, activities, tasks to be performed, respective responsibilities of the Client and the Consultant, and expected results and deliverables of the assignment.

“Similar Assignment” means Feasibility Study for establishing new route(s) for railway track or feasibility study for up-gradation / improvement of existing railway track

2.2 Introduction

2.2.1 The Client named in the Data Sheet will select a consulting firm/organization (the Consultants) in accordance with the method of selection specified in the Data Sheet. The Consultant can be single entity or Joint Venture / consortium of International and national firms, with total number of firms in JV not more than three.

2.2.2 The Consultants are invited to submit a Technical Proposal and a Financial Proposal for consulting services required for the assignment named in the Data Sheet. The proposals should be in separate marked and sealed

envelopes. The Proposal will be the basis for agreement negotiations and ultimately for a signed Agreement with the selected Consultants.

2.2.3 Consultants should familiarize themselves with assignment conditions and take them into account in preparing their Proposals. To obtain first-hand information on the assignment, Consultants are encouraged to visit the Client before submitting a proposal and to attend a pre-proposal conference as per schedule specified in Data Sheet.

2.2.4 Consultants should contact the Client's representative named in the Data Sheet to obtain information regarding the assignment. Consultants should ensure the official is informed well- ahead of time in case they wish to visit the Client.

2.2.5 Consultants shall bear all costs associated with the preparation and submission of their proposals and agreement negotiation. The Client is not bound to accept any proposal, and reserves the right to annul the selection process at any time prior to Agreement award, without thereby incurring any liability to the Consultants.

2.3 Conflict of Interest

2.3.1 Government of Pakistan policy requires that Consultants provide professional, objective, and impartial advice and at all times hold the Client's interests paramount, strictly avoid conflicts with other assignments or their own corporate interests and act without any consideration for future work.

2.3.2 Without limitation on the generality of the foregoing, Consultants, and any of their affiliates, shall be considered to have a conflict of interest and shall not be recruited, under any of the circumstances set forth below:

2.4 Conflicting activities

2.4.1 A firm that has been engaged by the Client to provide goods, works or services other than consulting services for a project, and any of its affiliates, shall be disqualified from providing consulting services related to those goods, works or services. Conversely, a firm hired to provide consulting services for the preparation or implementation of a project, and any of its affiliates, shall be disqualified from subsequently providing goods or works or services other than consulting services resulting from or directly related to the firm's consulting services for such preparation or implementation. For the purpose of this paragraph, services other than consulting services are defined as those leading to a measurable physical output, for example surveys, exploratory drilling, aerial photography, and satellite imagery.

2.5 Conflicting assignments

2.5.1 A Consultant (including its Personnel and Sub- Consultants) or any of its affiliates shall not be hired for any assignment that, by its nature, may be in conflict with another assignment of the Consultant to be executed for the same or for another Client. For example, a Consultant hired to prepare engineering design for an infrastructure project shall not be engaged to prepare an independent environmental assessment for the same project, and a Consultant assisting a Client in the privatization of public assets shall neither purchase, nor advise purchasers of, such assets. Similarly, a Consultant hired to prepare Terms of Reference for an assignment should not be hired for the assignment in question.

2.6 Conflicting relationships

2.6.1 A Consultant (including its Personnel and Sub- Consultants) that has a business or family relationship with a member of the Client's staff who is directly or indirectly involved in any part of (i) the preparation of the Terms of Reference of the assignment, (ii) the selection process for such assignment, or (iii) supervision of the Agreement, may not be awarded an Agreement, unless the conflict stemming from this relationship has been

resolved in a manner acceptable to the Pakistan Railways throughout the selection process and the execution of the Agreement.

2.6.2 Consultants have an obligation to disclose any situation of actual or potential conflict that impacts their capacity to serve the best interest of their Client, or that may reasonably be perceived as having this effect. Failure to disclose said situations may lead to the disqualification of the Consultant or the termination of its Agreement.

2.6.3 No agency (except any subsidiary of the Client) or current employees of the Client shall work as Consultants under their own ministries, departments or agencies. Recruiting former government employees of the Client to work for their former ministries, departments or agencies is acceptable provided no conflict of interest exists. When the Consultant nominates any government employee as Personnel in their technical proposal, such Personnel must have written certification from their government or employer confirming that they are on leave without pay from their official position and allowed to work full-time outside of their previous official position. Such certification shall be provided to the Client by the Consultant as part of his technical proposal.

2.7 Unfair Advantage

2.7.1 If a Consultant could derive a competitive advantage from having provided consulting services related to the assignment in question, the Client shall make available to all applicants together with this RFP all information that would in that respect give such Consultant any competitive advantage over competing Consultants.

2.8 Fraud and corruption

2.8.1 The Pakistan Railways requires Consultants participating in its projects to adhere to the highest ethical standards, both during the selection

process and throughout the execution of an agreement. In pursuance of this policy, Pakistan Railways:

a) defines, for the purpose of this paragraph, the terms set forth below as follows:

“corrupt practice” means the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence the action of a public official in the selection process or in agreement execution;

“fraudulent practice” means a misrepresentation or omission of facts in order to influence a selection process or the execution of a agreement;

“collusive practices” means a scheme or arrangement between two or more consultants with or without the knowledge of the Client, designed to establish prices at artificial, noncompetitive levels;

“Coercive practices” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in procurement process, or affect the execution of agreement.

b) will reject a proposal for award if it determines that the Consultant recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive or coercive practices in competing for the agreement in question;

c) will penalize a Consultant, including declaring the Consultant ineligible, either indefinitely or for a stated period of time, to be awarded a Government of Pakistan agreement if at any time it determines that the Consultant has, directly or through an agent, engaged in corrupt, fraudulent, collusive or coercive practices in competing for, or in executing, a Government of Pakistan agreement; and

d) will have the right to require that a provision be included requiring Consultants to permit the Government of Pakistan to inspect their accounts and records and other documents relating to the submission of proposals and agreement performance, and have them audited by auditors appointed by the Government of Pakistan.

e) Consultants, their Sub-Consultants, and their associates shall not be under a declaration of ineligibility for corrupt and fraudulent practices issued by the Government of Pakistan.

2.9 Only one Proposal

2.9.1 Each Consultants / JV can submit only one proposal. If a Consultant submits or participates in more than one proposal, all such proposals, in which the Consultants have participated, shall be disqualified.

2.10 Proposal Validity

2.10.1 The Data Sheet indicates how long Consultants' Proposals must remain valid after the submission date. During this period, Consultants shall maintain the availability of Professional staff nominated in the Proposal. The Client will make its best effort to complete negotiations within this period. Should the need arise, however, the Client may request Consultants to extend the validity period of their proposals. Consultants who agree to such extension shall confirm that they maintain the availability of the Professional staff nominated in the Proposal, or in their confirmation of extension of validity of the Proposal, Consultants could submit new staff in replacement, who would be considered in the final evaluation for agreement award. Consultants who do not agree, have the right to refuse to extend the validity of their Proposals.

2.11 Clarification and Amendment of RFP Documents

2.11.1 Consultants may request a clarification of any of the RFP documents up to the number of days indicated in the Data Sheet before the

proposal submission date. Any request for clarification must be sent in writing, or by standard electronic means to the Client's address indicated in the Data Sheet. The Client will respond in writing, or by standard electronic means and will send written copies of the response (including an explanation of the query but without identifying the source of inquiry) to all Consultants. Should the Client deem it necessary to amend the RFP as a result of a clarification, it shall do so following the procedure as stated in para below.

2.11.2 At any time before the submission of Proposals, the Client may amend the RFP by issuing an addendum in writing or by standard electronic means. The addendum shall be sent to all Consultants and will be binding on them. Consultants shall acknowledge receipt of all amendments. To give Consultants reasonable time in which to take an amendment into account in their Proposals the Client may, if the amendment is substantial, extend the deadline for the submission of Proposals.

2.12 Preparation of Proposal

2.12.1 The Proposal, as well as all related correspondence exchanged by the Consultants and the Client, shall be written in the language (s) specified in the Data Sheet.

2.12.2 In preparing their Proposal, Consultants are expected to examine in detail the documents comprising the RFP. Material deficiencies in providing the information requested may result in rejection of a Proposal.

2.13 Technical Proposal Format and Content

2.13.1 The Technical Proposal shall provide the information indicated in the following paras from (a) to (g) using the attached Standard Forms (Section 3).

a) A brief description of the Consultants' organization and an outline of recent experience of the Consultants (each partner in case of joint venture)

on assignments of a similar nature is required in Form TECH-2 of Section 3. For each assignment, the outline should indicate the names of Sub-Consultants/ Professional staff who participated, duration of the assignment, agreement amount, and Consultant's involvement. Information should be provided only for those assignments for which the Consultant was legally engaged by the Client as a firm or as one of the major firms within a joint venture. Assignments completed by individual Professional staff working privately or through other consulting firms cannot be claimed as the experience of the Consultant, or that of the Consultant's associates, but can be claimed by the Professional staff themselves in their CVs. Consultants should be prepared to substantiate the claimed experience if so requested by the Client.

b) Comments and suggestions on the Terms of Reference including workable suggestions that could improve the quality/ effectiveness of the assignment; (TECH-3 of Section 3).

c) A description of the approach, methodology and work plan for performing the assignment covering the following subjects: technical approach and methodology, work plan, and organization and staffing schedule. Guidance on the content of this section of the Technical Proposals is provided under Form TECH-4 of Section 3.

d) The list of the proposed Professional staff team by area of expertise, the position that would be assigned to each staff team member, and their tasks (Form TECH-5 of Section 3).

e) CVs of the Professional staff signed by the staff themselves or by the authorized representative of the Professional Staff (Form TECH-6 of Section 3) along with their Computerized National Identity Card numbers (if local) or Passport numbers (if foreigner).

f) Estimates of the staff input needed to carry out the assignment (Form TECH-7 of Section 3). The staff- months input should be indicated separately for home office and field activities.

2.13.2 The Technical Proposal shall not include any financial information. A Technical Proposal containing financial information may be declared non responsive.

2.14 Financial Proposal

The Financial Proposal shall be prepared using the attached Standard Forms (Section 4). It shall list all costs associated with the assignment.

2.15 Payment of Consultancy & Services Fee

2.15.1 The amount of remuneration will be claimed / paid as per the relevant clause of section-5 TOR.

2.15.2 15% Mobilization Advance can be paid to the Consultant against 100% counter bank guarantee from any scheduled bank of Pakistan. In case of any guarantee from foreign bank same must be counter guaranteed by any scheduled bank of Pakistan. Mobilization Advance shall be recovered from interim payments on pro-rata basis.

2.15.3 5% Retention Money will be deducted from each interim/monthly payment. Retention Money will be returned after six months of completion of the assignment.

2.15.4 The Client shall make all payments to the Consultant in Pak Rupees. However, the Client shall have no objection and shall facilitate the remittance in foreign currency of the remuneration of the foreign partner to the extent of services rendered by it with regard to this consultancy assignment.

2.16 Taxes

2.16.1 The Consultant may be subject to local taxes on amounts payable by the Client under the Agreement. The Client will state in the Data Sheet if the Consultant is subject to payment of any taxes. Payment of all taxes shall be the responsibility of the consultant.

2.17 Submission, Receipt and Opening of Proposal

2.17.1 The original proposal (Technical Proposal and Financial Proposal) shall contain no interlineations or overwriting, except as necessary to correct errors made by the Consultants themselves. The person who signed the proposal must initial such corrections. Submission letters for both Technical and Financial Proposals should respectively be in the format of TECH-1 of Section 3, and FIN-1 of Section 4.

2.17.2 An authorized representative of the Consultants shall initial all pages of the original Technical and Financial Proposals. The authorization shall be in the form of a written power of attorney accompanying the Proposal or in any other form demonstrating that the representative has been duly authorized to sign. The signed Technical and Financial Proposals shall be marked "ORIGINAL".

2.17.3 The Technical Proposal shall be marked "ORIGINAL" or "COPY" as appropriate. The Technical Proposals shall be sent to the addresses referred to in para 2.17.5 and in the number of copies indicated in the Data Sheet. All required copies of the Technical Proposal are to be made from the original. If there are discrepancies between the original and the copies of the Technical Proposal, the original governs.

2.17.4 The original and all copies of the Technical Proposal shall be placed in a sealed envelope clearly marked "TECHNICAL PROPOSAL" Similarly, the original Financial Proposal shall be placed in a sealed envelope clearly marked "FINANCIAL PROPOSAL" followed by the name of the assignment, and with a warning "DO NOT OPEN WITH THE TECHNICAL

PROPOSAL.” The envelopes containing the Technical and Financial Proposals shall be placed into an outer envelope and sealed. This outer envelope shall bear the submission address and title of the Assignment, clearly marked “DO NOT OPEN, EXCEPT IN PRESENCE OF THE OFFICIAL APPOINTED, BEFORE SUBMISSION DEADLINE”. The Client shall not be responsible for misplacement, losing or premature opening if the outer envelope is not sealed and/or marked as stipulated. This circumstance may be case for Proposal rejection. If the Financial Proposal is not submitted in a separate sealed envelope duly marked as indicated above, this will constitute grounds for declaring the Proposal non-responsive.

2.17.5 The Proposals must be sent to the address/addresses indicated in the Data Sheet and received by the Client not later than the time and the date indicated in the Data Sheet, or any extension granted thereof. Any proposal received by the Client after the deadline for submission shall be returned unopened.

2.17.6 The Client shall open the Technical Proposal immediately after the deadline for their submission. The envelopes with the Financial Proposal shall remain sealed and securely stored.

2.18 Proposal evaluation

2.18.1 From the time the Proposals are opened to the time the Agreement is awarded, the Consultants should not contact the Client on any matter related to its Technical and/or Financial Proposal. Any effort by Consultants to influence the Client in the examination, evaluation, ranking of Proposals, and recommendation for award of Agreement may result in the rejection of the Consultants’ Proposal. Evaluators of Technical Proposals shall have no access to the Financial Proposals until the technical evaluation is concluded.

2.19 Evaluation of Technical Proposal

2.19.1 The evaluation committee shall evaluate the Technical Proposals on the basis of their responsiveness to the Terms of Reference, applying the evaluation criteria, sub-criteria, and point system specified in Evaluation Criteria in Data Sheet and Appendix-I to Data Sheet and each responsive Proposal will be given a technical score. A Proposal shall be rejected at this stage if it does not respond to important aspects of the RFP, and particularly the Terms of Reference or if it fails to achieve the minimum technical score indicated in the Evaluation Criteria.

2.20 Public Opening and evaluation of financial proposals

2.20.1 After the technical evaluation is complete the Client shall notify in writing to the three top ranking Consultants that have secured the minimum qualifying marks, the date, time and location for opening the Financial Proposals. Consultants' attendance at the opening of Financial Proposals is optional. The opening date shall be set so as to allow interested Consultants sufficient time to make arrangements for attending the opening.

2.20.2 The Financial Proposal of the three top ranking Consultants who met the minimum qualifying mark will then be inspected to confirm that they have remained sealed and unopened. The name of these Consultants and the technical scores of the Consultants shall be read aloud. Their Financial Proposals shall then be opened publicly in the presence of the Consultants' representatives who choose to attend. The total prices quoted by them shall be read aloud and recorded.

2.20.3 The Evaluation Committee will correct any computational errors. When correcting computational errors, in case of discrepancy between a partial amount and the total amount, or between word and figures, the formers will prevail. The Evaluation Committee shall correct the quantification

indicated in the Financial Proposal so as to make it consistent with that indicated in the Technical Proposal, apply the relevant unit price included in the Financial Proposal to the corrected quantity and correct the total Proposal cost.

