REQUEST FOR EXPRESSIONS OF INTEREST
(CONSULTING SERVICES – FIRMS SELECTION)

Country: Islamic Emirate of Afghanistan
Assignment Title: Consultancy Service for Detail Survey and Detail design for Kandahar-Spinboldak Railway Project LENGTH (96 Km)
Duration of Assignment: 09 Months
Implementing Agency: Ministry of Public Works/Afghanistan Railway Authority (MOPW/ARA)
Duty Station: Kabul and Kandahar, Afghanistan
Contract Type: Lump Sum

Reference No: NPD/MOPW/1403/CS-978/QCBS

1. Background

Spin Boldak is a border town and the capital of Spin Boldak District in the southern Kandahar province of Afghanistan, next to the Durand Line, with Pakistan. It is linked by a highway with the city of Kandahar to the north, and with Chaman and Quetta in Pakistan to the south. It is the second major port of entry between Afghanistan and Pakistan, the Wesh–Chaman border crossing. It is also a major transporting, shipping and receiving site between the two neighboring countries. Chaman, on the Silk Road on the eastern side, is the capital of Qala Abdullah District of Baluchistan, Pakistan, situated south of the Chaman border crossing with neighboring Spin Boldak. Chaman has a railway station with daily services with Kandahar and other parts of Afghanistan. A slow passenger train runs between Chaman and Quetta. In 2008, it was proposed to extend this railway through Afghanistan to Central Asia. Chaman is an important trade point in the Baluchistan region, providing a gateway on the trade routes between Afghanistan and Karachi.

Over the last century, there have been proposals to extend the Chaman line to Afghanistan and possibly beyond, passing through Spin Boldak. These proposals have the support of the current Islamic Emirate of Afghanistan. In 2004, the Pakistan Railways did the feasibility study for the connection between Chaman and Kandahar, and also the HP Consultant which is funded by Asian Development Bank (ADB) has completed the studies once again for the railway line from Kandahar to Spin Boldak route.

The total length of main line track of the railway project is about 96 km. this railway line connects Kandahar to Spinboldak as shown in Figure 1-1.

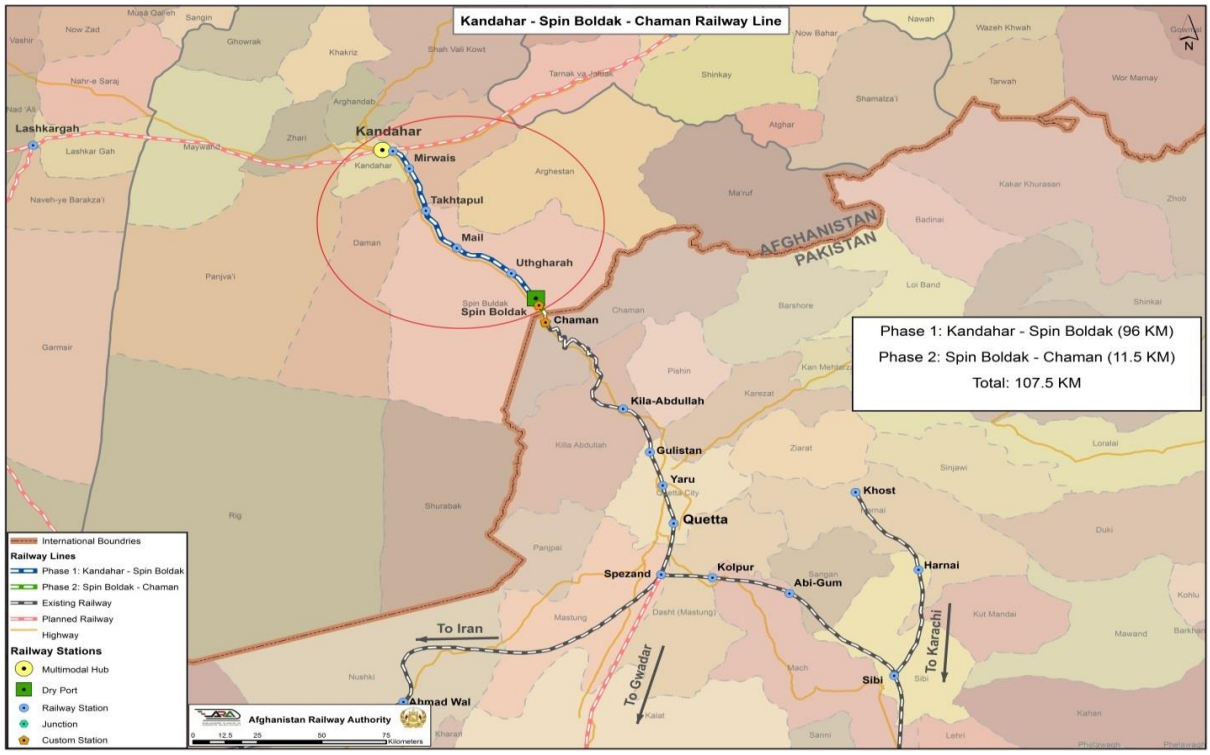

Figure 1: Kandahar – Spinboldak RAILWAY line project [SOURCE: MOPW, GIS Department]

2. Project Objectives

The main objectives of this ToR are detailed survey and detailed design consultancy services for 96 km railway line project, from Kandahar to Spinboldak as shown in figure 1 with all relative services and the whole package in the specified period of time.

- Regional connectivity
- Better utilization of resources
- Employment and job creation
- Economic development
- Development of railway lines.
- Social and environmental safeguard development
- Provide a large-capacity transport channel, which would play a positive role in enhancing the economic and social development in Afghanistan
- Promote the development of mineral resources along the line, so that the resources superiority can be changed into the economic advantages.
- Promote the building of north-south transportation main artery of Afghanistan to strengthen the exchange of goods between Afghanistan and the region countries.

This project is designed to improve the integrated transport network in Afghanistan, promote the development of mineral resources along the line, enhance the social and economic development in Afghanistan and improve the quality of life of residents along the line.

2.1 Ministry of Publics works which is a key governmental institution, has visions to create and maintain transport infrastructure, including roads, Railway and bridges, that effectively promotes the economic, cultural, and social development, as well as the health, education, and well-being of the people of Afghanistan, and are responsible for the development and maintenance of the country's infrastructure. Established in 1312 H.SH, its primary focus has been on designing, constructing, and managing roads, bridges, and Railway and public buildings to support Afghanistan's socio-economic development.

The ministry plays a critical role in improving transportation networks, fostering regional connectivity, and facilitating trade. It collaborates with international donors, private contractors, and local communities to implement projects that align with national priorities.

The Railway Deputy Ministry of Public Works (RD. MOPW) was Founded in 2012 as an independent department under the name Afghanistan Railway Authority (ARA), to oversee the development, regulation, and operation of Afghanistan's railway network. The ARA plays a vital role in enhancing the country's transportation infrastructure by promoting efficient, sustainable, and modern railway systems. Its mission is to support Afghanistan's economic growth by improving regional connectivity, facilitating trade, and providing reliable transportation for goods and passengers.

ARA works on planning and implementing strategic railway projects, connecting Afghanistan with neighboring countries such as Iran, Uzbekistan, Turkmenistan, and Pakistan. Key projects include the Khaf-Herat Railway (149 km), Aqena – andkhoy, Torghondi – Herat, the Hairatan-Mazar-e-Sharif line, and future transnational links envisioned under regional agreements. The authority collaborates with international partners, donors, and experts to develop railway standards, build capacity, and ensure compliance with international regulations. ARA is a cornerstone of Afghanistan's efforts to integrate into regional trade and logistics networks. All services and detailed design activities shall be monitored in the field by the Consultant and the representatives of the Client and if, required to be approved by the authorized representative of the client.