2.20.4 The weight-age of Technical and Financial Proposals would be as indicated in Data Sheet.

2.21 Technical Negotiations

2.21.1 Technical Negotiations will be held at the address indicated in the Data Sheet. The invited Consultant will, as a pre-requisite for attendance at the negotiations, confirm availability of all Professional staff. Failure in satisfying such requirements may result in the Client proceeding to negotiate with the next- ranked Consultant. Representatives conducting negotiations on behalf of the Consultant must have written authority to negotiate and conclude an Agreement.

2.21.2 Technical Negotiations will include a discussion of the Technical Proposal, the proposed technical approach and methodology, work plan, and organization and staffing, and any suggestions made by the Consultant to improve the Terms of Reference. The Client and the Consultants will finalize the Terms of Reference, staffing schedule, work schedule, logistics, and reporting. These documents will then be incorporated in the Agreement as "Description of Services". Special attention will be paid to clearly defining the inputs and facilities required from the Client to ensure satisfactory implementation of the assignment. The Client shall prepare minutes of negotiations which will be signed by the Client and the Consultant.

2.22 Availability of professional staff / experts

2.22.1 Having selected the Consultant on the basis of, among other things, an evaluation of proposed Professional staff, the Client expects to negotiate an Agreement on the basis of the Professional staff named in the

Proposal. Before agreement negotiations, the Client will require assurances that the Professional staff will be actually available. The Client will not consider substitutions during agreement negotiations unless both parties agree that undue delay in the selection process makes such substitution unavoidable or for reasons such as death or medical incapacity. If this is not the case and if it is established that Professional staff were offered in the proposal without confirming their availability, the Consultant may be disqualified. Any proposed substitute shall have equivalent or better qualifications and experience than the original candidate and be submitted by the Consultant within the period of time specified in the letter of invitation to negotiate.

2.23 Conclusion of the negotiations

2.23.1 Negotiations will conclude with a review of the draft Agreement. To complete negotiations the Client and the Consultant will initial the agreed Agreement. If negotiations fail, the Client will invite the Consultant whose Proposal received the second highest score to negotiate an Agreement.

2.24 Award of Agreement

2.24.1 After completing negotiations the Client shall award the Agreement to the selected Consultant and publish details on the website. The agreement will be executed based on Standard Format of Pakistan Engineering Council (PEC) for large projects (Lump Sum Based).

2.25 Confidentiality

2.25.1 Information relating to evaluation of Proposals and recommendations concerning awards shall not be disclosed to the Consultants who submitted the Proposals or to other persons not officially concerned with the process, until the publication of the award of Agreement. The undue use by any Consultant of confidential information related to the process may result in the rejection of its Proposal and may be subject to the

provisions of the Consultant Selection Guidelines relating to fraud and corruption.

2.26 Integrity Pact

2.26.1 The successful Bidder shall sign and stamp the Integrity Pact, as per Standard Format of Pakistan Engineering Council (PEC), in case contract value exceeds Pak Rs. 10.000 Million.

2.27 Registration of Foreign Firms with Pakistan Engineering Council (PEC)

2.27.1 The successful Bidder shall be required abide by the bylaws of Pakistan Engineering Council (PEC) and in case of foreign firm get registered with PEC after signing of the Contract Agreement.

2.28 Bankable Feasibility Study

2.28.1 The Feasibility Study should be bankable, acceptable to national / international financial institutions.

2.29 Time for Completion

2.29.1 Time for completion of the assignment shall be as specified in the Data Sheet.

2.29.2 Mobilization Period, after signing of agreement shall be as specified in the Data Sheet.

INSTRUCTIONS TO CONSULTANTS
DATA SHEET

Paragraph Reference	
2.2.1	<p>Name of the Client: Chief Engineer / Survey & Construction, Pakistan Railways, Headquarter Office, Lahore, Pakistan.</p> <p>Method of selection: QCBS (Quality and cost based Selection) in accordance with PPRA Rule 2004 and PPRA Procurement of Consultancy Services Regulations 2010.</p>
2.2.2	<p>Name of the assignment is: Feasibility Study of Rail Link from Quetta to Kotla Jam (App. 538km) (Updation of Existing Feasibility Study)</p> <p>Financial Proposal to be submitted together with Technical Proposal, however, both should be in separate sealed envelopes clearly marked with name of Assignment and Firm.</p>
2.2.3	<p>Pre-proposal conference shall be held as per following schedule: Pre-proposal conference: Date: 5th July, 2017. Time: 2:00 pm at The Chief Engineer / S&C, Pakistan Railways, Headquarter Office, Empress Road, Lahore, Pakistan</p>
2.2.4	<p>Rizwan Hashmi Deputy Chief Engineer / S&C, Pakistan Railways, Headquarter Office, Lahore, Pakistan. Phone: +92 42 99201797, 99201625 E-mail: censc@pakrail.com</p>
2.10.1	Proposals must remain valid for ninety (90) days after the submission date
2.11.1	Clarifications may be requested not later than seven (7) days before the submission date.
2.12.1	Proposals shall be submitted in the following language: English.

INSTRUCTIONS TO CONSULTANTS

DATA SHEET

2.16.1	Withholding / Advance Income Tax will be deducted as per prevailing government rules. It will be exclusive Consultant's responsibility to include all applicable Federal, Provincial or City taxes / fees & levies in the Financial Proposal
2.17.3	Consultant must submit one original and two (2) copies of the Technical Proposal and the original of the Financial Proposal.
2.17.5	<p>The Proposal submission address is: The Chief Engineer / S&C, Pakistan Railways, Headquarter Office, Empress Road, Lahore, Pakistan</p> <p>Proposals must be submitted not later than the following date and time: On or before 7th August, 2017 not later than 2:00 pm</p>

INSTRUCTIONS TO CONSULTANTS

DATA SHEET

2.19.1	<p>Criteria, sub-criteria, and point system for the evaluation of Technical Proposals are:</p> <p>(i) Company Profile: 40% (ii) Project Team: 40% (iii) Approach & Methodology: 20%</p> <p>Description Points</p> <p>(i) Company Profile: [100] a) Number of similar assignments [40] b) Value of similar assignments [40] c) Organizational structure [10] d) Financial Capability [10]</p> <p style="text-align: center;">$\overline{\hspace{1cm}}$ Total = A_1</p> <p>(ii) Project Team: [100]</p> <p>Railway Expert / Permanent way [10] Railway Expert / Bridges & Structures [8] Railway Alignment Design Expert [8] Railway Expert / Train Operation [7] Railway Expert / Signalling & Telecom [7] Railway Expert / Electrical [7] Railway Expert / Mechanical [7] Transport Economist [8] Environmental and Social Expert [5] Geologist [5] Geo-Tech Engineer [5] Hydrology Expert [5] Transportation Expert [6] Topographic Survey Expert [6] GIS Expert [6]</p> <p style="text-align: right;">$\overline{\hspace{1cm}}$ Total = A_2</p> <p>(iii) Approach & Methodology: [100] a) Understanding & Innovativeness[40] b) Methodology & Work plan [60]</p> <p style="text-align: center;">$\overline{\hspace{1cm}}$ Total = A_3</p> <p style="text-align: center;">Technical Score=$(A_1 (40) + A_2 (40) + A_3 (20))/100$</p> <p>The minimum technical score (St) required to pass is: 70 Points Further details of Evaluation Criteria are described in Appendix-I to Data Sheet</p>
	RFP / TOR for Feasibility Study for Rail Link from Quetta to Kotla Jam

INSTRUCTIONS TO CONSULTANTS

DATA SHEET

2.20.4	<p>Technical = 80% Financial = 20%</p> <p>The formula for determining the financial scores is as following:</p> $S_f = 100 \times F_m / F$ <p>S_f = The financial score F_m = The lowest price F = The price of the proposal under consideration.</p>
2.21.1	<p>Address for Technical negotiations:</p> <p>Chief Engineer / S&C, Pakistan Railways, Headquarter Office, Empress Road, Lahore, Pakistan.</p>
2.29	<p>2.29.1 Time for completion of the assignment shall be Eight (08) months after the mobilization period.</p> <p>2.29.2 Mobilization Period, after signing of agreement shall be fifteen (15) days.</p>

Appendix-I to Data Sheet
DETAILS OF EVALUATION CRITERIA

Mandatory Requirements

- i). As a mandatory requirement Consultants must have completed at-least two similar assignments. Any Consultant not fulfilling the said requirement is liable to be technically disqualified.
- ii). Any Consultant who failed to complete Feasibility Study, already awarded to him and delay has occurred more than six months (without legitimate time extension) shall be awarded with negative marking of 10 Marks per assignment.
- iii). A Professional Expert will not be considered for Evaluation if they have been already engaged in more than 1 ongoing Consultancy Assignment.

(1) Company Profile (100 Marks)

a) Number of similar assignments (40 Marks)

One Project	= 8
Two Project	= 16
Three Project	= 24
Four Project	= 32
Five Project	= 40

Similarity will be established and weightage will be given as under:

Strong = 100%, Medium = 80%, Weak = 70%

b) Value of similar assignments (40 Marks)

For completed projects having value

80% or more of this assignment	= 100%
50% to 80%	= 80%
Less than 50%	= 70%

For the purpose of Technical Evaluation, with a view to compare the cost of projects executed by the Consultants with this consultancy assignment, the estimated cost of this consultancy assignment shall be considered as **Rs.120 Million**.

c) Organizational structure (10 Marks)

Excellent = 100%, Good = 80%, Satisfactory = 60%

d) Financial Capabilities (10 Marks)

Annual Turnover (Pak Rs in Million)

More than or equal to 500 = 100%
More than or equal to 300 but < 500 = 80%
Less than 300 = 50%

(2) Project Team (100 Marks)

For minimum qualification and experience of project team please refer to Appendix-II to Data Sheet. Each member of Consultant's team will be evaluated on the following criteria:

i) Education (40%)

MSc or equivalent = 100%
BSc or equivalent = 90%

Higher education i.e. MSc shall be considered only if these are in relevant field / discipline.

In case the Consultants provide two CVs, one for foreign and other for local professional for particular professional category, then CV of the foreign professional will be considered for the purpose of Technical Evaluation.

ii) Experience (30%)

Where overall experience is 20 years
Twenty five years or more = 100%
20 to <25 years = 90%
Less than 20 years = 0% (Staff will not be considered for evaluation)

Where minimum overall experience is 15 years
Twenty years or more = 100%
15 to <20 years = 80%
Less than 15 years = 0%

Where minimum overall experience is 10 years
Fifteen years or more = 100%
10 to <15 years = 80%
Less than 10 years = 0%

iii) No of similar assignment (30%)

Five or more = 100%
2 to less than 5 = 80%
Less than two = Zero

(3) Approach & Methodology (100 Marks)

Methodology submitted by Consultant will be analyzed by evaluating team and graded as under:

Quality	Grade	Weight
Excellent	A	100%
Good	B	70%
Average / below average	C	50%
Absent	D	0

Methodology will be analyzed based on following:

a) Understanding & Innovativeness

- i) What is the depth of the firm's understanding of the requirements and objectives of the consultancy assignment?
- ii) What is the quality of the improvements to the TOR suggested by the consultant to improve the outcome of the assignment?
- iii) What is the level of identification of potential risks that will affect the execution of the assignment, and what is the quality of the mitigation strategies proposed?

b) Methodology & Work plan

- i) How in-depth is the Statement of Work: does it fully cover the scope of the assignment and is it sufficiently developed to ensure assignment completion?
- ii) How developed is the Work Breakdown Structure (WBS) for the assignment?
- iii) How suitable is the Work Plan (staffing schedule): is the resource utilization sufficient and practical?

Appendix-II to Data Sheet

- i). Minimum Qualification and Experience required for each position in Project Team
- ii). The professional having experience less than minimum specified below shall not be considered

Sr. No	Position	Min-Qualification	Overall Experience	Min-Relevant Experience
1	Project Manager (Permanent way Expert)	B.Sc. Civil Engineering	20 years	10 years
2	Railway Expert / Bridges & Structures	M.Sc. Structure Engineering	15 years	8 years
3	Railway Alignment Design Expert	B.Sc. Civil Engineering	15 years	8 years
4	Railway Expert / Train Operation	B.Sc. Civil Engineering / Mechanical Engineering or any transportation expert with graduation and inducted in railways under occupational group of railway (Traffic & Commercial)	15 years	8 years
5	Railway Expert / Signaling & Telecom	B.Sc. Electrical / Signaling /Telecommunication Engineering	15 years	8 years
6	Railway Expert / Electrical	B.Sc. Electrical Engineering	15 years	8 years
7	Railway Expert / Mechanical	B.Sc. Mechanical Engineering	15 years	8 years
8	Transport Economist & Financial Specialist	M.Sc./M.A Economics / CA	15 years	8 years
9	Environmental & Social Expert	M.Sc. Environmental Engineering / Sciences	15 years	8 years
10	Transportation Expert	Master in Transportation Planning / Engineering	15 years	8 years
11	Geologist / Tunnel Expert	M.Sc. Geology / Mining Engineering	15 years	8 years
12	Geo-Tech Expert	M.Sc. Geotechnical / Geological Engineering	15 years	8 years
13	Hydrology Expert	M.Sc. Hydrology/Water Resources Engineering./Hydraulics Engineering	15 years	8 years

14	Topographic Survey Expert	B.Sc. Civil Engineering	10 years	5 years
15	GIS Expert	M.Sc. GIS	10 years	5 years

Similar project has been defined under definitions for the purpose of comparison of the projects completed by the Consulting firm and assignment under consideration. For various professional, the similar assignment shall be as per their respective field of specialization.

3 SECTION 3: TECHNICAL PROPOSAL – STANDARD FORMS

Consultants are required to prepare Technical Proposal as per following format:

TECH-1 Technical Proposal Submission Form

TECH-2 Consultant's Organization and Experience

A Consultant's Organization

B Consultant's Experience

TECH-3 Comments or Suggestions on the Terms of Reference

TECH-4 Description of the Approach, Methodology and Work Plan for Performing the Assignment

TECH-5 Composition of Team to be deployed for this assignment and Task Assigned

TECH-6 Curriculum Vitae (CV) of Proposed Professional Staff

TECH-7 Staffing Schedule

TECH-8 Financial Capabilities

Form Tech-1 Technical Proposal Submission Form

(Please submit on Company's Letterhead)

To: The Chief Engineer / S&C,
Pakistan Railways,
Headquarter Office,
Lahore,
Pakistan.

Subject: FEASIBILITY STUDY OF RAIL LINK FROM QUETTA TO KOTLA
JAM (APP. 538 km) (UPDATION OF EXISTING FEASIBILITY STUDY)

Dear Sir,

We, the undersigned, offer to provide the subject in accordance with your Request for Proposal. We are hereby submitting our Proposal, which includes this Technical Proposal, and a Financial Proposal sealed under separate envelopes.

We are submitting our Proposal in association with: _____

[Insert a list with full name and address of each associated Consultant]

We hereby declare that all the information and statements made in this Proposal are true and accept that any misinterpretation contained in it may lead to our disqualification.

If negotiations are held during the period of validity of the Proposal, we undertake to negotiate on the basis of the proposed staff. Our Proposal is binding upon us and subject to the modifications resulting from Agreement negotiations.

We undertake, if our Proposal is accepted, to initiate the consulting services related to the assignment not later than the date indicated in the Data Sheet of the proposal.