3. Scope of the services

The Consulting Services shall be the Detailed Survey and Detailed Design for the proposed Kandahar – Spinboldak Railway Project with a total length of the main line 96 km from Kandahar province to Spinboldak district near to Durand line, as shown in Figure -1.
Information on the scope of the services, you can access the ToR under the above-mentioned assignment title and reference number on the website: https://ageops.af/da/home

4. Qualification Requirements/Short listing Criteria:

National Procurement Directorate on behalf of Ministry of Public Works, now invites eligible consulting firms ("Consultants") to indicate their interest in providing the services described under paragraph 3 above. Interested Consultants should provide information demonstrating that they have the required qualifications and relevant experience to perform the Services.

The short-listing criteria are:

a) The Consultant should be registered legal entity and should have been in business for at least the last 5 years in providing Consultancy Services of similar assignments. (The consultant is required to provide the Copy of the Certificate of Incorporation issued by relevant authority in country of establishment).

b) The consultant shall demonstrate having sound financial situation by submitting audited financial reports or any other credible financial documents in which the consultant annual turnover for any of the last Five (5) years **(2020, 2021, 2022, 2023 and 2024)** shall be **USD 600,000 (six hundred thousand US Dollars.**

c) The consultant should provide proven experience for a minimum of at least one contract with the value of **USD 540,000 (five hundred forty thousand US Dollars)** in the last Five (5) years of similar nature indicating the duration, value, years of performance, which should showcase the expertise/strength of the consultant for the undertaking such assignments. The Consultant while describing the assignment(s) for similar experience should furnish the following details:

- Consultant should explain in what way the executed assignment(s) was/were similar in nature to the current assignment.
- The Consultant should explain the exact role played by the Consultant in the assignment if the assignment was carried out in association with other firms as JV or in sub-consultancy for carrying out the assignment.
- In order to calculate the monetary value of similar contracts provided by the consultants, consider the size of the inflation rate according to the budget document for the same fiscal year.

d) Consultant having some regional experience is desirable.

e) The requirements for Consultants who intends to associate with other firm(s) in the form of a Joint Venture (JV) or sub-consultancy to enhance their qualifications are indicated as under:

I. The **lead partner is required to be identified clearly** and state the composition and nature of their association (**JV/ sub-consultant**) in their EOI. In case of JV, the following minimum requirements shall be fulfilled:

a) Lead Partner: Shall meet at least 60% of the shortlisting criteria for annual turnover and experiences requirement defined under Part 4 above (**Qualification Requirements/Short listing Criteria)**, paragraphs (b) and (c) respectively.

b) JV Partner: Shall meet at least 25% of the shortlisting criteria for annual turnover and experiences requirement defined under Part 4 above (**Qualification Requirements/Short listing Criteria)**, paragraphs (b) and (c) respectively.

When fulfilling the above minimum requirements, in aggregate, either the lead member and/ or JV partner(s) shall meet at least 100% of the short-listing criteria referred to above.

II. The short-listing criteria provided under Part 4 above (**Qualification Requirements/Short listing Criteria)**, paragraphs (b) and (c) will not be applied for sub-consultant.

f) The Consultant should furnish only true and factual information in the EOI (for itself, its partners and sub-consultant(s), if any). By an act of submission of an EOI against this REoI, the Consultant shall be deemed to be aware that for any misrepresentation by the Consultant in regards to its EOI including any qualification documents/ information about the consultant itself, its partner and/ or sub-consultant detected at any stage of selection process or during execution of the resultant contract, if successful, the Consultant will be prosecuted under the Laws of Afghanistan.

5. Legal References

The attention of interested Consultants is drawn to Chapter 4 of Procurement Procedure: *Process of Request for Proposal, Saratan 1395 issued by NPA, Government of Islamic republic of Afghanistan.* In addition, please refer to the following information on conflict of interest related to this assignment as Rule112 of *Procurement Procedure:* All employees connected with this procurement, Evaluation Committee, Opening Committee, Award Authorities, Members of National Procurement Commission are required, prior to start or approval of any type of Procurement activity; to declare their state of

Conflict of Interest in case such Conflict of Interest exist. The consultants are also required to maintain high standard of ethics throughout the procurement process.

The consultants can download the Public Procurement Law and Procedure from: www.ageops.net.

6. **Method of Selection**
A Consultant will be selected in accordance with the **Quality and Cost Based Selection (QCBS)** set out in Rule 57 of Procurement Procedures.

7. **Submission of EOI**
Expressions of interest must be delivered in a written form to the address below (in person, by mail, or by e-mail) by **January 05, 2025 at 02:00 PM Hrs.** (Kabul Local Time).
The EOI with all details should, preferably, not exceed 40 pages in total

Further information in respect to this REOI can be obtained at the address below by email or in person during office hours *[08:00-03:00 Hours]*.

For the purpose of clarifications, the address is as follows:

Attention: Procurement Plans Integration & Analysis Department – National Procurement Directorate

Address: National Procurement Directorate of General Directorate of Administrative Affairs, Next to Marble Palace, Pashtunistan Watt, Kabul – Afghanistan

Email: npd.bidding3@gmail.com

Copy to: mufti.wasif.arif@gmail.com

Phone No: +93 (0) 202143274

For submission of EOI, the address is:

Attention: Bid Opening Facilitation Secretariat Department of National Procurement Directorate

Address: Room No 111, 1st Floor of National Procurement Directorate of General Directorate of Administrative Affairs IEA, Next to Marble Palace, Pashtunistan Watt, Kabul – Afghanistan

Telephone: +93 (0) 202143219

Email: npd.bofs@aop.gov.af, bofsecretariat.npd@gmail.com, npd.bidding3@gmail.com, mufti.wasif.arif@gmail.com

Annexure 1: Format for Expression of Interest

The expression of interest must be submitted as per the following format:
{Note: In case documents submitted are in any language other than English, the consultant should submit a self-certified copy of the translated document in English (along with originals).}

SECTION 1: Organization Details (In case the EoI is being submitted as a Joint Venture, the information has to be submitted for the Lead Partner as well as other members of the Joint Venture separately.)

<table>
<tr><th colspan="4">Part 1: Organisation Detail</th></tr>
<tr><td>I.</td><td>Name of the Organization</td><td colspan="2"></td></tr>
<tr><td>II.</td><td>Details of the Organization</td><td colspan="2">• Address of the Registered Office:
• Telephone:
• Facsimile:
• Website:</td></tr>
<tr><td>III.</td><td>Information about Organization</td><td colspan="2">• Year of Establishment: (copy the incorporation certificate shall be provided)
• Status of the Organization: (Public Ltd./Private Ltd./LLP etc.)</td></tr>
<tr><td>IV.</td><td>Name and designation of the person authorized</td><td colspan="2">• Name
• Designation
• E-mail
• Contact Number</td></tr>
<tr><td>V.</td><td>Annual Turnover for any of the last Five (5) Financial Years</td><td>Financial Year</td><td>Annual Turnover (Million USD)</td></tr>
<tr><td></td><td></td><td>2020</td><td></td></tr>
<tr><td></td><td></td><td>2021</td><td></td></tr>
<tr><td></td><td></td><td>2022</td><td></td></tr>
<tr><td></td><td></td><td>2023</td><td></td></tr>
<tr><td></td><td></td><td>2024</td><td></td></tr>
<tr><td>VI.</td><td>Number of Personnel</td><td colspan="2"></td></tr>
<tr><td>Part 2</td><td colspan="3">EOI Respondent firm needs to mention its core business areas and any other relevant details / experience in a descriptive format. EOI Respondent firm needs to mention its Technical and managerial capability for executing the scope of services.</td></tr>
<tr><td colspan="4">Please provide a response with details in not more than 2 pages</td></tr>
</table>

SECTION 2: Documents to be submitted

	Information to be provided	Documentary Evidence to be Provided	Page number as part of Annexure
a	The Consultant should be registered legal entity and should have been in business for the last 5 years in providing Consultancy Services of similar assignments. (The consultant is required to provide the Copy of the Certificate of Incorporation issued by relevant authority in	Copy Certificate of Incorporation issued by relevant authority in country of establishment	

	Information to be provided	Documentary Evidence to be Provided	Page number as part of Annexure
	country of establishment).		
b	The consultant shall demonstrate having sound financial situation by submitting audited financial reports or any other credible financial documents in which the consultant annual turnover for any of the last Five (5) years **(2020, 2021, 2022, 2023 and 2024)** shall be **USD 600,000 (six hundred thousand US Dollars).**	Statutory Auditor's certificate (i.e. FY 2020, FY 2021, FY 2022, FY 2023, FY 2024) that provides the information explicitly as per the specific requirement of the criterion. OR Financials statements duly certified by the Chartered Accountant OR Self-certification by the authorized signatory of the EoI mentioning the Annual Turnover for any of the last Five (5) years supported by financial statements or Annual Auditor Reports (for FY 2020, FY 2021, FY 2022, FY 2023, FY 2024) clearly indicating the annual turnover. Please note: The annual turnover quoted must be the annual turnover of the EoI Respondent firm/Lead Partner/JV and not its parent/child company The contact detail (email and phone number with address) for the auditors shall be provided for verification purposes.	
c	The consultant should provide proven experience for a minimum of at least one contract with the value of **USD 540,000 (five hundred forty thousand US Dollars)** in the last Five (5) years of similar nature indicating the duration, value, years of performance, which should showcase the expertise/strength of the consultant for the undertaking such assignments. The Consultant while describing the assignment(s) for similar experience should furnish the following details: ▪ Consultant should explain in what way the executed assignment(s) was/were similar in nature to the current assignment. ▪ The Consultant should explain the exact role played by the Consultant in the assignment if the assignment was carried out in association with other firms as JV or in sub-consultancy for carrying out the assignment.	Details of the experience should be submitted as per format in **Section 3**. Please note: *The credentials cited under this must have been executed by the EoI Respondent or the Lead/JV partner and not its parent/child company*	

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d	Consultant having some regional experience is desirable.	Details of the experience should be submitted as per format in **Section 3**. Please note: *The credentials cited under this must have been executed by the EoI Respondent or the Lead/JV partner and not its parent/child company*	
e	The requirements for Consultants who intends to associate with other firm(s) in the form of a Joint Venture (JV) or sub-consultancy to enhance their qualifications are indicated as under: I. The **lead partner is required to be identified clearly** and state the composition and nature of their association (**JV/ sub-consultant**) in their EOI. In case of JV, the following minimum requirements shall be fulfilled: **a) Lead Partner**: Shall meet at least 60% of the shortlisting criteria for annual turnover and experiences requirement defined under Part 4 above (**Qualification Requirements/Short listing Criteria)**, paragraphs (b) and (c) respectively. **b) JV Partner**: Shall meet at least 25% of the shortlisting criteria for annual turnover and experiences requirement defined under Part 4 above (**Qualification Requirements/Short listing Criteria)**, paragraphs (b) and (c) respectively. When fulfilling the above minimum requirements, in aggregate, either the lead member and/ or JV partner(s) shall meet at least 100% of the short-listing criteria referred to above. II. The short-listing criteria provided under Part 4 above (**Qualification Requirements/Short listing Criteria)**, paragraphs (b) and (c) will not be applied for sub-consultant.		

SECTION 3: Format for furnishing details of Credentials / Past Experiences for projects in undertaking related or similar assignment as at Sl. No. 3 of Section 2. The information needs to be furnished as per the Format below for each credential.

The project citation should be a maximum of 2 pages per credential/project along with documents as mentioned under Sl. No. 3 of Section 2 (above). The citation needs to be furnished for each credential.

<table>
<tr><td>Assignment name:</td><td>Country:
Location within the country</td></tr>
<tr><td>Name of Client:</td><td>Address:

Email and Phone No.</td></tr>
<tr><td>Name of the Legal Entity in whose name the contract is:</td><td>Duration of assignment (months):</td></tr>
<tr><td>No. of man month of the assignment:</td><td>Start date (Month/year):
Completion date (Month/year):</td></tr>
<tr><td>Approx. value of the overall contract (in USD):</td><td>Approx. value of the services provided by your firm under the contract (in USD):</td></tr>
<tr><td>Name of associated organizations, if any:</td><td>Role of Consortium member:</td></tr>
<tr><td colspan="2">Narrative description of the Project:</td></tr>
<tr><td colspan="2">Detailed Scope of services, coverage of the project:
• Consultant should explain in what way the executed assignment(s) was/were similar in nature to the current assignment
• The Consultant should explain the exact role played by the Consultant in the assignment if the assignment was carried out in association with other firms as JV or in sub-consultancy for carrying out the assignment.
• Key-person inputs provided by the Consultant in executing the assignment giving particulars such as qualification and experience of Key staff provided for the assignment (CVs of such key staff are not required to be attached)</td></tr>
<tr><td colspan="2">Relevance of Project to the current scope (i.e. relevant project components in detail)</td></tr>
<tr><td colspan="2">Details of the impact of the project for the client:</td></tr>
</table>

Islamic Emirate of Afghanistan
Ministry of Public Works

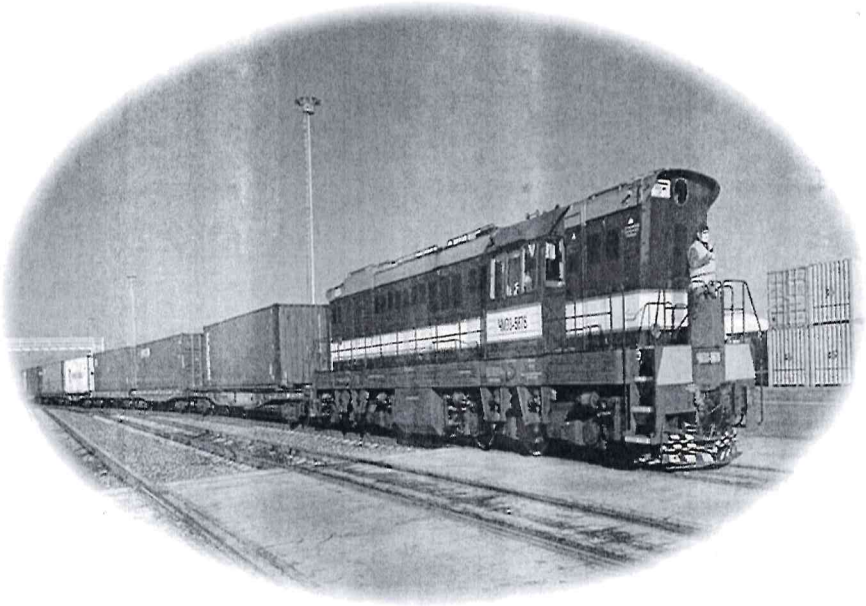
TERM OF REFERENCE

FOR

Consultancy Service for Detail Survey and Detail design for **Kandahar-Spinboldak** Railway Project

LENGTH (96 Km)

CONTRACT (Lump Sum)



2024

Table of Contents

1 PROJECT BACKGROUND

Spin Boldak is a border town and the capital of Spin Boldak District in the southern Kandahar province of Afghanistan, next to the Durand Line, with Pakistan. It is linked by a highway with the city of Kandahar to the north, and with Chaman and Quetta in Pakistan to the south. It is the second major port of entry between Afghanistan and Pakistan, the Wesh–Chaman border crossing. It is also a major transporting, shipping and receiving site between the two neighboring countries. Chaman, on the Silk Road on the eastern side, is the capital of Qala Abdullah District of Baluchistan, Pakistan, situated south of the Chaman border crossing with neighboring Spin Boldak. Chaman has a railway station with daily services with Kandahar and other parts of Afghanistan. A slow passenger train runs between Chaman and Quetta. In 2008, it was proposed to extend this railway through Afghanistan to Central Asia. Chaman is an important trade point in the Baluchistan region, providing a gateway on the trade routes between Afghanistan and Karachi.