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

Yours sincerely,

Authorized Signature [In full and initials]: _____

Name and Title of Signatory: _____

Name of Firm: _____

Address: _____

3.1 Form Tech-2 Consultant's Organization and Experience

A - Consultant's Organization

Please provide the following information for your firm/entity and each associate for this assignment

Firm's Background and Achievements (min two pages)

Organogram.

List of professional Staff with Qualification and Experience.

3.2 Form Tech-2 Consultant's Organization And Experience

B - Consultant's Experience

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

Assignment name:	Value of the Project (in Pak Rs or US\$):
Country: Location within country:	Duration of assignment (months):
Name of Client:	
Start date (month/year): Completion date (month/year):	Value of consultancy services provided by your firm under the agreement (in Pak Rs or US\$):
Name of associated Consultants, if any:	Percentage of input provided by associated Consultants:
Name of senior professional staff of your firm involved and functions performed (indicate most significant profiles such as Project Director/Coordinator, Team Leader):	
Narrative description of Project:	
Description of actual services provided by your staff within the assignment:	

3.3 Form Tech-3

Comments or suggestions on the TOR.

3.4 Form Tech-4 Description Of Approach, Methodology And Work Plan For Performing The Assignment

[Technical approach, methodology and work plan are key components of the Technical Proposal. You are suggested to present your Technical proposal divided into the following three chapters:

Technical Approach and Methodology,
Work Plan
Organization and Staffing

- a) **Technical Approach and Methodology.** In this chapter you should explain your understanding of the objectives of the assignment, approach to the services, methodology for carrying out the activities and obtaining the expected output, and the degree of detail of such output. You should highlight the problems being addressed and their importance, and explain the technical approach you would adopt to address them. You should also explain the methodologies you propose to adopt and highlight the compatibility of those methodologies with the proposed approach.
- b) **Work Plan.** In this chapter you should propose the main activities of the assignment, their content and duration, phasing and interrelations, milestones, constraints (including interim approvals by the Client), and delivery dates of the reports. The proposed work plan should be consistent with the technical approach and methodology, showing understanding of the TOR and ability to translate them into a feasible working plan. A list of the final documents, including reports, drawings, and tables to be delivered as final output, should be included here.
- c) **Organization and Staffing.** In this chapter you should propose the structure and composition of your team. You should list the main disciplines of the assignment, the key experts responsible, and proposed technical and support staff.

3.5 Form Tech – 5 Composition of Professional Staff Team To Be Deployed For this Assignment And Task Assigned

Name of Staff	CNIC / Passport No.	Firm	Area of Expertise	Position Assigned	Task Assigned
For Foreign Professional Staff					
For Local Professional Staff					

3.6 Form Tech-6 Curriculum Vitae (CV) Of Proposed Professional Staff

1. Proposed Position [only one candidate shall be nominated for each position]: __

2. Name of Firm [Insert name of firm proposing the staff]: _____

3. Name of Staff [Insert full name]: __

4. Date of Birth: __ Nationality: __

5. CNIC No (if Pakistani): _____ or Passport No: _____

6. Education :

Degree	Major/Minor	Institution	Date (MM/YYYY)

7. Membership of Professional Associations: _____

8. Other Training [Indicate significant training since degrees under 6 - Education were obtained]:

9. Languages [For each language indicate proficiency: good, fair, or poor in speaking, reading, and writing]:

10. Employment Record [Starting with present position, list in reverse order every employment held by staff member since graduation, giving for each employment (see format here below): dates of employment, name of employing organization, positions held.]:

Employer	Position	From (MM/YYYY)	To (MM/YYYY)

11. Detailed Tasks Assigned

[List all tasks to be performed under this assignment]

12. Work Undertaken that Best Illustrates Capability to Handle the Tasks Assigned

[Among the assignments in which the staff has been involved, indicate the following information for those assignments that best illustrate staff capability to handle the tasks listed under point 11.]

1) Name of assignment or project: __

Year: _

Location: ____

Client: _____

Main project features: _____

Positions held: _____

Activities performed: _____

2) Name of assignment or project: __

Year: _

Location: ____

Client: _____

Main project features: _____

Positions held: _____

Activities performed: _____

3) Name of assignment or project: __

Year: _

Location: _____

Client: _____

Main project features: _____

Positions held: _____

Activities performed: _____

4) Name of assignment or project: __

Year: _

Location: _____

Client: _____

Main project features: _____

Positions held: _____

Activities performed: _____

5) Name of assignment or project: __

Year: _

Location: _____

Client: _____

Main project features: _____

Positions held: _____

Activities performed: _____

13. Certification:

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience. I understand that any willful misstatement described herein may lead to my disqualification or dismissal, if engaged.

____ Date: _____
[Signature of staff member or authorized representative]
Day/Month/Year

Full name of authorized representative: _____

Form Tech – 7 Professional Staffing Schedule¹
 Full Time
 Part Time

Year:																			
No	Name of Staff	Total staff-month input																	
		S	e	p	t	e	m	b	e	r	e	F	o	r	e	-	O	t	e
For Foreign Professional Staff																			
1.		[Home]																	
		[Field]																	
2.																			
3.																			
4.																			
5.																			
For Local Professional Staff																			
1.		[Home]																	
		[Field]																	
2.																			
3.																			
4.																			

- i). For Professional Staff the input should be indicated individually; for Support Staff it should be indicated by category (e.g.: draftsmen, clerical staff, etc.).
- ii). Months are counted from the start of the assignment. For each staff indicate separately staff input for home and field work.
- iii). Field work means work carried out at a place other than the Consultant's home office

3.7 Form Tech-8 Financial Capabilities

Total Assets = (in Million Pak Rs or US\$)
Total Liabilities =

Annual Turnover

For the year		
2012-13	2013-14	2014-15

For assessment purpose average turnover of three years shall be considered

(in case of joint venture please provide above information for all partners)

4 SECTION 4: FINANCIAL PROPOSAL - STANDARD FORMS

Financial Proposal Standard Forms shall be used for the preparation of the Financial Proposal.

FIN-1 Financial Proposal Submission Form

FIN-2 Summary of Costs

FIN-3 Breakdown of Cost for Local Component and Foreign Remittance

FIN-4 Breakdown of Remuneration of Staff deployed for Feasibility Study

FIN-5 Breakdown of Reimbursable Expenses

Form Fin-1 Financial Proposal Submission Form

(Please submit on Company's Letterhead)

[Location, Date]

To:

Chief Engineer / S&C
Pakistan Railways', Headquarters Office,
Lahore

Subject: FEASIBILITY STUDY OF RAIL LINK FROM QUETTA TO
KOTLA JAM (APP. 538KM) (UPDATION OF EXISTING FEASIBILITY
STUDY)

Dear Sir,

We, the undersigned, offer to provide the consultancy services for subject assignment in accordance with your Request for Proposal and our Technical Proposal. Our attached Financial Proposal is for the sum of [Insert amount(s) in words and figures]. This amount is inclusive of all applicable taxes.

Our Financial Proposal shall be binding upon us subject to the modifications resulting from Agreement negotiations, up to expiration of the validity period of the Proposal.

No commissions or gratuities have been or are to be paid by us to agents relating to this Proposal and Agreement execution.

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

We remain,

Yours sincerely,

Authorized Signature [In full and initials]: _____

Name and Title of Signatory: ____

Name of Firm: ____

Address: ____

4.1 Form Fin-2 Summary of Costs

Item	Costs (Pak Rupees)	
	In Figure	In Words
Feasibility Study of Rail Link from Quetta to Kotla Jam (App. 538km) (Updation of Existing Feasibility Study)		
Investigation Adits (2m x 3m x 10m) for tunnel. (please add cost of four Adits)		
Total		

Note:

- i). Cost of Feasibility Study should be inclusive of all applicable taxes, overheads and any other cost required to complete the assignment as per ToR.
- ii). Any tax imposed by the government after submission date of RFP shall be paid separately to Consultant, in addition to accepted Financial Proposal.
- iii). Consultants are requested to include fee for four Adit tests. However, payment of Tunnel Adits shall be made as per actual number of tests performed by the Consultant at site.
- iv). In case any Consultant failed to fill the cost of adits the fee of adits shall be deemed to have been included in any other item. In such an eventuality the Consultants shall not be allowed to add the fee of adits in their financial proposal.

Authorized Signature of Consultants

4.2 Form Fin-3 Breakdown of Cost for Local Component And Foreign Remittance

Item	Amount (Pak Rs)		
	Payment of Local Staff & other expenditure	Payment of Foreign Staff & other expenditure required to be remitted to home country	Total
Feasibility Study of Rail Link from Quatta to Kotla Jam (App. 538km) (Updation of Existing Feasibility Study)			
Investigation Adits (2m x 3m x 10m) for tunnel. (please add cost of four Adits)			
Total			

Note:

All payments shall be made in Pak Rupees, however the above breakup is to facilitate the Consultants for remittance of remuneration (in case of foreign Consultant).

Authorized Signature of Consultants

4.3 Form Fin-4 Breakdown of Remuneration of Staff Deployed For Feasibility Study

Name ²	Position ³	Staff-month Rate (PKR) ⁴
Foreign Professional Staff		
		[Home]
		[Field]
Local Professional Staff		
		[Home]
		[Field]

Form FIN-4 shall be filled in for the same Professional and Support Staff listed in Form TECH-7.

Professional Staff should be indicated individually; Support Staff should be indicated per category (e.g.: draftsmen, clerical staff)

Positions of the Professional Staff shall coincide with the ones indicated in Form TECH-5.

Indicate separately staff-month rate for home and field work.

4.4 Form Fin-5 Breakdown Of Reimbursable Expenses

(Information to be provided in this Form shall only be used to establish payments to the Consultant for possible additional services requested by the Client)

N ^o	Description ¹	Unit	Unit Cost (Pak Rupees)
i).	Per diem allowances	Day	
ii).	International Flight ²	Trip	
iii).	Miscellaneous travel expenses	Trip	
iv).	Communication costs between [Insert Place] and [Insert Place]		
v).	Drafting , reproduction of reports		
vi).	Equipment, Instruments, materials, supplies		
vii).	Shipment of personal effects	Trip	
viii).	Use of Computers , software		
ix).	Laboratory tests / surveys.		
x).	Sub agreements		
xi).	Local transportation costs		
xii).	Office rent, clerical assistance		
xiii).	Training of Client' personnel		

Delete items that are not applicable or add other items if required.

Indicate route of each flight, and if the trip is one-or two-ways.

Section-5

TERMS OF REFERENCE (TOR)

FOR

FEASIBILITY STUDY

FOR

RAIL LINK FROM QUETTA To KOTLA JAM (538 KM)

(UPDATION OF EXISTING FEASIBILITY STUDY)

5 TERMS OF REFERENCE (TOR)

5.1 Project Background

A feasibility study was carried out in year 2007-8 by PRACS for the conversion of closed Bostan-Zhob narrow gauge section to broad gauge and to extend it up to Kotla Jam (a town located at 10 km from Bhakkar on Shershah – Kundian section), via D.I.Khan.

At that time the feasibility of linking D.I. Khan with Peshawar via Bannu and Kohat was also examined by PRACS. The main objective of these studies were to investigate the linking of the Provincial capitals of KPK and Balochistan at Peshawar and Quetta respectively, reducing the present rail distance between these two capital cities by more than 400 km, besides opening up the entire area bordering the tribal belt, boosting economic activities, fostering integration and national harmony.

Pakistan Railways has now decided to get the existing feasibility study of linking Quetta with Kotla Jam via Bostan, Zhob and D.I.Khan updated, by re-designing the infrastructure for the design speed of 160 km/hr and axle load of 30 tonnes. The bridges are now to be designed for HMBG loading of Pakistan Railways Bridge Rules of 1970.

As the new study will include the designing of the infrastructure for higher speed and axle loads, referred to above, the study will involve the up-gradation/rehabilitation of the existing Quetta –Bostan section also for the above mentioned new design parameters.

The details of the sections included in the proposed study shall be as under;

Quetta-Bostan	=33 km
Bostan-Muslim Bagh-Zhob	=295 km
Zhob-D.I.Khan	=185 km
D.I.Khan –Kotla Jam	=25 km

Total	=538 km

(Project area Map is attached as **Appendix-A & C**)

5.2 Objectives of the Feasibility Study

The existing feasibility study was carried out in year 2007-08. Pakistan Railway intends to carry out a new feasibility study primarily to revalidate various aspects of the existing feasibility study particularly topographic survey, geological and geo-tech investigations, hydrology, traffic survey, cost estimates and Economic & Financial Analysis etc.

Following reports from previous feasibility study will be provided to successful consultant in hard form.

- i). Condition Survey Bostan-Zhob, Nov 2006.
- ii). Traffic Survey for Bostan-Zhob-D.I. Khan, Nov, 2006
- iii). Environmental Study Bostan-Zhob-D.I. Khan
- iv). Revenue Cost for Bostan-Zhob, Nov, 2006
- v). Route Selection D.I. Khan-Zhob, June 2006.
- vi). Revised Estimate Cost of Service & Residential Buildings on Bostan-Zhob Section, July, 2007
- vii). The Railway System –II Bostan-Zhob-D.I. Khan, Nov, 2006.
- viii). Geotechnical Investigation for Bostan-Zhob Section, June, 2006.
- ix). The Railway System-I for Bostan-Zhob Section, Nov, 2006.
- x). Basics of Railway Signalling & Interlocking, Nov, 2006.
- xi). Financial Analysis, June, 2007.
- xii). Hydrology Study & Bridges Bostan-Zhob-D.I. Khan, June, 2007.
- xiii). Geotechnical Investigation Studies Bostan-Zhob-D.I. Khan, Nov, 2006
- xiv). Hydrological Studies Bostan-Zhob-D.I. Khan, June 2006.
- xv). Condition Survey & Proposal of Bridges for Bostan & Zhob.

- xvi). The Railway System Bostan-D.I. Khan, Nov 2007.
- xvii). Drawings for Signalling & Interlocking at Station Yards for Bostan-Zhob..
- xviii). Topographic Survey Zhob-D.I. Khan.
- xix). Plan & Profile Bostan-Zhob.

Secondly the design parameters used in the existing feasibility study in respect of design speed was taken as 95 km/hr and bridges were to be designed presumably for BGML loading of Pakistan Railway Bridge Rules of 1970. These parameters for the present feasibility study shall be 160 km/hr and HMBG loading respectively.

it is highly important for the consultant to avoid plagiarism and a simple reproduction of any of the contents of the older report which are for reference only. The consultant should write each and every report of this feasibility study afresh.

5.3 Scope of Services- Part A: Quetta-Bostan Section

The feasibility study for the rehabilitation/improvement of the existing track and infrastructure is desired to be carried out on existing Quetta-Bostan section to achieve the higher speed of 160 km/hr. The entire infrastructure including right of way shall be proposed for double railway track. However construction of single line or double line will be recommended by the consultant based on traffic volume.