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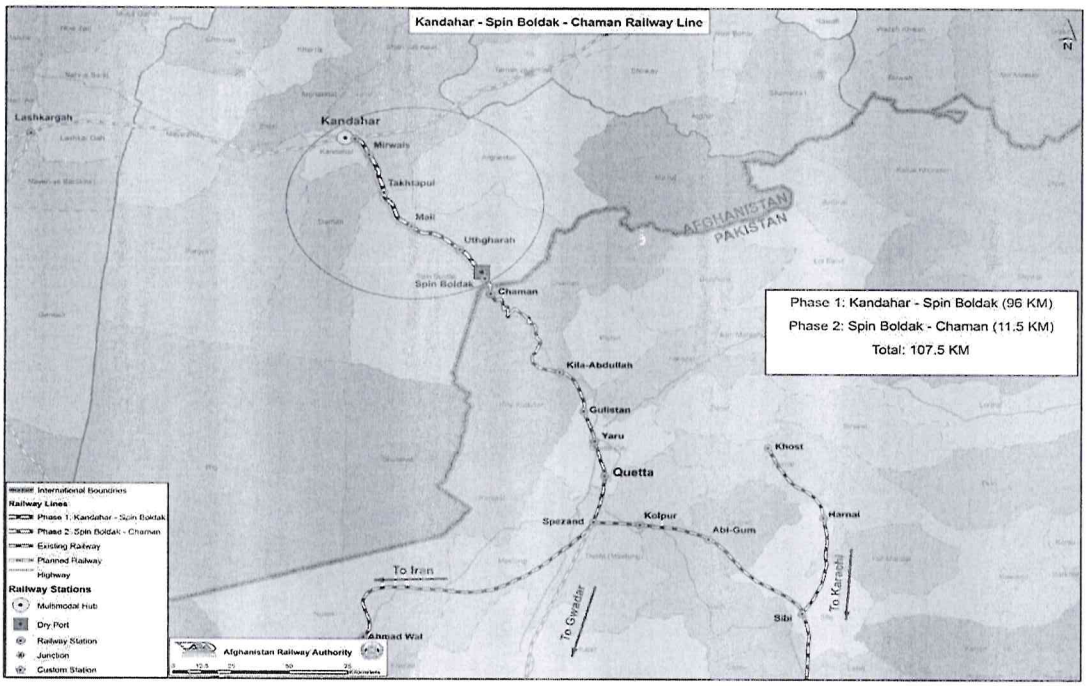

FIGURE 1: KANDAHAR – SPINBOLDAK RAILWAY LINE PROJECT [SOURCE: *MOPW, GIS DEPARTMENT*]

1.1 Project Objectives

The main objectives of this ToR are detailed survey and detailed design consultancy services for 96 km railway line project, from Kandahar to Spinboldak as shown in figure 1 with all relative services and the whole package in the specified period of time.

- Regional connectivity
- Better utilization of resources
- Employment and job creation
- Economic development
- Development of railway lines.
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2 THE CLIENT AND THE CONSULTANT

The Consultant is ( ) and the Client is the Railway Deputy Ministry of Public Works (RD.MoPW). Ministry of Publics works which is a key governmental institution, has visions to create and maintain transport infrastructure, including roads, Railway and bridges, that effectively promotes the economic, cultural, and social development, as well as the health, education, and well-being of the people of Afghanistan, and are responsible for the development and maintenance of the country's infrastructure. Established in 1312 H.SH, its primary focus has been on designing, constructing, and managing roads, bridges, and Railway and public buildings to support Afghanistan's socio-economic development.

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3 SCOP OF SERVICES

The Consulting Services shall be the Detailed Survey and Detailed Design for the proposed Kandahar – Spinboldak Railway Project with a total length of the main line 96 km from Kandahar province to Spinboldak district near to Durand line, as shown in Figure -1. The Consulting Services shall consist of, but not be limited to the following:

- Detail of Reconnaissance survey and Topographical Survey.
- Geological and Geotechnical Study and Investigation.
- Hydrological Investigation.
- Seismological investigation.
- Social Environment investigation.
- Railway Alignment design.
- Railway track Structure Design (Embankment, Subgrade, Sub ballast, Ballast, Sleeper, rail and…etc.
- Design of Bridges and culverts.
- Retaining wall design as per requirement..
- Design of overpass and underpass bridges on the road crossing if required.
- Railway Crossing investigation and design.
- Design of railway Sidings.
- Design of platforms.
- Design of stations (Transit station and grand station) and also Gauge changing facilities in the station if required.
- Railway passenger and freight station buildings, Locomotive Workshop structural and architectural design including Design of Facilities and Services.
- Design of Yards (access roads, track layout, drainage, and with other necessity services.
- Design of Crossing Facility (passing Facility) in case of the intersection of the Railway line with the pipe, Gas, and Electric, such as transmission line, and other necessary Structure or types of equipment.

- Detail design of Signaling and Telecommunication facilities.
- Economic and financial analyses including Preparation of BoQ;

This ToR describes the whole detailed survey and detailed Design Framework Assessment activities. The detailed survey and detailed design focus mainly on addressing the following areas of concern and the Consultant undertakes the following activities, but not limited to:

i. Detail survey of the proposed railway route and stations, yard, and siding along the route, both sides of the center line minimum shall be 100 m right and 100 m left side. But in station, yard and siding area the minimum area shall be surveyed (2500x1000) meter.
ii. Conduct a hydrologic review study including rainfall and flood level data to establish hydrological and hydraulic parameters for fixation of the formation level of the railway embankment and track, opening of the bridges and culverts, design and suggestion of cost-effective feasible water protection structure, and also design of scour, and erosion protection in the vicinity of major bridges and river banks according to the prevailing site conditions.
iii. Carry out detailed geotechnical investigations and soil tests to identify characteristics of soil and determine the whole Geotechnical parameter that affected the design for instance bearing capacity of soil, etc, which are required for the design of Railway tracks, bridges, Viaducts, culverts, embankments, buildings and other structures, also the investigation for the suitable filling materials of embankment.
iv. Identify the various technical options for railway construction involving the design of tracks including signaling facilities and operational facilities such as stations, yard sidings, maintenance sheds etc. with the view of identifying the least cost solution.
v. Prepare detailed geometric track design, design of Prestressed bridges, platforms, Viaduct, retaining walls and culverts (and typical and detailed cross-sections, horizontal and vertical alignments, etc.) for the railway track works, structural works, railway transit and grand stations, railway sidings, freight yard and marshaling yards, platform sheds, etc., as per standard gauge and MOPW specifications and Guidance.
vi. Carry out geological and seismological investigation and responsible for technical environmental hazards and seismic evaluation of proposed railway route and design the most appropriate hazard assessment methodology for earthquakes and environment based on expert knowledge and international best practices.
vii. Prepare the Signaling, Telecommunication and Fiber Optic Cable (FOC) design.

The Consultant should provide detailed plans and drawings which shall include, but not be limited to, the following:

- Cover Sheet
- Key Plan, Project, and Vicinity Map
- Location Map
- Plan and Profile Sheets
- Soils and Materials Investigation Maps
- Typical Cross Sections

- Construction Details
- Cross Sectional and Elevation Views
- Drainage Plan and Profile and Cross-Section Details
- Minor Drainage Structure Drawings
- Railway structure Drawings
- Railway Signs and Markings
- Power Supply and railway Lighting Details
- Utility Relocation Maps
- Ancillary Works / Miscellaneous Details
- Detailed Cross-Sections
- Right-of-Way Plans
- Signaling, Telecommunication and Fiber Optic Cable (FOC) details
- Drawing Index
- Summary of Quantities
- All required data for the completion of design package.
- Other necessary plans.

4 ADDITIONAL RESPONSIBILITIES OF THE CONSULTANT

- The Consultant should provide and guarantee the highest quality of detailed engineering consulting services required to do the detailed survey and detailed engineering design as mentioned above; technical specifications, BoQ, and construction drawings and etc. are the consultant responsibility.
- The validations of detailed survey and detailed design are up to 1 years, so the consultant is responsible for the mentioned services from the date of completion and submittal of project services.
- Because geometric design has been around forever, so whenever an accident happens in the main line, the designing company is responsible.
- The consultant must provide in-person training to the 3 technical person of the Studies and Projecting Directorate of the Deputy Ministry of Railways in the field of Receiver GPS/GNSS uses practically, Drone cameras, processing of DGPS Data, and comprehensive Practical detailed design of Railway signaling.

5 OBLIGATION, DUTIES AND RESPONSIBILITIES OF THE CLIENT

- MOPW will provide the Consultant with all available data, and study reports related to the project including the recently completed feasibility study report Railway Development Study.
- Handover of the project site to the consultant.
- Any assistants required by the consultant from local government Authority.
- It is anticipated that the consultant will commence the services after awarding the contract.

- MOPW confirmed to provide the following counterpart support on a no-cost basis to the consultant team:
    - Assist in obtaining formal consent from all authorities or persons having rights or power in connection with the works or the site thereof:
    - Assist in obtaining all licenses and permits in connection with the study.
    - All counterpart staff necessary for the successful completion of the project, including the appointment of a dedicated Project Manager who will coordinates with the consultant on a daily basis and report to the Program Director, MOPW. Counterpart staff will also have identified and deputed at field locations (out of Kabul Such as Kandahar - Spinboldak to facilitate introduction and interaction with local government agencies and prompt collection of required data from them.
    - The consultant shall prepare a comprehensive plan for on job training of counterpart staff of MoPW during the survey and design of the project.

5.1 Communication Methods & Approaches:

To establish clear and effective communication during the detailed design phase of a project, the following combination methods, approaches, and roles can be specified.

5.1.1. Formal Meetings:

- Kick-off Meetings: To discuss project scope, design expectations, and timelines.
- Progress Meetings: Scheduled regularly to monitor progress and resolve design issues.

5.1.2. Written Communication:

- Emails: For formal correspondence and sharing key updates.
- Memos/Letters: For official documentation and approvals.
- Minutes of Meetings (MoM): To record discussions and action items from meetings.

5.1.3. **Digital Collaboration Platforms**:

- Cloud-based platforms: (e.g., Google Drive, BIM 360) for sharing design files and maintaining version control.

5.1.4. Presentations and Reports:

- Regular design review reports are provided with summaries of progress, challenges and solutions.

5.1.5. Clear Role Definition:

- Clearly will outlined responsibilities for team members to ensure accountability.

5.1.6. Documentation and Archiving:

- Maintain a detailed record of all communications and decisions for future reference.

5.1.7. Conflict Resolution:

- Will Established protocols for resolving disagreements, such as involving a project manager or neutral expert.

5.2 Designation of Individuals for Communication:

5.2.1. Project Manager (PM):

In case of project manager are not hired the studies and projecting director will undertake the overall following responsibility.

- Responsibility: Overall coordination, schedule management, and liaison between client and consultant's Design Coordinator.
- Lead Design Engineers, ensuring compliance with standards, client requirements and Contract Condition & criteria.
- Ensure all documents are stored, shared, and updated correctly.

6 DURATION OF THE SERVICES

The duration of the Services is to extend from the date of effectiveness of the Contract for period of approximately [9] months.

7 Equipment to be provided by the consultant

The consultant must provide the survey equipment and using Drone cameras, GNSS/GPS, and the Total station for the Reconnaissance Survey and Technical Survey, moreover the geotechnical investigation Equipment, and other necessary equipment which is vital for the completion of this stage of the project.

8 DELIVERABLES

The delivery schedule for the design submittals shall developed by the Contractor and approved prior to commencement of design work. The 30% design documents shall be packaged and submitted within 3 months from the contract award date and MOPW shall review the design package and provide its comment and technical consideration within twenty-five days from the submission date:

30% Design Submittal shall include (2 sets A3 size paper copies of drawings, 1 set of reports, analysis, 1 CD with all documents, and a soft design file of Structure)

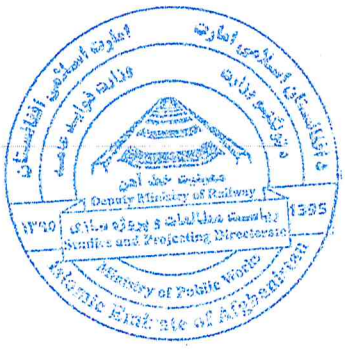
- Survey data report and drawings.
- Design Criteria and detail design plan & profile
- Hydrological report and drawing, Seismological investigation report.
- Geotechnical and geological Report with details.
- Railway track Structure Design (Embankment, Subgrade, Sub ballast, Ballast, Sleeper, rail and Switches…etc.
- Economic analysis including economic analysis of types of structure.

- Design of Prestressed Bridges and culverts including soft file of structure.
- Retaining wall design as per requirement...
- Design of Level Crossing, in Railway Crossing with a road.
- Railway Crossing investigation and design.
- Design of railway Sidings
- Design of Equipment or Structure in case of the crossing of the railway line with wire, gas, and pipe.
- Design of Prestressed overpass and underpass if required
- Design of platforms.
- Design of stations (Transit station and grand station) and gauge changing facilities.
- Railway passenger and freight station buildings, workshop, architectural and structural design with details.
- Design of Yards (access roads, track layout, drainage, and with other necessity services.)
- Signaling and communication facilities.
- Outline of Technical Specifications
- Alignment Drawings
- Typical Cross Section Drawings
- Outline of Financial & Economic Analysis Report

60% Design Submittal (2 sets A3 size paper copies of drawings, 1 set of reports, analysis, 1 CD with all documents)

The 60% of design documents shall be packaged and submitted within 2.5 months from the date that MOPW has been provided its technical consideration in stage 30%. and the MOPW shall review the design package and provide its comment and technical consideration within 15 Days from the submission date:

- Design Analysis/Calculations
- Alignment & Profile Drawings
- Design railway track and Cross Sections at 20m intervals
- Detail Drawings (Bridges, Culverts, Viaduct, Retaining wall, Drainage, geometric design, structures, railway stations, platform, sidings, yards)
- Structural and Drainage Design
- Design of Equipment or Structure in case of the crossing of the railway line with wire, gas, and pipe.
- Design and analysis report of Station buildings.
- Hydrology and Hydraulic Report
- Social environment report
- Technical Specifications
- Detail design and drawing of Signaling and communication facilities with detail Report.
- Bill of Quantities
- Financial & Economic Analysis Report
- Rolling Stock Report



- Design Analysis/Calculations of the whole structure including design soft files of related software.

90% - 95% Design Submittal (2 sets A3 size paper copies of drawings, 1 set of reports, analysis, 1 CD with all documents)

The 90-95% of design documents shall be packaged and submitted within 1.5 months from the date that MOPW has been provided its technical consideration in stage 60%. and the MOPW shall review the design package and provide its comment and technical consideration within 15 Days from the submission date:

Final and Whole package analysis report, technical specifications, and Drawings

The 100% design documents shall be submitted within 5 days from the date that MOPW has been provided its technical consideration in the stage 90-95%.

- Final Drawings
- Final Technical Specifications
- Final Design Analysis/Calculations
- Final Reports
- Final Bill of Quantities
- Final Cost Estimation
- Final plans, specifications, design analysis/calculations soft and hard, reports and BoQ incorporating all corrections and comments from Engineering reviews.

100% For Construction Set Submittal (4 sets of A2 size hard copies of drawings, 1 full size set of drawings for construction, and 2 electronic copies- CD. 4 sets of reports, calculations, Structural calculation report, Auto cad soft copy, Arc GIS Shape file with DEM, original soft copy of the structural design and original Soft Copy of Geometric design, (civil 3d or alternative program) update the standard gauge or UIC Regulation.