For detailed understating and in case of any conflict or ambiguity the guiding document will be AREMA manual (latest) for all of the different parts and sections of the study. For areas where AREMA manual is found limited in it elaboration or detail, other well established international codes such as AASHTO, UIC, European Codes or other regional Codes/Manuals can also be followed with approval of the client. All information, data, procedures, standards etc. provided by the consultant in the various fields and areas of the feasibility study shall be properly referenced leaving no ambiguity whatsoever. The feasibility study is to be carried out by the

nominated consultant who will focus on, but not be limited to the following services:

- i). Study of the existing condition of the track infrastructure on the entire section based on the data/information to be made available by the Client and preparation of Track Condition Report. This Report and the results of the following studies/investigations will form basis for the proposed Up-gradation / Rehabilitation of track infrastructure to enhance the line capacity and make the railway track fit for a speed of 160 Km/hr. (except where un-avoidable) and for 30 tonne axle load.
- ii). Bridge Condition Survey of major and key bridges which require Rehabilitation / Extension / Reconstruction to maintain desired operational speed of 160 Km/h with the axle load of 30 Tons (HMBG Loading) of Pakistan Railway Bridge Rules -1970.
- iii). Hydrology Study, comprising, identification of vulnerable points against the threat of floods, hill torrents and regime study of major flood openings based on past flood history. Proposal for provision of new flood openings of suitable sizes/ increasing the capacity of existing openings to make the track fit for all weather conditions.
- iv). Study for Up-gradation/conversion of Level Crossings (at grade crossing) into overhead bridge / underpass / manned level crossings where necessary, based on traffic count, vulnerability / adverse geometrical conditions.
- v). Easement of sharp curves and grades (where possible) to achieve the design speed of 160 km/h.
- vi). Study for improvement of signalling and telecommunication system.

- vii). Plan and Profile of the entire corridor including areas which need horizontal and / or vertical alignment improvement. (Topographic Survey)
- viii). Traffic Study for assessment of Passenger & Freight Traffic demand after 5, 15 and 30 years of up-gradation and rehabilitation. The assessment must include the economical influx of CPEC after development of ML-I and ML-II (Western Corridor).
- ix). Geological Study and Geotechnical Investigations along the railway alignment.
- x). Study for provision / improvement of water supply and drainage system at the stations
- xi). Power Supply Study, for provision / improvement of electricity to key stations and other installations on the section.
- xii). Preparation of Environment Impact Assessment Report.
- xiii). Condition Survey of Tunnels and study for their improvement/upgrading if considered necessary
- xiv). Study of existing railway yards. Preparation of proposal for remodelling of yards to remove bottlenecks (if any) and make them fit for the designed speed and cater for long haul freight trains. Addressing the drainage problem of station yards and drainage along/across the track where the track level become lower than adjoining areas and is prone to flooding.
- xv). Study of existing buildings and proposal for their up-gradating particularly station buildings (where required).
- xvi). Proposal for construction of boundary wall / fencing on major railway yards to restrict the tress passing.
- xvii). Study for improvement / establishment of maintenance facilities for Locomotives, Carriages and Freight Wagons.

- xviii). Financial and Economic Analysis.
- xix). Cost estimation of Up-gradation of track and infrastructure.

5.3.1 Data / Information to be provided by the Client

The Client shall provide the data/information in respect of the track infrastructure on this section and it shall include but not be limited to its following components.

i) Rails

Different types of rails laid in the track, their kilometre-wise location, their year of manufacture / laying in track. Locations, where the rails are welded as LWR or SWR or where the rails form the jointed track. General condition of rails

ii) Sleepers

Different types of sleepers laid in the track, their kilometre-wise location, their density, year of their manufacture and year of laying in track. Condition and percentage of unserviceable sleepers, location (kilometre-wise)

iii) Track Fastening System

Different types of track fastenings laid in the track, their kilometre-wise location, their year of manufacture and year of laying in track. Condition and percentage of unserviceable track fastenings, location (kilometre-wise)

iv) Points & Crossings

The name of the railway station, the location and number & type of the points and crossing at the station, their angle of crossing. Type of rails used in each point and crossing and their condition

v) Loops & Sidings

The name of the railway station, the description and line number of the main line, loop lines sidings as indicated in the station yard plan

including the clear stabling length (CSL) of each line. Type of rails and sleepers etc.

vi) Private Sidings

The name of the railway station, the description of the private sidings including the name of the sponsoring authority and other details of siding

vii) Condition of Ballast

Description of the condition of the ballast, average existing ballast cushion in track and on shoulders etc.

viii) Curves

List of all the existing curves on every sub-section, indicating the serial number of the curve, its degree and radius in feet/meters, its chain-age and total length in feet and meters, the super elevation provided in inches and millimetres and whether the curve is circular or transitioned.

ix) Gradients

List of gradients for every sub-section, indicating the location and chain-age of every grade and whether it is in up or down direction (ascending or descending)

x) Bridges

List of existing bridges on every sub-section, indicating their serial number on that sub-section, their location, type and span etc. Annual bridge inspection registers and other inspection reports, which indicates current general condition of bridges.

xi) Foot over Bridges & Road over Bridges

List of all the foot over bridges and road over bridges existing on every sub-section, indicating their serial number on that sub-section, its location, type and width etc.

xii) Tunnels

List of all the tunnels existing on every sub-section, indicating their serial number on that sub-section, the location, the chain-age and total length etc. Annual tunnel inspection register, which indicates current general condition of bridges.

xiii) Level Crossings

List of level crossings existing on every sub-section, indicating their serial number on that sub-section, the location, the class of level crossing, manned or un-manned, traffic or engineering, the width of level crossing, the length of check rail (single or double), interlocked or not, etc.

xiv) Tress Passing Locations

List of all locations where there was regular trespassing of the track, indicating the location and other details of such sites.

xv) Sui gas & other Utility Services Crossings

List of the pipe line crossings under the existing railway line for passage of sui gas or other utility services e.g. water supply, telephone and telecommunications cables etc. shall be provided, indicating the type of the utility service, the name of the sponsoring agency, size and other details of the crossing

xvi) River Training Works and Protection Bunds

Details of any river training works and/or flood protection work(s) provided along or across the existing railway embankment, giving its brief details , including its location, type of protection work, purpose for its provision, its length and cross section.

5.3.2 Preparation & Submission of Track Condition Survey Report

Based on the desk study of the data/information provided by the Client under paragraph 5.3.1 above and the result of the reconnaissance survey of the project area, the Consultants shall prepare and submit the Track Condition Survey Report for the section.

The Consultant shall examine the existing embankment during the reconnaissance survey of the route and based on physical survey and sub-surface investigations, shall spell out the condition of the existing embankment, identifying the problematic stretches i.e. sections / locations prone to excessive settlements, erosions, inundation, over toping and inadequacies of the cross sections etc.

The report shall summarize the existing condition of the track including rails, sleepers, fastenings, ballast and the formation etc, based on the study of the data made available by the Client and the data collected by the Consultant during reconnaissance survey of the section and the study of the designed parameters.

5.3.3 Bridge Analysis for Extension / Reconstruction of Bridges.

The Client will provide available data of the bridges. The Consultant shall carryout detailed structural analysis of all the bridges on the basis of data provided by client and field reconnaissance survey. Consultant will draw their conclusions and recommendation along with comprehensive plan for reconstruction/ rehabilitation and strengthening, of all bridges along with the cost.

The Consultant will verify or recoup missing information in bridge data (provided by the Client) during the reconnaissance survey of the alignment, in respect of type, span, location of bridge and any dimensional data required for structural modelling of bridge. The Client will provide available data in respect of bridge under paragraph 5.3.1.

5.3.3.1 Field Reconnaissance Surveys

A team of the Consultant's experts shall visit all the bridge to collect all pertinent data including layout dimensions, super structure details, sub structure details, elevations, hydrological and topographic conditions. Any defects/damages in the substructure and superstructure shall also be identified. This visual survey will be conducted using a pre-developed performa including an extensive photography of the relevant structure.

After assessment based on the field visit and data collected, the bridges/culverts shall be categorized into three categories:

- i). The structures which structurally meet the revised requirements of increased loads and speed and do not require structural improvement.
- ii). The structures which will require rehabilitation/strengthening.
- iii). The structures which will be replaced/reconstructed.

5.3.3.2 Structural Analysis of Selected Bridges

Based on the bridge data, provided by Client and field survey, fully integrated models of bridges shall be developed and analyzed by the Consultant for both super structure and sub structure. Finite Element Analysis Programs (e.g. SAP 2000 and Staad Pro or any latest version of equivalent software patent in market) shall be used to determine the effects of increased loads on these structures. This assessment/analysis will be carried out in accordance with the relevant provision of P.R. Bridge Rules, AREMA Manual, UIC, European Codes, AISC, ACI specifications and other regional/international codes & manuals. The loads to be applied include dead, live and impact loads, tractive effort, breaking force, centrifugal, longitudinal, wind, stream flow, buoyancy, seismic and other applicable loads/forces and their prescribed combinations.

The existing bridges are to be analysed for speed and axle load as mentioned in Appendix-B and for train operation with D.E locomotives and trailing load comprising of high capacity freight wagons.

5.3.3.3 Interpretation of Results

The results of structural analysis shall be studied in detail to arrive at logical, reliable and efficient rehabilitation / strengthening measures required to upgrade the life expectancy and load carrying capacity of the structure under study. If the above testing and analysis reveals that any strengthening measures will not be sufficient enough, demolition and reconstruction shall then be proposed.

5.3.3.4 Reporting and Presentation

The results of detailed investigation and analysis shall be presented to the Client for each studied structure and the recommendations / action plan given for each category of bridges (type / size / location) based on these studies. Recommendations shall be made for requisite rehabilitation / strengthening procedures to be followed for increasing the durability and reliability against intended loads and speeds as mentioned in Appendix-B. Preliminary designs and sketches for these rehabilitation/strengthening works shall also be appended to the report along with Preliminary cost estimates.

The proposed works shall be developed based on considerations of economy, constructability, durability, environment, strength, and serviceability. A tentative plan for carrying out rehabilitation/strengthening activities shall be provided in the report.”

5.3.4 Hydrological Studies.

5.3.4.1 Scope of Work

The Consultants shall carryout hydrological investigations with the analysis of rainfall and flood records supplemented by detailed field investigation for improving existing and providing new cross-drainage structures (where required) after proper hydrological and drainage evaluation. The Consultant shall identify vulnerable points against the threat of floods and carryout regime study of major flood openings based on past flood history. Prepare proposal for provision of flood openings of suitable sizes to make the section fit for all weather tracks. Consultant shall also submit recommendations based upon concise field data for the closure of redundant bridges, culverts etc to eliminate the weak portion in the track infrastructure.

5.3.4.2 Collection of Data

Information / data, not limited to the following shall be collected for preparation of Hydrological Study.

- i). Evidence of flooding and flood record data in the vicinity of track.
- ii). Historical data of flood passed through flood openings.
- iii). Breach of railway embankment or damage to any bridge or protection works
- iv). Rainfall data.
- v). Water logged areas, slushy/marshy land.
- vi). Saline area.
- vii). Waterway area of existing structures.

5.3.4.3 Flood Studies

i) Rainfall Frequency Analysis

Rainfall frequency analysis will be carried out for all stations which will be required for the estimation of flood values corresponding to various return periods. For this purpose, one day maximum rainfalls of each year will be used. Rainfalls corresponding to 2, 5, 10, 20, 25, 50, 100, 500, 1000 and 10,000 years return period will be computed using five flood frequency distribution functions, i.e. Normal, 2 Parameter Log Normal, 3 Parameter Log Normal, Gamma, and Gumble. These frequency distribution functions will be evaluated using both approaches, i.e. Method of Moments and Method of Maximum Likelihood. Mean Relative Deviations (MRD) will also computed for each distribution function results to select the distribution which best fits the observed data.

Hydrologic Frequency Analysis (HYFA) software developed by the Army Corps of Engineers will be used to carry out the rainfall frequency analysis.

ii) Development of IDF curves

Intensity Duration Frequency (IDF) curves will be developed for various meteorological stations using very fine temporal scale rainfall data of the severe most historical rainstorms of each year. Rainfall mass curves will be plotted for each severe most rainstorm. For various rainfall

durations, maximum amounts of the rainfalls will be computed. Then using Gumbel's approach, rainfall depths for various return periods will be evaluated. Finally average rainfall intensities will be computed simply by dividing the rainfall amounts with the respective durations. In this way several Intensity duration curves will be developed for various return periods.

These curves are useful for the estimation of appropriate intensity of rainfalls corresponding to various rainfall durations (time of concentrations) and return periods, which is required for the estimation of flood magnitudes using Rational Method.

iii) **Assessment of Watershed Characteristics**

From GIS watershed maps, all relevant watershed characteristics will be evaluated like, watershed area, highest elevation, lowest elevation, length of the drainage path, slope and time of concentration etc.

5.3.4.4 Hydrological Investigations

The hydrological investigations shall include comprehensive examination of the phenomenon of flash floods in hilly areas where even sporadic rains result in enormous discharge inundating embankments and structures. The railway line may in some cases have to be re-aligned after proposing new flood openings or raising the formation levels to completely avoid or mitigate the effects of hill torrents/floods in order to make it all weather line.

5.3.4.5 Studies Related to Irrigation Network in the Area

The Consultant shall also inspect all bridges of canal / irrigation channels and report shall be made part of hydrology Study. The following data shall be obtained from the concerned Provincial Irrigation Department or WAPDA as the case may be:-

- i). Maximum design discharge.
- ii). Actual discharge.

- iii). Velocity of flow in the canal bed.
- iv). Bed level and full supply level including freeboard.
- v). Bed width, top width, bed and side slopes.
- vi). Scour, if any and proposed remedy.

While preparing the report for irrigation channels the Consultant shall also study that whether the discharge of canal is same as per design discharge or has increased with the passage of time. In case of increased discharge the area of flow has accordingly been revised, if not then what are the effects on bridge structure.

5.3.4.6 Preparation & Submission of Hydrology Study Report

The Report shall include the results of hydrological investigations discussed in above paragraphs. The railway line may have to be re-aligned at some locations after proposing new flood openings or raising the formation levels to completely avoid or mitigate the effects of hill torrents/floods in order to make it all weather line.

5.3.5 Topographic Survey / Plan & Profile of the Entire Corridor

5.3.5.1 Monumentation for the Permanent Control Points

The Consultant shall establish Permanent Survey Control Points, to be used as reference system. In this regard Permanent Ground Markers, made of precast concrete, of size 15 cmx15 cmx75 cm or 4 inch dia PVC pipe filled with 1:2:4 PCC duly reinforced with suitable 1 cm dia steel rod or steel nail in the centre shall be fixed at every railway station but not more than 10 kilometres apart.

Description of all the monuments along with photographs will be prepared by the Consultant and included in the Report.

5.3.5.2 Horizontal Control

Horizontal control for topographic survey shall be established by intermediate traversing. The traverse circuits shall be started and closed

on the GPS monuments already established during the above mentioned GPS survey. The transverse monuments measuring 15cm x15cm x75cm shall be fixed at one km interval.

After verifying the accuracy of traverse circuit at known survey of Pakistan (SOP) control points, the plane control shall be calculated using scale factor. These plane coordinates shall be used for project survey.

Azimuths shall be checked by Polaris/Solar observations at 10 to 15 Km interval.

The minimum acceptable accuracy of the traverse line shall be 1/10,000 or better.

5.3.5.3 Vertical Control

Vertical control shall be provided by double levelling based national datum established by Survey of Pakistan.

All the traverse points/ground markers established during horizontal control shall be connected to the levelling net.

Vertical mis-closure within the levelling net shall not exceed + 10 K mm where K is the length of levelling line in kilo-meter.

5.3.5.4 Topographic Strip Survey

Topographic survey of the alignment corridor will be carried out by both DGPS and EDM tachometry method. The control points already established will be used for this purpose. Some additional control points will also be established, to facilitate topographic survey works along rivers. The data will be saved in raw form, so that if there is any change in datum the data can be recomputed without any problem.