9 REPORTING REQUIREMENTS

The Consultant shall prepare and submit specified printed and bound copies of the reports listed below, along with MS Word and PDF format and also DWG format of the required reports and electronic files of drawings and calculations, to the Ministry of Public Works (MOPW).

i. Inception report

The Inception Report is to be submitted within 30 days of mobilization. This will focus on the Consultant's arrangements and Work Program for fulfilling the tasks and responsibilities of the project.

ii. Monthly Progress Report

After submission of the Inception Report at the end of the starting Month, the Consultant will submit brief situation reports (Site Reports) or Monthly Progress Reports (MPRs) to MOPW outlining progress and any relevant project design and implementation issues.

iii. Presentations to the Client: The consultant has to provide presentation of the detailed survey and detailed design of the project; the time and schedule of the presentation will be arranged by the consultant with coordination of MOPW.

iv. Draft detailed design Report

The Draft Design Report shall contain all technical, economic, and financial analysis. It shall include geo-technical aspects, hydrological aspects, geological and seismological aspects, design of bridges, culverts, retaining wall, Stations, Yards, Sidings, Design of Freight and passenger buildings geometric design, telecommunication and signaling.

v. Final detailed design Report

In addition to formal reporting, the consultant will organize consultation meetings with the MOPW during inception and review missions regarding project administration, outputs, deliverables, and achievements; and with stakeholders on all activities under the project as documented in the reports. In connection with these meetings, the consultant will also arrange meetings with other development partners operating in the transport or mineral extraction sectors. The consultant will prepare and circulate minutes of these meetings, and incorporate comments in the reports and activities, as appropriate.

10 REQUIRED EXPERTISE AND PREFERRED QUALIFICATIONS (SKILL)

It is estimated that approximately a total **(130)** person-months of consultants, which include **(28)** person-months of international experts and **(102)** person-months of national experts will be required to complete the assignment. The project team of the consultants would include but not be limited to, the following Specialists.

Sl.No	Expertise	Required Key experts (Number)	Input Man-Month(M-M)
A.	**Key International Professional Staff:**		
K-1	Team Leader / Senior Railway Engineer (International)	1	9
K-2	Railway Alignment (Geometry) and Track structure Design engineer (International)	1	7
K-3	Railway Signal and Telecommunication Engineer (international)	1	5
K-4	Railway Bridge, Viaduct, and Structure Engineer (international)	1	7
	Subtotal (A)	**4**	**28**

B	National Key Experts		
K-1	**Senior Technical Survey Engineer**	1	9
K-2	**Technical Surveyor Engineer**	2	3
K-3	**Civil or Transportation Geometric design Engineer**	1	9
K-4	**Civil Design Structure Engineer (Bridge, Culverts, retaining wall, Overpass and Underpass)**	1	9
K-5	**Civil Design Structure Engineer (Buildings, Railway workshop, Locomotive maintenance building, and Related Structures in the station.**	1	9
K-6	**Mechanical Engineer**	1	3
K-7	**Electrical Engineer**	1	5
K-8	**Hydrologist and Hydraulic Engineer.**	1	6
K-9	**Geotechnical Engineer**	1	6
K-10	**Environmental and Social Expert**	1	3
K-11	**Economist/Financial Analyst.**	1	7
K-12	**Traffic engineer.**	1	3
K-13	**Civil/ Architect Engineer**	2	3
K-14	**CAD Operator**	1	9
K-15	**Survey Helper and Rodman**	4	3
Subtotal		**20**	**102**
Total		**24**	

11 JOB DESCRIPTIONS AND MINIMUM QUALIFICATIONS

The job descriptions and minimum qualifications of the key/other professionals for the core Team of Consultants shall be as given below furthermore, the geometric design Engineer, Structure design engineer, and Signaling Engineer must have related experience in Railway Projects:

SL	Positions	Job Descriptions	Minimum Qualification
1	Team Leader / Senior Railway Engineer (International)	Coordination with the EA and management of the consulting team to undertake the following: i. Review of all available materials and reports including special attention to the highly relevant recent financed Railway Development Study. ii. Carry out detailed reconnaissance survey and assess the various alternative routes of the rail link duly considering the topography, land formation, area, and future development plans of the Government in the region and suggest the most suitable route among proposed routes with comparative scenario of the various alternative routes. iii. Direct all necessary survey and engineering designs required to fulfill the terms of reference. iv. Direct all necessary institutional, financial and economic assessment as required to fulfill the terms of reference v. Direct the development and implementation of the project safety plan. vi. Prepare implementation schedule and detailed work plan.	• Postgraduate degree, preferably a Master's Degree, (Licensed or registered engineer is a benefit) in Transportation, Civil, or railway engineering, with 12 years of relevant experience. • Familiarity with procurement processes and contract management (e.g., FIDIC or similar frameworks). • Previous experience in Asian countries is preferred. • Must have related experience in Design Management. • Certification in Project Management (e.g., PMP, PRINCE2) • Specialized certifications related to railway systems, such as IRSE (Institution of

		vii. Able to Prepare and check Standard technical specifications for the whole part of the Project.	Railway Signal Engineers) or similar, can be advantageous. • Proficiency in railway design standards (e.g., UIC, AREMA, or relevant national standards). • Strong knowledge of: • Track alignment and design. • Railway signaling and communication systems. • Structural design for bridges, stations, and other railway infrastructure. • Environmental and safety considerations in railway projects. • Experience with design software such as AutoCAD, Civil 3D, Bentley Rail Track, or similar tools.
2	Railway Alignment (Geometry) and Track structure Design engineer (International)	Under the direction of the Team Leader and in association with other team members: I. Identify railway design plan, codes and standards and also material specifications for the construction selected route. II. Identify and design the various technical options for railway construction involving track and bridges including signaling facilities and operational	• Graduate degree in Transportation engineering, Civil Engineering and/or railway engineering, with expertise in Railway track design, with 8 years of relevant experience.

		facilities such as stations, yard sidings, maintenance sheds etc. with the view of identifying the least cost solution. III. Prepare detail designs (and detail cross-sections, horizontal and vertical alignments, etc.) for the railway track works, structural works, railway stations, railway sidings, freight yard and marshaling yards, platform sheds etc., for the proposed alignment as per the Government's specifications and international standards.	• Previous experience with Asian countries is an added advantage. • Related experience in Railway Geometric design with 9 Years.
3	Railway Signal and Telecommunication Engineer (International)	i. Conduct field surveys and prepare field sketches of signal locations for the design team. ii. Prepare and review the signal system construction schedule and identify work that is most critical in terms safety and accuracy of the project. iii. Provide markups of railroad signal drawings using project specific drawing markup standards. iv. Create reports and other documents, as required for projects. v. Produce Signaling design as required, confirming that it meets the requirements given in the scope of works and that the operational, technical and safety principles have been met vi. Lead a team of designers undertaking signaling design	i. Bachelor's Degree in: Electrical Engineering, Electronics Engineering, Telecommunications Engineering, Railway Systems Engineering Master's Degree in a related discipline is often preferred. ii. 10 years of professional experience in railroad signaling industry. iii. Certification from IRSE (Institution of Railway Signal Engineers) or AREMA (American Railway Engineering and Maintenance-of-Way Association)

		activities while ensuring that delivery is technically accurate, to time and budget, and provide support and guidance to less experienced team members. vii. Monitor (or undertake where applicable) the development of engineering options giving consideration to safety, reliability, operational capacity modelling, maintainability, ease of construction, and environmental/whole life issues viii. Carry out independent checking of signaling design documentation. ix. Support the provision of adequate resourcing for project design, in both the quality and quantity of internal and supplier staff, and in the use of the most appropriate support equipment. x. Provide project management advice in respect of all signaling construction activities, including testing and commissioning and site supervision.	and/ or any other acceptable authority. iv. Knowledge of signaling systems, such as: 1. CBTC (Communication-Based Train Control) 2. ETCS (European Train Control System) 3. Automatic Train Control (ATC) 4. PTC (Positive Train Control) v. Ability to travel as required to job sites. vi. Knowledge of Rules Standards and Instructions applicable to railroad signal systems. vii. Knowledge of GOST and AREMA standard Communication & Signal recommended practices.
4	Railway Bridge, Viaduct and Structure (International)	i. Directs and/or performs simple to complex bridge design and analysis in the rail roads and highways.	• 10 years of professional experience in progressive bridge design and rating wall

		ii. Be responsible for the development and review of engineering calculations, drawing details, specifications, quantities and cost estimates. iii. Provides technical direction, on-the-job training, and opportunities for technical growth and knowledge sharing to expand the technical capabilities of the MoPW bridge and Viaduct design team, and mentor and assist junior engineers in developing final design plans iv. Lead the structural design for all project types, including complex bridge designs; v. Could to lead and design of Viaducts vi. Assist project managers with scoping and budgeting for structural work and be responsible for quality assurance of deliverables. vii. Develop and/or assist in developing specifications, cost estimates, and prepare final bid packages viii. Work with Project Managers and Sr. Rail Engineers to coordinate the design and management of projects involving transportation in railroad and transit facilities and property. ix. Manage bridge design task assignments for the bridge	in highways and railroads. • Bachelor's degree in Civil Engineering, Transportation Engineering with a Structural Engineering focus. • Master's Degree in Civil Engineering with Structural Engineering focus. • Experience with structural analysis software packages including Midas, Bentley's CSI programs. • Experience with completing railroad bridge load rating in accordance with FRA requirements. • Experience designing structural steel bridges, precast prestressed concrete bridges, and drainage structures such as box culverts and large vaults and stilling basins. • Understanding of structural engineering principles and the ability to utilize those skills to provide innovative solutions

		team including preparation of design calculations, development of contract drawings, specifications, and cost estimates. x. Assure that the bridge structures are designed in accordance with approved international and local requirements and the construction is implemented in accordance with accepted industry practices and procedures. xi. Prepares and issues specifications, data sheets, and other construction documents. xii. May be required to provide the seal and signature of the professional engineer, as appropriate, ensuring compliance with all applicable codes, regulations, and ordinances.	for complex structural engineering problems. • Must possess excellent analytical, technical, and communicational (oral and written) skills. • Must have related experience in design of Railway Bridge and other Railway structures. • In-depth knowledge of railway design standards (e.g., AREMA, UIC, GOST).
5	Senior Technical Survey Engineer (National)	Carry out detailed topographic surveys of the viable route to the needed accuracy using Satellite Base Survey equipment (DGPS, Drone, Data Logger & Total Station) that can be used for detailed engineering design and construction. The minimum requirements for topographic maps are at a scale of 1:1000. All the specifications of these surveys are to be followed as per the latest standards of Geodesy and Cartography of the Islamic Emirate of Afghanistan.	• Bachelor's degree and Master's Degree is preferable. • Senior Surveyor shall have degree in geodesy engineering, and expert in survey, with 6 years relevant experience, previous experience in survey of railway or Road project.

		➢ ***Data Processing and Mapping:*** • Process raw survey data using software such as AutoCAD Civil 3D, Leica Infinity, or Trimble Business Center. • Generate detailed maps, plans, and drawings for use in design and construction. • Verify data accuracy and ensure consistency with project specifications. ➢ ***Collaboration and Reporting:*** • Work closely with engineers, architects, and project managers to understand survey needs and provide accurate data. • Prepare and submit clear and detailed survey reports, maps, and charts. • Participate in project meetings to present findings and provide technical input. •	• He should have working knowledge in Remote Sensing and Geographic Information Systems (GIS).
6	Technical Surveyor Engineer (National)	Carry out detailed topographic surveys of the viable route to the needed accuracy using Satellite Base Survey equipment (DGPS,Drone, Data Logger & Total Station) that can be used for detailed engineering design and construction. The minimum requirements for topographic maps are at a scale of 1:1000. All the specifications of these surveys are to be followed as per the latest standards of Geodesy and Cartography of the Islamic Emirate of Afghanistan.	• Bachelor's degree and Master's Degree is preferable. • Technical Surveyor shall have Degree in geodesy Engineering Survey. He should have working knowledge in Remote Sensing and Geographic Information Systems (GIS). He should have a minimum of 5 years'

			relevant experience in Survey of Rail way or road project
7	Railway Alignment (Geometry) and Track structure Design engineer (National)	ii. Lead the development of geometric designs for complex railway projects. iii. Coordinate with project managers to ensure design deliverables are completed on time and within budget. iv. Interface with clients, discuss project requirements, and present design solutions. v. Conduct advanced geometric analysis and simulations to optimize railway alignments. Ensure all designs comply with safety standards and environmental regulations.	• Bachelor's or Master's degree in Transportation Engineering, Civil Engineering, railway Engineering, or a related field. • Minimum of 7 years of experience in railway or Road geometric design and 6 year in pavement or railway truck design, Expertise in railway design software Rail Track, Civil 3D, or related fields. In-depth knowledge of railway design standards (e.g., AREMA, UIC, GOST).
8	Railway Bridge, Viaduct, and Structure Engineer (National)	i. Directs and/or performs simple to complex bridge design and analysis in the railroads and highways. ii. Be responsible for the development and review of engineering calculations, drawing details, specifications, quantities and cost estimates. iii. Lead the structural design for all project types, including complex bridge designs; iv. Assist project managers with scoping and budgeting for structural work and be	• 6 years of professional experience Structure design, such as bridge, culverts and retaining walls. Experience in structures design of railway Project are preferred than structure design of Road Project. • Bachelor's or master's degree in Civil or Transportation Engineering with focus on Structural Engineering.

		responsible for quality assurance of deliverables. v. Develop and/or assist in developing specifications, cost estimates, and prepare final bid packages vi. Manage bridge design task assignments for the bridge team including preparation of design calculations, development of contract drawings, specifications, and cost estimates. vii. Assure that the bridge structures are designed in accordance with approved international and local requirements and the construction is implemented in accordance with accepted industry practices and procedures. viii. Prepares and issues specifications, data sheets, and other construction documents. ix. Have the ability to create the BIM model for railway projects.	• Experience with structural analysis software packages. • Related Experience in designing structural steel bridges, precast prestressed concrete bridges, and drainage structures such as box culverts and large vaults and stilling basins. • Understanding of structural engineering principles and the ability to utilize those skills to provide innovative solutions for complex structural engineering problems. • Must possess excellent analytical, technical, and communicational (oral and written) skills. • Preferable to have related experience in the design of Railway Bridge. • In-depth knowledge of railway design standards (e.g., AREMA, UIC, GOST).
9	Civil Engineering Buildings,	i. Directs and/or performs simple to complex building design and analysis in the stations and yards.	• 5 years of professional experience in Design of railway Building

	Workshop, and Related Structures (National)	ii. Be responsible for the development and review of engineering calculations, detail drawings, technical specifications, and BoQ. IV. Be responsible for Creating Loading, analyses, and design of Concrete and Steel structures. V. Be responsible for consideration of cost-effective types of structure. VI. Assure that the Railway Building are designed in accordance with approved international and local requirements and the construction is implemented in accordance with accepted industry practices and procedures. VII. Be responsible for Creating a comprehensive design Report and detail drawing for railway buildings in accordance with accepted Standard.	especially concrete and steel Building. • Able to use Csi software in design. • Bachelor's or master's degree in Civil Engineering focus on Structural Engineering specifically on design of Concrete and Steel Structure. • Understanding of structural engineering principles and the ability to utilize those skills to provide innovative solutions for complex structural engineering problems. • Preferable to have related experience in the design of Railway Structures and Railway Projects. • In-depth knowledge of railway design standards (e.g., AREMA, UIC, GOST).
10	Mechanical Engineer	• i. Directs and/or performs simple to complex firefighting systems design, and mechanical system design in the station Building, and station yards. • ii. Be responsible for the development and review of firefighting and mechanical systems calculations, design, detail drawing, for station buildings and station yards.	• Bachelor or master Degree in Mechanical Engineering with 5 Years of Progressively Experience in a Similar Field. and should have a good knowledge of Computer Programs • Understanding of mechanical engineering principles and the ability to utilize