All man-made and natural physical features within route corridor will be surveyed. Ground levels will be surveyed in the shape of cross sections at appropriate interval and cover topographic features as well as ditches, road edges and buildings and installations. The cross sections alignment will be kept perpendicular to centreline visually and may not be a straight line. The interval will be maximum distance 200 m in straight line

and flat area and will be reduced in the reaches where the terrain and / or alignment changes sharply as well as at crossings and in built up areas. The cross section interval will be marked approximately by pacing etc.

The boundary of built up area and the fenced areas will be the limit of survey if these exist within the corridor width of 50 m to each side of the track. However, built up area and the fenced areas within the corridor width of 30 m to each side of the track will be surveyed to allow for a sufficiently accurate DEM (digital elevation model) of the existing track bed. The boundary of forest and fields or property line within the corridor width of 50 m to each side of the track will be identified.

In the course of the survey, the centre line of the existing track will be surveyed and the respective data will be allocated to present the existing alignment properly in the topographic survey layout (Element Location [km from – to], Length of Straight / Curve / Transition, Degree / Radius of Curve, Super Elevation). Accordingly, the existing track will be presented in each cross profile (centre line of track, super elevation, elevation of top of non-elevated rail).

Additionally, existing track information like Chain-age markers, etc. will be surveyed and shown on the layout drawings, moreover existing rail system equipment like signalling and telecommunication equipment, drainage systems, switches, etc.

On the stations the survey will cover the yards area showing all station buildings operational for handling passenger, freight, operation and maintenance services, platforms, tracks, sidings, stabling lines etc., up to the building line of buildings on both sides of the railway line that are not related to the station / yard operation.

Lieca made, TRIPLE Frequency DGPS, model GS15 & GS10 with internal radios with rovers and an external radio transmitter with base, may also be used generally for detailed topographic survey in RTK mode. The radio will transmit the signal from base to rover at the frequency of 464 MHz at 1 second time interval. The reliability of the radio will be insured to 100% before start of RTK survey. The signal rate for RTK

survey will be 9600 baud rate. The RTK survey will be stored in the memory card attached with the survey controller at rover end. The number of rovers may be increased to improve progress. The minimum epochs for a single point will be 10 at 1 second interval.

All the data will be in the form of points having attributes as Point ID, Easting, Northing, Elevation etc. All features along the existing centreline and its buffer will be surveyed for inclusion on the route survey plan as per specifications.

5.3.5.5 Plan and Profile of the Entire Corridor

The Consultants shall carry out topographic survey of the entire length of the sections included in Feasibility Study, by using GPS ground Survey method or by Total Station in consultation with Client or to use other latest gadgets having more precision as compared to above mentioned devices.

The adjusted co-ordinates and elevations of control points/traverse points shall be used for topographic survey. The topographic strip survey shall depict all the natural and man-made features within a corridor of railway land on either side of the track. The survey shall be tied to control/traverse points already established by the Consultant.

A rough sketch of the area under survey shall be prepared. All the features shall be numbered and coded as "Strings". Sufficient spot heights shall be observed to accurately represent the land form and provide height information, at regular intervals to produce an adequately detailed digital terrain model.

At the railway stations the railway land on both sides is generally more than the railway land in block sections and ranges from 200 ft to 400 ft on either sides of the railway line. It is not desired to cover the whole land on stations. The scope includes only yards covering station building, platform, all tracks, sidings, stabling lines etc, up to building line on both sides.

The topographic strip survey shall show the position, levels and lines of existing structures and their features, carriage ways, road shoulders, ridges, cliffs, river beds and banks, embankments etc.

Survey of Pakistan (SOP) control points or UTM shall be used for carrying out topographic survey.

The Consultants shall plot the right of way, longitudinal profile, cross-sections, detail of utilities crossing under the track, electrical crossings over the track and other details necessary to make the best possible route for the design speed.

In case of road crossings, the proposed alignment, angle of skew, width of road metalling, shoulders and top levels of the road surface shall be observed on both sides at adequate spots for plotting X-section proposal for under pass/over head bridge be submitted.

Cross sections of railway embankment and profile levelling shall be run at not more than 200 meters intervals. However, where required, due to important features or sudden topographic changes, the said interval should be reduced as per site requirements.

Consultants shall also prepare Longitudinal Profile at the centre of the existing track and centre of new alignment (where applicable) to be plotted on 1/1000 horizontal and 1/100 vertical scale.

The survey data shall be computer processed using suitable software and computer aided mapping carried out to the desired scale. The mapping shall be in thematic layers format or any other better / latest techniques.

5.3.5.6 Marking of Major Track Components and Fixtures

The Consultant shall mark, but not limited to, the following on topographic sheets / drawings showing detailed data of each:

- i) Level Crossings
 - Location (kms) and Level Crossing Number.
 - Sketch of Level Crossing.
 - Type of Level crossing.
 - Width of Gates / Gate Posts.
 - Width and type of Road.

ii) Bridges

- Location (kms) and Bridge Number.
- Sketch of Bridge.
- Type of Bridge.
- Total Span with width of each span.
- Digital Photograph

iii) Curves

- Location (kms from – to--).
- Length of Curve.
- Degree / Radius of Curve.
- Circular or Transition.
- Length of transition
- Super Elevation

5.3.5.7 Units of Measurement

The linear measurement units will be metric and the angular measurement units will be in degrees, minutes and seconds.

5.3.5.8 Data Processing & Production of Drawings

The topographic survey data, electronically recorded in GNSS memory will be downloaded into laptops which will be available with survey crew at site. The data shall be processed and checked at the site for quality and gaps if any.

Further, the observed data will be digitized in the AutoCAD software in the form of point line and polygon. The digitization of the features will be done by creating the feature layers in the AutoCAD software. The different feature layers will have the unique colour, code and symbols so that they can be well distinguished from the other features. Finally, the layouts were prepared on scale 1:2.500 for the entire alignment and 1:1.000 for station areas.

For major crossing of roads and highways longitudinal profiles at scale 1:1.000 / 100 will be submitted.

All drawings will be prepared in A3 format.

5.3.5.9 Preparation & Submission of Topographic Survey Report

This Report shall include the results of topographic survey carried out, as described in above paragraphs.

5.3.6 Geological and Geo-technical Investigations.

5.3.6.1 Finalization of Subsurface Investigation Programme

The Consultants will prepare detailed subsurface investigation programme covering drilling of bore holes, excavation of test pits and field testing during the inception stage keeping in view the investigational quantum specified in the ToR. The drilling programme will be finalized in order to determine the nature and engineering characteristics of soil/rock units encountered along the route alignment and borrow areas etc. The criteria for selecting locations, depths and number of bore holes & test pits for soil investigation should be based on some codal requirements/provisions such as AREMA, AASHTO etc.

5.3.6.2 Preparation of Technical Specifications for Subsurface Investigations

Technical specifications will be prepared for all the subsurface investigation works including surface geological mapping, drilling of boreholes, excavation of test pits, adits and various field tests sampling and laboratory testing.

5.3.6.3 Subsurface Investigations Methods

All drilling operations at the main area other than those in the river will be preferably undertaken using Long year Model 38 wire line equipped with diamond rotary bits. In rock, the drill will advance with coring

equipment. The cores recovered will be logged and preserved in core boxes by the drilling agency under the supervision of Consultants.

In overburden soils, drilling will be advanced by percussion or rotary methods. Standard penetration and permeability tests will be carried out at suitable intervals.

Off-shore drilling in the rivers / Nullahs alluvium will be carried out with both percussion and straight rotary methods, as the conditions permit. The depth of the alluvium in the river bed will be determined. Continuous core drilling in bed rock will be carried out, if encountered. Undisturbed and disturbed sampling in the soil/overburden and rock coring in bedrock will be carried out. In situ testing like standard penetration tests, cone penetration tests and permeability tests will also be performed. Test pits and trenches will be excavated to explore nature of overburden soils overlying the bedrock along the route alignment and in the borrow areas. Approximate size of each pit would be 2.0 m x 2.0 m x 2.0 m.

Investigation Adits will be excavated at each proposed tunnel to explore the nature of overburden, assessment of the rock conditions and rock mass classifications to assess the rock support. The approximate size of each adit would be 2m x 3m x 10m.

As per TOR, the Consultants shall carryout but not limited to the following field testing:

- i). Execution of boreholes in overburden soil/rock, by straight rotary/heavy/light percussion drilling method including backfilling of boreholes to their original position using cement-sand-bentonite mix.
- ii). Continuous core drilling (NW size) in bedrock including preservation of core samples in core boxes, waxing of core samples, photography of rock cores and transportation of core samples to the laboratory.
- iii). Performance of Standard Penetration Tests (SPTs) in the boreholes in overburden soils generally at 1 m depth interval,

including collection and preservation of spilt-barrel samples as per latest ASTM D - 1586.

- iv). Execution of Cone Penetration Tests (CPT) in overburden soils at specified locations along the section as per latest ASTM D-5778.
- v). Collection of relatively undisturbed soil samples (UDS) from each borehole through Shelby/Denison/Pitcher sampler including their waxing, labelling, packing, storage & transportation to an approved testing laboratory.
- vi). Excavation of test pits along the alignment and in borrow areas below top of the ground in overburden soil including backfilling of test pit to original condition.
- vii). Performance of field density tests by sand replacement method in test pits at selected horizons including collection of small disturbed samples in moisture tins, for determination of moisture content as well as labelling, packing, storage & transportation to an approved testing laboratory.
- viii). Extraction of hand-cut Block samples (30cm x 30cm x 30cm) from test pits.
- ix). Collection of composite bulk soil samples (at least 60 kg for sandy/clayey soils & 120 kg for gravelly soils) from test pits including their labelling, packing, storage & transportation to an approved testing laboratory.
- x). Performance of field permeability tests in specified boreholes with soil column or flush bottom condition using constant/falling/rising head method
- xi). Collection of ground water samples (if encountered) from boreholes/test pits including their labelling, packing, storage & transportation to an approved testing laboratory.

5.3.6.4 Supervision of Subsurface Investigations

The investigation work will be carried out by the staff of the sub-contractor. The subsurface investigations will be supervised by the Consultants to ensure execution of all the works by the Contractor as per laid down technical specifications. The supervising geologists/geotechnical engineers will prepare geologic logs of the boreholes and test pits and will maintain the records pertaining to the field tests. They will also decide about the type, sequence and interval of collection of soil/rock/water samples together with the supervision of all the field tests envisaged in the study.

5.3.6.5 Surface Geological Mapping

Geological mapping would be based in the first instance on interpretation of remote sensing information including satellite imagery. This will provide a basic regional map identifying the regional structure, faults, joints etc.

Subsequently, detailed geological mapping will be carried out for major structures relevant to the selected route alignment. A 100 m corridor along the route alignment will be mapped at appropriate scales, such as 1:2,000. On the maps, rock outcrops, soil-talus cover, alluvial deposits, dip and strike of faults and fractured zones will be shown, as well as unstable areas. Additionally, springs, ravines and streams will be mapped. The mapping will also include geological cross-sections and longitudinal sections along all relevant structures, borrow and quarry areas and unstable zones affecting or possibly project components. Extensive use will be made of the 1:10,000 and 1:2,500 scale contour maps and the images to assist in the mapping.

Rock and soil samples will be taken at various locations to assist in the cataloguing of outcrops. Selected samples may be sent to the laboratory for detailed analysis of composition.

5.3.6.6 Rock mass Surveys

As part of normal geologic mapping procedure, numerous joint measurements are required to determine rock fabric and structure at the accessible locations. All joint data are to be recorded and shall include lithology and a description of the discontinuity using standard descriptive criteria (orientation, degree of weathering, roughness, waviness, separation, persistence, spacing, and wall strength). The analysis of discontinuity data is best completed by the presentation of the geologic data utilizing spherical projections. The data shall be available in tabulated form to facilitate data entry in the software like DIPS or other structural geology software.

Information to be gathered about the rock mass will include interpretations or field opinions on:

- i) Strength of rock units and degree of weathering and/or alteration
- ii) The rock mechanical data of sample of representative rocks will be tested on field collected samples

5.3.6.7 Drilling

It is anticipated that the drilling programme could be commenced within 1 month from the start of the study. It is planned to have all drilling completed within three months. The programme we have established is based on the realistic drilling rate. This is an overall rate and allows for moving of the rigs between holes at a site and all down-the-hole testing. This assumption is conservative as our experience in similar geological conditions suggests that greater rates are achievable. However, flexibility needs to be retained in the drilling programme to allow for the inevitable changes that will occur during the course of the studies.

The main objective of the core drilling is to obtain complete geotechnical information on the prevailing conditions. Good quality core recovery makes possible the determination of the mechanical and mineralogical properties of soils and rocks by inspection and laboratory

tests. It is recommended to use at least N-size bits and double or triple-tube core barrels. In certain rock formations it would be even more advantageous to use H-size bits.

All cores will be stored in adequate core-boxes and logged by the Consultant, and will be photographed. Selected samples from the recovered cores will be sent for analysis and/or testing.

5.3.6.8 Field Testing

Field testing will comprise:

- i). Standard penetration tests
- ii). Cone penetration tests
- iii). Field permeability tests
- iv). Field density test by sand replacement method

Standard Penetration Tests

The bearing capacity of the soft rock and the soil is assessed by the use of standard penetration test results at various depths. Data are required for use in all foundation engineering work.

Cone Penetration Tests

Cone Penetration Tests will be performed according to ASTM D-5778.

Field Permeability Tests

Soil and weathered rock permeability will be determined by means of constant and falling head Le Franc tests.

Packer tests (method Lugeon) will be suitable to obtain information on rock mass permeability. This is required for grouting design of foundations and for all seepage considerations. Tests will be carried out in test sections of 3 m, in deep holes as required.

Field Density Test by Sand Replacement Method

The in-situ density of the soil in the project area will be determined by performing Field density tests in the excavated test pits using the sand replacement method.

5.3.6.9 Test Pits

Test pits will be excavated at sites of major structures to establish the presence and character of soils and weathered rock and to take samples for material testing. At places it will be possible to determine the presence of fracture or fault zones, study the character, conditions, spacing and orientation of joints and to establish the presence of unsuitable soil materials. Particularly in borrow areas a considerable number of test pits will be needed to study the mechanical properties of construction materials.

All pits will be re-filled after logging and sampling to minimize hazards to local population and livestock.

5.3.6.10 Laboratory Testing

Laboratory testing is an integral part of the Geotechnical investigation process. The staff members and on site geologists are particularly trained in following industry standards during the collection, preservations and transportation of soil/rock samples. Consultant is well aware of the importance of the quality of samples and believes that this is the most crucial part of investigations that is commonly neglected.

The samples collected during the subsurface and materials investigations will be preserved, properly packed and transported to an approved laboratory for carrying out various laboratory tests in accordance with the design requirements. Consultants will prepare detailed laboratory testing program. Appropriate supervision of laboratory testing will also be provided by the Consultants. The purposes of these tests are.

- i). Classification.
- ii). Strength/deformation characteristics.
- iii). Material permeability characteristics.
- iv). Potential suitability for use as fill material or as aggregate.
- v). Identification of deleterious material.

The range of tests and the scope is set out in the T.O.R which is reproduced below:

Table 1 Laboratory Testing

TESTS	QUANTITY (NOS.)
Sieve Analyses	As suggested by Consultant
Hydrometer Analyses	As suggested by Consultant
Atterberg Limits	As suggested by Consultant
Specific Gravity	As suggested by Consultant
Bulk Density	As suggested by Consultant
Moisture content	As suggested by Consultant
Direct shear test	As suggested by Consultant
Unconfined Compression Test	As suggested by Consultant
Modified Proctor Test	As suggested by Consultant
Tensile Strength Test (Brazilian Test)	As suggested by Consultant
Point Load Test	As suggested by Consultant
Bearing Capacity Test (CBR)	As suggested by Consultant
Swell/Collapse Potential Test	As suggested by Consultant
LA Abrasion Test	As suggested by Consultant
Testing for Chemical Characteristics of water (SO ₄ , CL, TDS, PH value)	As suggested by Consultant

Whereas all efforts will be made to follow the above programme, the Consultants may recommend modifications during the course of work depending upon the type of rocks / materials actually encountered.

5.3.6.11 Construction Material Investigations

The Consultant material expert will conduct thorough reconnaissance of the project and surrounding area to identify suitable potential sources for different materials required for construction. All the available test

results of the existing sources will be collected and reviewed. Laboratory testing will be carried out on representative samples. The potential material sources will be investigated through excavation of test pits so as to ascertain the thickness and distribution of required materials. Representative samples will be collected from test pits and river bed for necessary testing. Existing and potential rock quarries will also be investigated and representative samples will be collected for testing.

In addition to the field and lab testing Consultants shall also provide following information:

- i). Identification of potential borrows pit areas.
- ii). Identification of locally available sources in the vicinity of proposed alignment for coarse and fine aggregates for concrete works and use as ballast.
- iii). Identification of sources of water.
- iv). General geology and topography of the area and their possible effects on the proposed embankment and foundations.

5.3.6.12 Geological and Geotechnical Investigations Report

The Geological and Geotechnical Investigation report should comprise, but not limited to the following:

- i). General description of the site and field activities
- ii). Location of Boreholes and Test pits
- iii). Test pits groundwater elevation measurements
- iv). Undisturbed samples details
- v). Recommendations for borrow areas
- vi). Foundation recommendations and capacity curves
- vii). Results of all tests / investigations and Recommendations
- viii). Results of Geological studies and related maps

5.3.7 Study for Up-gradation/conversion of Level Crossings

The Consultants will inspect all the level crossings existing on the alignment and collect necessary data/ information during the reconnaissance survey and the topographic survey.

The Consultant shall study all level crossings (at grade crossings) with a view to increase the safety of train and road users. The Consultant shall prepare a comprehensive report on all level crossings after taking into consideration visibility of level crossing from track and road, previous accident history, interlocking arrangements, condition of road, road traffic census etc.

Based on the analysis the Consultant also suggests (where required) provision of flyover or underpass and up-gradation of un-manned level crossings into manned level crossing besides shifting, to mitigate chronic problems or closure where above conditions of traffic census do not employ further requirements of the same. The Consultant also estimate the cost of such up-gradation and include it in the overall cost estimate. The Consultants shall prepare and submit a Report to the Client on the completion of this study.

5.3.8 Easement of sharp curves and grades (where possible) to achieve the design speed

After the completion of the topographic survey of the alignment corridor in the section, the Consultants shall study the existing alignment in accordance with the requirements of the design parameters. The alignment shall be redesigned wherever considered practicable and viable by easing out the sharpness of the curves and the gradients.

After carrying out the above study the Consultant shall prepare a comprehensive report regarding their suitability for increased speed and required hauling capacity. The Consultant shall also propose, if so required, the easement of curves to negotiate the proposed increased speed of 160 Km/h. In addition, where necessary the Consultant shall

propose easement of grades either by changing the level of proposed new track or by detouring.

The Consultant also prepare cost estimate of such interventions including the assessment of cost of requirement of additional land (if any) and include it in the overall cost estimation.

The Consultants shall prepare and submit the Report on Easement of Curves and Gradients to the Client on the completion of this study.

5.4 Scope of Services-Part B Bostan-Zhob-D.I. Khan-Kotla Jam Section

The revalidation/revision of the existing feasibility study to make it comply with the revised design parameters of 160 km/hr speed and axle load of 30 tonnes as detailed in sub-section 5.3 (i) above and the design parameters at Appendix-B, shall be conducted by the nominated consultant. The entire infrastructure including right of way shall be proposed for double railway track. However construction of single line or double line will be recommended by the consultant based on traffic volume. The Successful Consultant will focus on but not limited to following:.

5.4.1 Selection of the Alignment

Bostan-Zhob

The alignment for the proposed broad-gauge railway line between Bostan and Zhob is based on the existing alignment of the narrow-gauge railway line between these two destinations. It has been re-aligned wherever necessary to meet with the requirements of easier curves and gradients.

Zhob-D.I. Khan-Kotla Jam

PRACS had identified the following three alternative routes to connect Zhob with D.I Khan on the basis of topo sheets of the area obtained from Survey of Pakistan and Satellite imageries obtained from SUPARCO and physical survey of the area by GPS.

- i). Zhob – Gulkach – Tanai Chowk – Jandola – Manzai – Tank – D.I. Khan

- ii). Zhob – Khajurikach – Kot Murtaza – Tank – D.I. Khan
- iii). Zhob – Kapip – Narwask – Dhanasar Maghalkot – Darazinda – Daraband – D.I. Khan

According to the Feasibility Study Report, the above stated three routes were analyzed regarding the geographical conditions, waterways, tunnels and expected available traffic and a presentation was given by PRACS to the executive committee of Railway Board with Minister of Railways in Chair on 17.07.2007. The Committee approved the route given under item 3 above and show in the plan at Annexure-C. The selection of this route was notified vide MOR notification No. 7(G)/pl-2006 dated 29.08.2007.

The salient features of the above referred selected alignment (Bostan-Zhob-D.I. Khan-Kotla Jam section) according to the existing feasibility study are as under:

- i). Track Structure shall consist of 45 kg rails over Pre-Stressed Concrete (PSC) sleepers at N+7 density (1,640 sleepers per km) with a ballast cushion of 20 cm (8 inch). Standard R.N type elastic fastenings shall be used. The above track structure was subsequently modified to include UIC 54 rails and 30 cm ballast with 150 cm sub-ballast.
- ii). The maximum design speed was 95 km per hour which was later on revised in the concept paper of this project as 120 km per hour.
- iii). Total number of bridges on the section is equal to 768
- iv). Total number of stations on the section is equal to 23 (13 on Bostan-Zhob section and 10 on Zhob-D.I. Khan-Kotla Jam section)
- v). Total number of level crossings on the section is equal to 29
- vi). Total number of tunnels on the section is equal to 04 with total length of 24 km

- vii). The ruling gradient on the section will be as under:
- viii). Bostan to Muslimbagh 1:50
- ix). Muslimbagh to Zhob 1:100
- x). Zhob to Kotla Jam 1:100 (except for a small section where it will be 1:34)
- xi). Maximum degree of curve 3 degree

The above mentioned alignment is to be reviewed / redesigned wherever necessary if required to meet with the requirements of the design parameters detailed in Appendix-B of this document and on the basis of the results of the field investigations to be carried out along the selected alignment as detailed in the following paragraphs.

The Feasibility Study will be reviewed based on the above referred approved alignment.

5.4.2 Re-design of Alignment for 160 km/hr

The previous study was carried out based on speed of 95 km/h and axle load of 22.9 M Ton. The Consultant shall redesign the alignment of proposed route suitable for speed of 160 km/h with axle load of 30 M Ton (HMGB Loading).

In the previous study the minimum degree of curve on the proposed alignment was 3 degree i.e. radius of 582 m. The Consultant shall propose realignment / easement of curves to suite speed of 160 km/h.

If for any particular portion the Consultant considers that attaining of speed of 160 km/h is not possible due to difficult terrain he can suggest speed less than 160 km/h with sound justification.

If for any particular portion the Consultant considers that 160 km/h speed is very costly option he can propose other options at reduced speed with proper cost comparison of both options.

For calculating the line capacity speed combination of passenger and freight trains shall be 160 km/h and 80 km/h.

The Consultant shall study the previously proposed vertical grades and provide expert opinion on suitability of these grades for proposed speeds of passenger / freight trains and hauling loads. Consultant should also suggest remedial measures for easement of grades, like provision of tunnels along with cost comparison of different options.

Particular attention is required from the consultant to envisage connecting areas of high density and activity in terms of land usage. The rail link itself can lead to high density land usage and human activity which needs to be in terms of economics and overall impact on society.

The consultant is required to spell out his criteria for re-alignment (if proposed) through urban and rural areas separately.

5.4.3 Topographic Survey Up-dation / Revalidation.

The Consultant shall update the whole topographic survey, longitudinal section and cross sections. The Consultant shall make necessary adjustment / corrections in topo survey if deemed necessary. The topographic survey will include the following main activities, as already detailed under sub-section 5.3.5 above.

5.4.3.1 Monumentation for the Permanent Control Points

After the selection of the final alignment for the proposed rail link, permanent control points shall be established at important locations along the route as reference system for future use, as detailed below:

The monuments shall be made of pre-cast / cast – in – situ reinforced concrete 15 cm x 15 cm x 75 cm with one cm diameter steel rod in the centre at one km intervals indicating their x, y, z coordinates. One large monument measuring 30 cm x 30 cm x 90 cm of cast in situ concrete will be installed at interval not less than 10 km. This monument can also be of in situ reinforced concrete having round shape and of length of 30 cm.

The permanent monuments are required to remain stable particularly during land slide etc. and shall be so positioned that these can be conveniently referred to during detailed field survey

The monuments shall be fixed at or close to permanent structures at suitable points. The location of which will be agreed in advance with the Employer.

These shall be buried in ground and only 10 cm shall be visible, which shall be painted white and respective number written over it.

The description of all the monuments shall be prepared along with photographs.

5.4.3.2 GPS Survey of the Permanent Control Points

The surface coordinates of all the permanent control points, provided at 10 km intervals along the selected route as reference system, shall be established by global positioning system (GPS) survey and shall be checked with SOP control points in the vicinity of the area of work.

5.4.3.3 Horizontal Control

Horizontal control for topographic survey shall be established by intermediate traversing. The traverse circuits shall be started and closed on the GPS monuments already established during the above mentioned GPS survey.

After verifying the accuracy of traverse circuit at known survey of Pakistan (SOP) control points, the plane control shall be calculated using scale factor. These plane coordinates shall be used for project survey.

Azimuths shall be checked by Polaris/Solar observations at 10 to 15 Km interval.

The minimum acceptable accuracy of the traverse line shall be 1/10, 000 or better.

5.4.3.4 Vertical Control

Vertical control shall be provided by double levelling based national datum established by Survey of Pakistan.

All the traverse points/ground markers established during horizontal control shall be connected to the levelling net.

Vertical mis-closure within the levelling net shall not exceed $+ 10 K$ mm where K is the length of levelling line in kilo-meter.

5.4.3.5 Topographical Strip Survey

The adjusted co-ordinates and elevations of control points/traverse points shall be used for topographic strip survey.

The topographic strip survey shall depict all the natural and man-made features in the width of 200 meter wide corridor, 100 meter on either side of the centre line.

The survey shall be tied to control/traverse points already established. A rough sketch of the area under survey shall be prepared.

All the features shall be numbered and coded as "Strings". Sufficient spot heights shall be observed to accurately represent the land form and provide height information, at regular intervals to produce an adequately detailed digital terrain model.

The topographic strip survey shall show the position, levels and lines of existing structures and their features, carriage ways, road shoulders, ridges, cliffs, river beds and banks, embankments etc.

For bridges angle of skew & up-stream Dn. stream bed levels shall be observed for all crossings water courses, canals, channels etc at sufficient spots. Water courses, canals/channel levels will be taken as strings up to 100 meters from the centre line.

The important rivers shall be surveyed for a distance of 1.5 Km upstream and 0.5 Km downstream including spill channels etc. Cross-sections of river bed shall be taken at suitable points and their position marked on the plan. The level of highest known flood and ordinary low flood shall be noted on each cross-section. In case it is considered desirable to divert the course of river or stream, the best method of doing so shall be examined in consultation with the Employer and necessary topographic survey and cross-sections made.

In case of road crossings, the proposed alignment, angle of skew, width of road metalling, shoulders and top levels of the road surface shall

be observed on both sides at adequate spots for plotting X-section proposal for under pass/overhead bridge be submitted.

The Consultant shall carry out all field work suitable for the string digital data required for Bentley Power Rail Track or other similar software.

The Consultant shall travel through the complete route and check the correctness of major / important existing structures like roads, water way, high tension electric poles etc.

It is assumed that since the last topo survey there are chances of construction of new roads, buildings etc. The Consultant shall mark such new structures on the topo sheets.

5.4.3.6 Location of Station Sites

The following information shall be collected in respect of each site proposed in the feasibility study for the location of various railway stations along the alignment:

Location of the station building on one or other side of the alignment, be indicated keeping in view the convenience of local public, the position of neighbouring, town, approach roads and river etc.

Availability of arrangements for extension of station to meet increased railway traffic in future.

Suitability of site with reference to nature of soil, depth of foundation of buildings and availability of water supply etc.

5.4.3.7 Provision of level crossings & road over/under bridges

The means for crossing of the railway line through level crossing roads over / under bridges to be provided in case of villages owning a large of amount of land on the opposite side of the line or diversions of roads.

5.4.3.8 Rate of land and marking of district boundaries on plans

The approximate rate of land per acre in the project corridor and in the vicinity shall be ascertained and noted.

The boundaries of the districts and tehsils shall be noted and marked on the plans of the project corridor for ease of reference.

5.4.3.9 Development of Digital Terrain Model of the selected corridor

The raw data collected through total station during the topographic strip survey will be directly down loaded to the computer and will be processed using appropriate software.

After the finalization of the computations of the coordinates and elevations of the fields shots duly coded for various entities, separate files will be prepared in DXF format for the specific topographic features such as buildings, roads electric and telephone lines, etc. Files shall be developed for various information layers.

The contouring at one meter interval shall be plotted using appropriate software. The total station data comprising the elevations for the spot heights, topographic features and control points, all taken together will be used for contouring purpose. The contour plot files for each sheet will be prepared in AutoCAD DXF format for superimposition on the topographic details to complete the digital terrain model for the railway line strip.

5.4.3.10 Procurement of Satellite Images

The satellite images for the selected corridor of 0.6 resolutions shall be procured and processed. The digital terrain model prepared under item 5.4.3.9 above shall be overlaid on the satellite images to finalise the digital terrain model to be used for the design of the railway alignment and related structures.

5.4.4 Design of the Selected Railway Alignment

5.4.4.1 Computer Aided Design of the Railway Line

The Digital Terrain Model of the selected alignment, prepared on the basis of the strip survey carried out as per sub-section 5.4.3.9 above, shall be used as the basis for the computer aided design of the railway

alignment, in accordance with the design parameters defined in Appendix-B of this Terms of Reference, by using Pro VI or any other similar software.

Final track levels shall be fixed keeping in view the natural ground levels, free board of waterways, type of bridges/culverts and minimum cushion over these and the governing HFLs in the area.

5.4.4.2 Monumentation of the Designed Alignment

Upon finalization of track levels and grades, control points shall be established on the centre line of the new alignment of the proposed railway line at 500m interval with special reference to transitioned and circular curves (beginning and end point). The monuments shall be made of pre-cast concrete measuring 10 cm x 10 cm x 45 cm with 01 cm diameter steel rod in the centre.

5.4.4.3 Final alignment plans and profiles

The approved final alignment shall be presented as plans and profiles to a horizontal scale of 1:2,500 on A3 paper. Larger format can be used with the approval of the Employer. Contours shall be to an interval not exceeding 1m. The plans/profile drawings shall, as a minimum, show the following:

- Railway centreline with chain-ages at regular intervals, not exceeding 500m;

- Right-of-way limit;

- Horizontal and vertical curves with the chain-ages of the salient points shown; and

- Location (chain-age), brief description and reference of all structures.

5.4.4.4 Typical cross-sections

An appropriate number of typical cross sections along the approved final alignment shall be prepared showing the existing/natural ground, the proposed construction and other appropriate information. The cross-

section will be plotted on 1/200 horizontal and 1/20 vertical scale or as directed by the Employer.

5.4.4.5 Structures

All substantial structures shall be located and briefly described. These structures shall include bridges, viaducts, tunnels, culverts, etc.

5.4.4.6 Earthwork quantities

The earthwork quantities for the approved final alignment shall be estimated to the stipulated accuracy. All principal earthworks items shall be considered including common excavation, rock excavation, common fill, rock fill, etc.

5.4.5 Up-dation / revalidation of Geotechnical and Geological Study

The Consultant shall study the Geological and Geotechnical study report and relevant data and up-date the same by incorporating latest secondary data of the area available with various departments keeping in view latest seismic zoning of Pakistan.

For preparation of updated geological report the Consultant shall also carry out Geotechnical Investigations by drilling bore holes for identification of sub soil strata, Standard Penetration Test (SPT), Rock Quality Designation (RQD) and other lab tests necessary for preparation of comprehensive test reports as detailed under sub-section 5.3.6 above.

According to the feasibility study, there will be four tunnels with total length of 24 km along the selected alignment. Necessary geotechnical field investigations shall as such include the provisions of adits at the site of the proposed tunnels.

Total 20 boreholes with approximate depth of each borehole as 20 meter are proposed for soil investigations, the locations shall be decided in consultation with the Client.

The Consultant shall carryout Surface Geological Mapping (80 meter corridor) as detailed under sub-section 5.3.6 above.

The Consultant identify potential borrow pit areas, locally available sources in the vicinity of proposed alignment for coarse and fine aggregates for concrete works and use as ballast, sources of water.

5.4.6 Up-dation / re-validation of Hydrological Study Report

The Consultant shall study the Hydrological study report and relevant data and up-date the same in accordance with the relevant requirements detailed under sub-section 5.3.4 above.

The Consultant shall collect rainfall and flood records, particularly for the period since previous study and incorporate the same for updating the report.

The up-dation of hydrological report should include examining the phenomenon of flash floods in hilly areas where even sporadic rains result in enormous discharge inundating embankments and structures. The railway line shall be so laid as to completely avoid or mitigate the effects of hill torrents in order to make it an all weather line.

The Consultant shall also carryout hydrologic analysis and design by using applicable computer software such as HEC-1, HEC-2, HECWRC, WSPRO, HEC-RAS, HEC-HMS or other in-house programs.

Already proposed protection works (if any) and flood openings should be reassessed based on latest data and flood records. If any protection work and flood openings necessary for all weather track but not proposed in previous study, the same should be proposed accordingly.

5.4.7 Up-dation of Environmental Impact Assessment (EIA) Report

The Consultant shall study the Environmental Impact Assessment (EIA) study report and relevant data and up-date the same.

The Consultant shall completely redraft the previous report based on current data and information collected from primary and secondary resources.

The Consultants shall prepare / up-date a comprehensive report regarding resettlement of affected stakeholders and their socio economic impacts along with relocation plans / proposal.

Standards to be followed for environmental impact analysis to be followed must be provided by the consultant and compared with the environmental impact of the project.

The environmental study should include effects of both construction and eventual operations.

In terms of choice of technology in all areas of the feasibility study, renewable and alternative sources of energy for reduced carbon footprint should also be studied.

5.5 Scope of Services-Part A&B Quetta-Bostan-Zhob-D.I. Khan-Kotla Jam Section

5.5.1 Study for improvement of Signalling and Telecommunication System

The Consultant shall study the existing signalling and telecommunication system over the entire section i.e. Quetta-Bostan-Zhob-D.I Khan-Kotla Jam and prepare a comprehensive report regarding its existing condition and the up-gradation / improvement of existing system or installation of new modern signalling system to commensurate with the increased speed of 160 km/hr, the line capacity required for catering the future traffic volume.

The new system shall be proposed in consultation with the Client. The Consultant shall also prepare cost estimate of new proposed modern signalling and telecommunication system.

The design of the signalling and telecommunication system shall cover the following essential elements:

- i). Defining signalling and telecommunication system based on traffic forecasts, recommended train speeds and resulting density of traffic for each section.

- ii). Rules & regulations, local requirements, flexibility for operation etc.
- iii). Technical design standards of the proposed systems.
- iv). Study of various modern signalling and telecommunication systems and description of salient design features, broad outline of specifications of the equipment and power supply system etc. of the recommended system.
- v). Yard layouts.
- vi). Cost estimates of the equipment, recurring expenditure, availability of spares, cost of training etc.
- vii). Establishment of maintenance workshops and centres, maintenance structure and organization etc.

The telecommunication system is not limited to the regular telephone communication along the railway line regarding the operational and commercial needs. Efficient and effective railway telecommunication systems are essential to allow transmission of all relevant information from the technical and operational installations along the railway line to the Operation Control Centre (OCC) via cables or wireless systems.

Fibre optic cables are most probable in modern systems due to their high capacity, while for long-distance communication radio links may be used. Local cabling depends on the type of installation and the level of cable load and capacity. The cabling can be designed with copper or aluminium cables of different types and dimensions.

According to the results of the telecommunication concept, number and type of the pieces of telecommunication equipment with its investment costs will be estimated. The investment in telecommunication will be phased to match the development of the rail transportation volume.

The Consultants shall prepare and submit a Report to the Client on the completion of this study.

5.5.2 Rolling Stock Report

Keeping in view the future traffic forecast, based on latest data and scenario like China-Pak Economic Corridor (CPEC), the Consultant shall define the type and design standard of rolling stock.

The Consultant shall also update the requirement of rolling stock (locomotives, coaches, freight wagons, special stock, if any) based on traffic forecasts, location of Loco Sheds, Sick Lines, Washing Lines etc.

The type of rolling stock should be chosen based on sound analysis and understanding of the different aspects of engine and vehicle design. In addition the track and operations should also be kept in view.

The Consultant shall up-date / proposes the requirement and proposed location of Maintenance Facilities, Loco Sheds, Sick Lines, Washing Lines, etc.

5.5.3 Passenger & Freight Traffic forecasting

Passenger and traffic forecasting was carried out during previous feasibility, since previous forecasting is around seven years, therefore, it is desired that proposer passenger and traffic forecasting shall be carried out by the Consultant keeping in view present scenario of China – Pak Economic Corridor (CPEC) and other developments in the country. viii). The traffic and freight survey must include the economical influx of CPEC after development of ML-I and ML-II (Western Corridor).

The relevant professional trade and industry organization such as Chamber of Commerce in Pakistan should also be consulted for traffic forecast analysis.

Proposed fares should also be included in the study. This is crucial in terms of understanding the economic viability of the project. Forecast of earnings based on sound business analysis is also required to know whether the project needs government subsidy after completion for maintenance & operations or not. In case it does then what percentage of operational costs can be funded with railway earnings.

Competition from other modes of transportation should also be included in the study.

In addition, Passenger and traffic forecasting will be carried out for the Quetta-Bostan section in accordance with the procedure / requirements indicated in the following paragraphs:

5.5.3.1 Transport Profiles

In the context of freight and passenger movement the consultant will study the operations of major competitors of Railway i.e. trucks, buses, coaches etc giving focus to large truck and bus terminals /operations with a view to have a competitive edge. The Consultant will also obtain the following information:

- Number of transport agencies

- Origin and destination of main cargo and passenger routes

- Passenger Rates and Freight rates per passenger / ton or per bus / truck to other major cities

- Approximate number of trucks / buses arriving and departing the area

- Actual weight carried by truck by size and type

- Number of passengers carried by busses / coaches by size and type

5.5.3.2 Traffic Diversions

Certain project sections are likely to experience a substantial patronage by traffic diverting from adjacent roads. The extent of the diversion will depend on the relative travel cost in terms of VOC and travel time as compared between the respective project section and the alternate route. The Consultants are expected to develop a simple diversion model in each case.

5.5.3.3 Traffic Growth

Traffic growth models shall be established at the macro and micro levels for overall application and variation on individual routes/sections. Overall growth rates will be established on the basis of growth rates of various transport demand indicators based on historical data to be

indicated in the methodology & approach and in more detail in the Inception Report.

The growth rates established by the National Transport Plan and other studies (so far such information is available) will be taken into account. Overall growth rates may have to be modified for individual routes depending upon socio-economic conditions on the route/influence areas and other local conditions.

5.5.3.4 Growth Estimates

Overall traffic growth tendencies shall be determined & reviewed comparing planned development growth and actual achievement in recent years, establishing a framework of growth relevant to the project, addressing major evaluation factors and then estimating local traffic growth on each project route/section by extending current socio-economic trends in the future influence areas, and interrelating them with traffic on the project routes.

5.5.3.5 Traffic Forecast

After establishing current transportation demand traffic forecast shall be done for the next 30 years using an appropriate model to be developed by the consultants and outlined in the methodology & approach in the Technical proposal and in more detail in the Inception Report. On the basis of this traffic forecast, traffic revenues will also be worked out based on rationalized tariff structure.

The consultant should identify locations where new railway stations may have to be provided depending upon passenger & freight demand.

The traffic sources should be identified and shown on maps in order to rationalize alignment and provision of supporting facilities. The economic and social activity centers should be studied and linked with the rail link.

The other modes of transportation creating competition for the rail link must be studied in order to ascertain the ridership and preferred choice of passengers.

Methodology for determining traffic forecast should be in line with International best practices. Methodology shall be clearly referenced and linked to international standards and the consultant shall get approval for the same prior to start of work.

5.5.3.6 Market Analysis

The over-whelming objective of the market research/analysis shall be helpful in analyzing current transport demand of goods and passengers in the project area and to establish realistic projections. The Consultant will refer to the existing studies and reports, if available on the subject, and carry out his own analysis arrive at a tangible quantification of the following parameters:

- To identify the travelling pattern of passenger and goods transportation

- To ascertain the preferences of passengers and goods transporters

- To determine the needs of passengers and goods transporters

- To identify the social/cultural constrains if any for using one or other mode of transportation.

- To identify the comparative strengths and weaknesses of rail and road traffic.

- To get the perspective of rail and road operators.

- To identify the purpose of travel

For this purpose the Consultant shall review the secondary data available on the subject, interact with the major target groups, hold FGDs, and statistically analyze the data so obtained using SPSS or other similar software for making important inferences.

5.5.3.7 Social Impact Analysis

The Consultant shall also undertake social impact analysis of each alternate corridor in case the project is implemented. The analysis will identify cost of specific social measures deemed necessary to solve the identified issues and to provide additional social benefits, if possible.

5.5.3.8 Traffic Forecasting

Based on the work done as elaborated above the Consultant will describe the traffic potential for the proposed route in terms of Tons Kms for freight and Passenger Kms for passenger.

5.5.4 Estimating Land Requirements

The Consultant shall prepare a report indicating total land requirement for laying of track, construction of stations, maintenance facilities etc. It is proposed that for laying of track 100 meter strip of land on both sides shall be required (total strip width 200 meter). However, the land at proposed stations will be 300 meter on either side.

The Consultant shall clearly identify the land as proposed above, prepare plans indicating the owner of land, reference of relevant revenue record, etc for onward submission to concerned revenue authorities to acquire the proposed land. The boundaries of districts and sub-divisions shall be noted and marked on the plans for ease of reference. The plans should be prepared based geographic coordinate (WGS1984) so that the land can be located during construction.

The Consultant shall provide the cost / rate of proposed land (both DC Price and market value) and same should also be incorporated in the cost estimates.

5.5.5 Electric Power Study Report and Improvement of the Existing Electric Power Supply on Quetta-Bostan Section

The updated report shall include distribution network for supply to stations, yards, residential/office building, colonies, pumping stations and signalling equipment etc.

3.9.3 The Consultant shall also identify the sources of electric supply and also propose electric power generation, if required.

5.5.6 Preliminary Engineering Design

The Consultant shall perform the preliminary engineering design work. This design must include preliminary design of Track Structure along with preliminary design of retrofitting of existing bridges and preliminary design for Construction of new bridges. Preliminary Engineering design must be in accordance with the following requirements:

5.5.6.1 Preliminary engineering design extent

The Consultant shall perform the project preliminary engineering design to an extent/level that will enable the project quantities to be estimated to within an accuracy of +/- 25%.

The Consultant will prepare the tender level design. The tender design will be sufficiently detailed to form the basis of the Construction design later on.

The tender design and drawings will be detailed enough to facilitate the Contractors to prepare their technical bids apropos to the factual requirements of the project.

5.5.6.2 Project preliminary engineering design parameters

The Consultant shall perform the preliminary engineering design based on the railway design parameters given in Appendix B to these Terms of Reference. These design parameters are for guidance only and the Consultant can modify them using his best professional judgment provided the Employer's approval is sought and obtained for any material changes.

5.5.6.3 Preliminary engineering design methodology

All preliminary engineering design work shall be performed in accordance with the relevant American/British Standards, where applicable. Other widely-used international standards may be used subject

to the approval of the Employer. The engineering design methods used shall be the latest subject to being widely used.

Locally available materials shall be adopted as much as possible. Both the construction, operating and maintenance costs shall be taken into account while developing the preliminary engineering designs. Structural designs shall be performed using preferably the strength method.

5.5.6.4 Preliminary engineering design calculations

Where applicable, the preliminary engineering design calculations shall be provided as annexes to the relevant Assignment deliverable. The design calculations shall be clear and sufficiently detailed to enable checking by others. The basis of all design decisions (if not calculated) shall be reported. Metric SI units shall be used throughout.

5.5.6.5 Preliminary engineering design drawings and brief specifications

The principal output of all preliminary engineering designs shall be preliminary colour drawings drawn to an appropriate scale supplemented by brief specifications and schedules. The preliminary drawings shall be to sufficient detail to enable a third party to take-off quantities and to later perform detailed engineering design. All preliminary drawings shall be plotted in colour on A3 paper. Metric SI units shall be used throughout.

5.5.6.6 Preliminary quantity estimates

For each preliminary engineering design, a schedule of estimated quantities for the main items shall be prepared. The quantity take-off sheets shall be provided as an annex to the relevant Assignment deliverable. The quantity take-off sheets shall be clear and sufficiently detailed to enable checking by others.

5.5.6.7 Preliminary cost estimates

For each preliminary engineering design, the Consultant shall derive preliminary cost estimates by applying unit rates or lump sums (as appropriate) to the schedule of quantities.

Foreign currency (preferably United States Dollars) and local currencies shall be shown separately.

For foreign currency costs, the following items shall be shown separately:

1. Imported materials, supplies and equipment;
2. Salaries of expatriate staff; and
3. Company overheads and profit.

For local currency costs, the following items shall be shown separately:

1. Right of Way (ROW) acquisition (not to be included in the economic/financial evaluation of the project)
2. Local materials, supplies and equipment; and
3. Salaries and wages of local staff.
4. Any local taxes and duties shall be indicated separately.

The Consultant may be required to explain any unit rate or lump sum which the Employer considers unreasonable. The estimated costs of any environmental or social mitigation measures shall be taken into account.

5.5.7 Preparation of Cost Estimates

The cost estimates were prepared during previous study but due to passage of more than seven years these are no more valid. Consultant shall prepare fresh cost estimates for both construction and operation & maintenance including the cost of land acquisition.

Based on the results of the engineering investigations, the Consultants will prepare preliminary design / tender design, estimate the quantities of work and costs for entire route. The costs will be given separately for foreign exchange and local currency. Consultants will also

provide BOQ for land, track, structure, signal, telecom, electrical, tunnels, earthwork, sub-ballast etc.

5.5.7.1 Capital Investment

The initial capital requirements/costs of the proposed new work shall be segmented by major groups as associated with this type of work. These work groups include land acquisitions, with details of land to be acquired, separately for Urban & Rural area, cost of construction, maintenance facilities, locomotives, freight wagons, passenger coaches, signalling, Telecommunication, electrical and other miscellaneous capital equipment.

5.5.7.2 Construction cost

The construction cost shall be segregated into major groups such as civil/structural works, track structure, railway signal & Telecommunications, railway facilities, other miscellaneous works and contingencies.

5.5.7.3 Railway Operating Costs

The Railway operating costs are extremely peculiar in nature and comprise fixed and variable costs, divided broadly into maintenance of permanent way and other infrastructure, maintenance of equipment, general charges, train service expenses & marketing expenses, and shall be carefully worked out.

5.5.7.4 Unit Rate Analysis

With the raw data on the local cost of labour, materials, and equipment collected, basic rates for all anticipated items of work such as track, bridges, platforms etc. including structural work shall be developed.

5.5.8 Economic & Financial Analysis

The Economic & Financial Analysis were prepared during previous study but due to passage of more than seven years these and are no more valid, therefore, the Consultant shall prepare the same afresh.

The Economic & Financial Analysis for Quetta-Bostan section shall have to be added to the revised / updated Economic & Financial Analysis Report.

5.5.8.1 Economic Analysis

Economic analysis methods yield a comparison of a project's benefits and costs over time, thereby serving as useful input into the evaluation and decision making process of infrastructure investment. As such, the objective of the economic analysis will be determined if the project is economically feasible from a social or government perspective, i.e. the project shall be deemed to be desirable if the benefits are in excess of the estimated costs.

5.5.8.2 Methodology and Assumptions

The Consultants shall carry out economic analysis, ascertaining potential benefits and cost impacts, quantifying and monetizing these impacts over a 20 year project evaluation period. Three economic evaluation measures such as BCR, NPV & IRR will be used to present the results of analysis of the proposed rail network.

The Consultant will study and outline the methodology and assumptions to carry out the analysis.

5.5.8.3 Evaluation of Results of Economic Analysis and Summary

The relative contribution of the various links/networks shall be worked out and evaluated separately and cumulatively as well.

5.5.8.4 Financial Analysis

Besides economic feasibility it will be analyzed that the project proposed for implementation achieves financial returns sufficient to justify such huge investment. This is also considered necessary from the

standpoint of private sector investors to build and operate such enterprises.

5.5.8.5 Costs and Revenues

The capital and operating costs of the various links and services will be worked out and combined, as mentioned in the previous section.

Revenue derived from freight and passenger transport are the product of the ton-Kms and passenger-Kms delivered, multiplied by the tariff rate. Rail freight and passenger tariff rates will be set with the consideration to the competitive options available to shippers and passengers.

5.5.8.6 Operation Results

Operating results shall be determined by the revenues and costs for each network evaluated.

5.5.8.7 Performa Income Statements

Full 20 year spreadsheet income statement projections shall be prepared for each section/net work. These proforma statements will show annual details of operating costs, net income, and investment returns etc.

5.5.8.8 Investment Results

The investment returns shall be summarized in a table as per specimen below under the following headings analyzing their implications:-

Average annual operating return

Payback period

I.R.R

N.P.V

Investment Return Summary by Network							
Section/ Network	Description	Freight/ Passenger	Average Operating ROI	IRR	Payback period	NPV	BCR

5.5.8.9 Sensitivity analysis

The analysis described above will be built around the traffic projections, estimated capital and operating costs and estimated tariffs for the various types of traffic. The returns reported from these “base case” network evaluations represent the returns expected to be achieved in practice. However, there are significant uncertainties and unknowns at this level of project development. Sensitivity analysis will seek to guide the decision-making process by providing information on the effect on project returns of changes to the base projections and estimates on the project returns.

Sensitivity results will be calculated for each section/network. Sensitivity results will be given in terms of changes to the most meaningful indicator of project performance i.e. the IRR. Sensitivity analysis for each network consists of all combinations of the following conditions.

- High capital costs at 20% increase in total capital costs

- Low capital costs at 20% decrease in total capital cost

- High operating costs at 20% increase in total operations and maintenance (O&M) costs

- Low operating costs at 20% decrease in total O & M costs

- High traffic volume at 20% increase in traffic

- Low traffic volume at 10% decrease in traffic

- Low tariff at reduction in the tariff level

- Very low tariff-a further reduction in the tariff level

- Increase in tax structure by 10%

- Decrease in tax structure by 10%

The IRR sensitivity result will be presented in a single table for all sections / networks compared to the base condition

5.5.8.10 Risk Analysis

The Consultant shall identify the project risks and suggest means to control and reduce them.

Project risk analysis should be carried out identifying different kinds of risks and response and mitigation thereof.

5.5.8.11 Financial Model

The Consultants will develop a financial model for the project considering various financing options of the proposed investment, the expected returns etc identifying any implications.

5.6 Draft Feasibility Report

After carrying various studies as described in the TORs, the Consultant shall prepare and submit Draft Feasibility Report and shall include all technical studies made and conclusions drawn, there from.

5.7 Final Feasibility Report

After having discussion on the Draft Feasibility Report and receiving comments from the Client, the Consultant shall prepare Final Feasibility Report.

5.8 Time for Completion

The Completion period shall be eight (08) months, from the date of commencement. The date of commencement shall be 15 days from the date of signing of the Contract.

5.9 Deliverables

5.9.1 Detail of Deliverables

The Consultants shall provide the following:

Sr.No.	Description / Deliverables	Remarks
1.	Inception Report	Softcopies (5 sets minimum) of all models developed in different engineering, economics and finance related softwares used for analysis in all the study areas of the
2.	Updated Topographic Survey Report	
3.	Updated / revalidated report for alignment	
4.	Updated Plan, Profile and Cross Sections of the redesigned alignment	
5.	Report for easement of sharp curves and grades	

Sr.No.	Description / Deliverables	Remarks
6.	Track Condition Survey Report	feasibility report should be provided on CDs in addition to Ten (10) copies of each report with editable Soft Copy on CD/DVD for detailed scrutiny
7.	Bridge Analysis Report	
8.	Report of study of up-gradation / conversion of Level Crossings	
9.	Updated Traffic and Commercial Survey Report	
10.	Updated Geological, Geotechnical and Seismological Studies Report	
11.	Updated Hydrology Study Report	
12.	Updated Environmental and Resettlement Impact Report	
13.	Financial & Economic Analysis Report	
14.	Updated Signalling & Telecommunication Report	
15.	Rolling Stock Report	
16.	Electric Power Study Report	
17.	Land Requirement / Acquisition Report	
18.	Preliminary / Tender Design	
19.	BOQ & Cost Estimates	
20.	Draft Feasibility Report	
21.	Final Feasibility Report	

5.9.2 Approval of Inception Report

Approval of Inception Report shall not be deemed to supersede or take preference over any requirements mentioned in the TORs which translates into reduction in scope of work by the consultant unless agreed 'specifically' by the client. However, in case the inception report and the eventual feasibility report provides some details more than required as per TORs then it is welcome.

5.10 Mode of Payment

The Client shall make all payments to the Consultant in Pak Rupees. However, the Client shall have no objection and shall facilitate the remittance in foreign currency of the remuneration of the foreign partner to the extent of services rendered by foreign partner with regard to this consultancy assignment.

Payment shall be made as per following schedule:

S.No	Submission of Deliverables (Payment will be done after approval of Deliverables)	%age Payment
1.	Inception Report	5(Five) %
2.	Updated Topographic Survey Report	10(Ten) %
3.	Updated / revalidated report for alignment	3(Three) %
4.	Updated Plan, Profile and Cross Sections of the redesigned alignment	2(Two) %
5.	Report for easement of sharp curves and grades	5(Five) %
6.	Track Condition Survey Report	5(Five) %
7.	Bridge Analysis Report	5(Five) %
8.	Report of study of up-gradation / conversion of Level Crossings	2(Two) %
9.	Updated Traffic and Commercial Survey Report	10(Ten) %
10.	Updated Geological, Geotechnical and Seismological Studies Report	10(Ten) %
11.	Updated Hydrology Study Report	3(Three) %
12.	Updated Environmental and Resettlement Impact Report	2(Two) %
13.	Financial & Economic Analysis Report	10(Ten) %
14.	Updated Signalling & Telecommunication Report	2(Two) %
15.	Rolling Stock Report	2(Two) %
16.	Electric Power Study Report	2(Two) %

S.No	Submission of Deliverables (Payment will be done after approval of Deliverables)	%age Payment
17.	Land Requirement / Acquisition Report	2(Two) %
18.	Preliminary / Tender Design	5(Five) %
19.	BOQ & Cost Estimates	5(Five) %
20.	Draft Feasibility Report	5(Five) %
21.	Final Feasibility Report	5(Five) %

5.11 Provision of Transport to Client:

The Consultant will provide one number brand new Toyota Corollas GLI with minimum 1300 cc engine and automatic transmission or equivalent with registration within two months after signing of contract agreement.

5.12 Time for Completion of Assignment

Completion Period as stated in RFP Clause no. 2.29.1.

5.13 General Requirements

5.13.1 Integrity Pact

The consultant shall sign and stamp the Integrity Pact, as per Standard Format of Pakistan Engineering Council (PEC), in case contract value exceeds Pak Rs. 10.000 Million.

5.13.2 Registration of Foreign Firms with Pakistan Engineering Council (PEC)

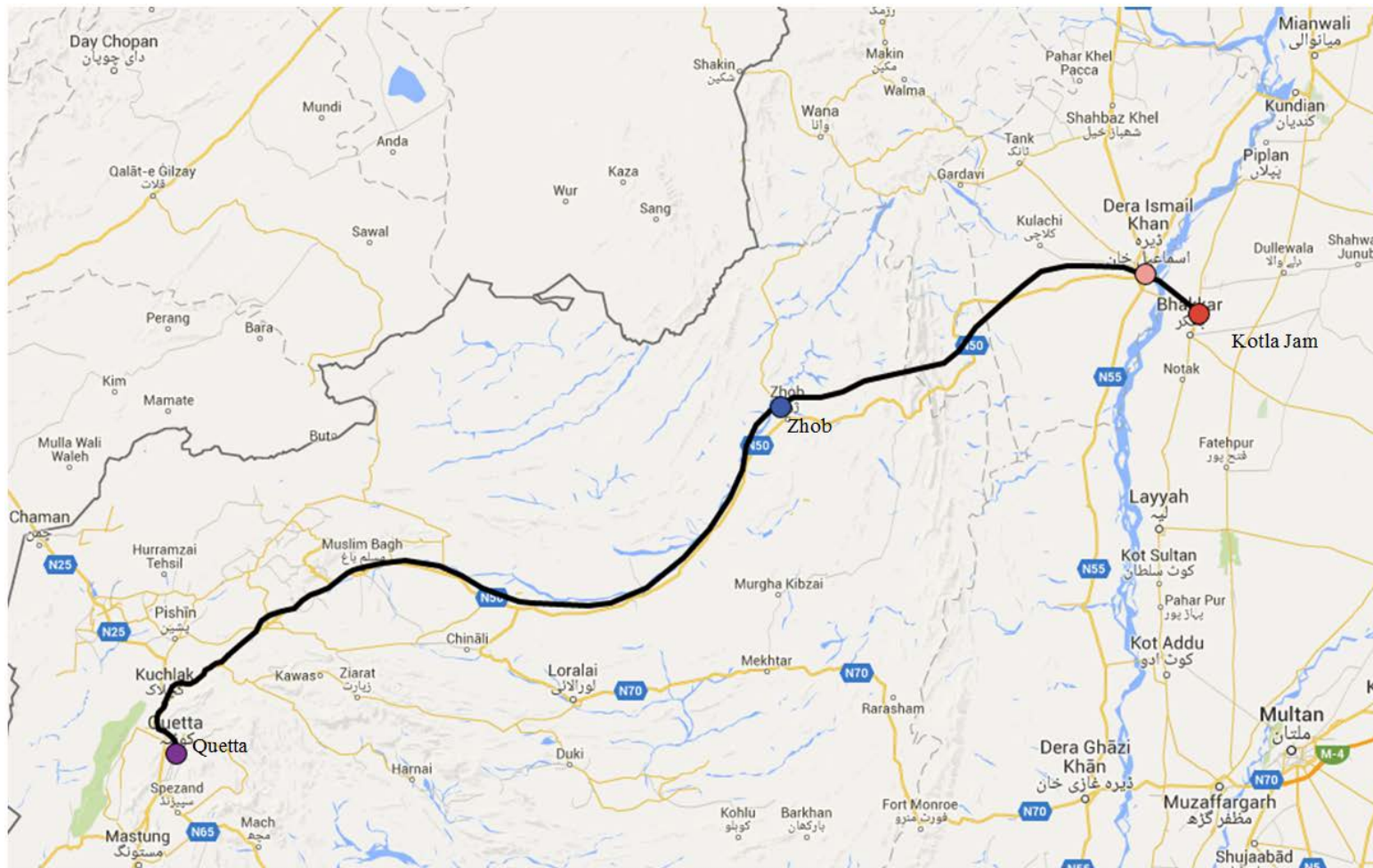
The consultant shall be required to abide by the bylaws of Pakistan Engineering Council (PEC) and foreign firm should get registered with PEC after signing of the Contract Agreement.

5.13.3 Security:

Since the project location is highly vulnerable to terrorist activities therefore special attention should given to safeguarding all installations including track, stations buildings, sheds etc. It is also crucial to study the

costs involved and benefits of monitoring certain sections of track through cameras which are vulnerable to terrorist activities.

Appendix-A : Project Area Map



RFP / TOR for Feasibility Study for Rail Link from Quetta to Kotla Jam

Appendix-B : Track Parameters

	Parameter	Requirements as per TOR
1	Track Gauge	Broad Gauge (1676mm)
2	Single or Double Track	The entire infrastructure including right of way shall be proposed for double railway track. However construction of single line or double line will be
3	Proposed Speed of track infrastructure (freight)	160 km/h
4	Axle Load	30 M. Ton
5	Ruling Gradient	Should not be sharper than existing ruling gradients. Easing out where possible to suit speed of 160 Km/hr
6	Curves	Compatible with speed of 160 Km/hr & with parabolic transition
7	Rails	UIC 54/60 kg/m as per EN standard, continuously welded (CWR)
8	Sleepers	Pre-stressed Mono block Concrete
9	Fastening	Elastic (W-14)
10	Ballast	Crushed Stone, thickness below sleeper as suggested by Consultant
11	Sub Ballast	As suggested by Consultant
12	Line turnouts	60 kg/m rail, suitable for 160 Km/h on concrete bearers, Crossing angle 1 in 16
13	Signalling	Preferably CBI (including CTC and ATP) or as suggested by the Consultant

14	Fencing	Station Yards, Populated areas or as suggested by the Consultant.
15	Type of Traction	<p>Consultant will suggest type of traction i.e diesel or electric</p> <p>For electric traction location of power stations must also be</p>

Appendix-C : Selected Alignment of Zhob-D.I. Khan-Kotla Jam