		• Prepare technical reports, maps, and presentations summarizing mechanical findings and recommendations for project stakeholders. • Be responsible for Creating a comprehensive Mechanical Design Report and detail drawing for the railway Project in accordance with accepted Standards.	those skills to provide innovative solutions for complex mechanical engineering problems.
11	Electrical Design Engineer (National)	• Develop detailed designs for electrical systems for buildings, including lighting, power outlets, lightning protection, mechanical and HVAC power, site power distribution MV&LV including distribution transformer, CT, PT, metering medium pole, bus bar, feeders, CB, ATS, MTS, synchronize panel for Gen Set, diesel generators, switchboard, panel boards, grounding system, lighting arrester, street lighting, power system, wiring system, load calculation, site layout, and fault level analysis. • Design internet systems for building, fire alarm system, CCTV systems, security, remote monitoring and access control systems. • Create specifications and technical descriptions for all electrical systems and equipment. • Conduct electrical audit and load analysis for electrical and PV systems.	• Bachelor's degree in electrical engineering is required. A Master's degree in electrical engineering is preferred. • Minimum of 10 years of proven experience as an Electrical Design Engineer. Additionally, 2-3 years of experience in solar PV systems design, either on-grid/off-grid and hybrid systems is required. Strong knowledge in solar PV modules, trackers, and inverters is essential. • High proficiency with AutoCAD and other design software such as DIALux, Pvsyst, ETAP, PowerWord, Matlabe, PV*SOL

12	Hydrologist Engineer (National)	Conduct a hydrologic review study including rainfall and flood level data to establish hydrological and hydraulic parameters for fixation of the formation level of the railway embankment and track, opening of the bridges and culverts, and also design of scour and erosion protection in the vicinity of major bridges and river banks according to the prevailing site conditions. Quantities and cost estimates.	Bachelor or master Degree in hydrological/civil Engineering or hydro metrological, Geology Engineering. With expertise in hydrological engineering and 5 years of relevant experience.
13	Geotechnical Engineer (National)	I. Carry out geotechnical investigations and soil tests to identify characteristics of soil and determine the bearing capacity of soil required for the design of bridges, culverts, embankments, buildings, and other structures, II. Carry out soil tests to identify characteristics of soil behavior during the ground motion due to seismic.	Graduate degree in civil, geological or geo-technical engineering, with expertise in geo-technical study and design engineering and 5 years of relevant experience.
14	Environmental Social Expert (National)	i. Conduct an Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) due to the implementation of the railway link and their mitigation measures and also submission of an Environment Management Plan (EMP) as per the ADB's *Safeguard Policy Statement (2009)* and Government's policies. The provision for implementing the recommendations of EIA has to be incorporated in the bid document.	Graduate degree in environmental engineering/science/ with 5 years' experience in transport sector related projects.

15	Transport Economist (National)	Conduct the economic and financial analysis. In addition to the standard *With* and *Without* Project framework, the economic analysis should apply a Multi-Criteria Analysis (MCA). At a minimum, the economic analysis should address the following: (a) demand forecasts for the proposed railway considering the quantity and type of goods to be transported and possibility of passenger service; (b) direct benefits owing to rail operations in lieu of other modes of transport ;(c) Indirect benefits such as induced economic development. The financial analysis should focus on the long-term viability of operations.	Postgraduate degree in economics or finance with 5 years' experience in transport sector related projects.
16	Financial Analyst (National)	Conduct the economic and financial analysis. In addition to the standard *With* and *Without* Project framework, the economic analysis should apply a Multi-Criteria Analysis (MCA). At a minimum, the economic analysis should address the following: (a) demand forecasts for the proposed railway considering the quantity and type of goods to be transported and the possibility of passenger service; (b) direct benefits owing to rail operations in lieu of other modes of transport ;(c) Indirect benefits such as induced economic development. The financial analysis should focus on the long-term viability of operations.	Postgraduate degree in finance/economics with 5 years' experience in transport sector-related projects.
17	Traffic engineer. (National)	• Study traffic patterns and collect data on vehicle counts, speeds, and pedestrian activity. • Use software and tools to model and simulate traffic systems.	• A Bachelor degree or master degree in civil/Transpiration engineering. • Experience 4 years in traffic engineering • Knowledge of traffic control and management principles

		• Develop traffic control plans, including road signs, traffic lights, and lane markings. • Design safe intersections, roundabouts, and other road layouts. • Recommend and implement measures to reduce traffic congestion and improve safety. • Conduct road safety audits and propose safety improvements. • Ensure designs comply with local, state, and national traffic regulations. • Collaborate with urban planners, civil engineers, and government agencies. • Provide input on transportation infrastructure projects, such as roads, highways, and parking systems. • Communicate plans and recommendations to stakeholders, including government officials and the public. • Prepare technical reports, studies, and presentations.	• Excellent organizational, analytical and problem-solving skills • Knowledge of traffic management systems and road safety principles. • Proficiency in CAD software and Geographic Information Systems (GIS).
18	Civil/ Architect Engineer (National)	• Designing, analyzing, and altering plans, prototypes, or structures. • Ensuring building plans, prototypes, and structures are operating safely, efficiently, and reliably. • Identifying and solving problems in building plans, prototypes, and structures. • Ensuring building systems are functional, reliable, and safe. • Testing and evaluating building systems to find problems and improvements.	• A bachelor's or master's degree in architectural or civil engineering. with 5 years' experience • Current knowledge of industry trends, technology, codes, and regulations. • The ability to diagram designs both manually and with computer-aided drafting.

		• Reading, interpreting, and explaining complex technical documents.	• Good team working and communication skills. • An excellent working knowledge of science, mathematics, and engineering principles.
19	CAD Operator (National)	• Use software to create detailed 2D or 3D designs for complex projects. • Modify and revise designs to incorporate project changes, client feedback, or site adjustments.	• A bachelor's or master's degree in architectural or civil engineering. With 5 years' experience. • Extensive knowledge of the company's preferred software. • Strong communication skills. • Ability to collaborate with others to solve problems. • Firm grasp of mathematics, engineering, and industry information.

12 DESCRIPTION OF THE MINIMUM REQUIREMENT SCOPE OF THE PROJECT

The consultant shall consider the following minimum requirements which are recommended in the feasibility report, for the completion of entire project, each and every activity or task is described shortly, the consultant shall observe all the requirements, Specification and Laws of MoPW and international standards for the completion of the project. If the consultant has suitable recommendations any of the activities and tasks, before to apply, they have to take approval from MoPW.

12.1 Economic and Financial Analysis

(i) The analysis of the economic cost should be carried on the basis of the following (not limited to): (a) net investment cost; (b) net operating cost; (f) cost of earthworks; (g)

cost of all component of the railway line; (h) construction cost of bridges based on the type of the bridges and its durability, culverts, Viaducts, retaining wall and protection works; (i) cost of operations and maintenance (O&M) of the railway; and (j) other identifiable potential economic and social costs.

(ii) The economic benefit analysis shall be conducted on the basis of the following: (a) net operating revenue; (b) consumer and/or producer surplus; (c) reduction of traffic accidents; (d) time-saving due to undisturbed transport of passengers and goods; (e) reduction of fuel costs; (f) reduction of pollution and hazards; (g) induced economic development; and (h) other identifiable potential economic and social benefits.

(iii) Risk and sensitivity analysis shall be conducted. The consultant is encouraged to perform a risk analysis considering: (a) a range of parameter values to assess the relative importance of different sources of risks to the project; and (b) to systemically assess the reliability and robustness of the base case estimates.

(iv) Financial analysis shall include the findings the following components: (a) investment schedule, (b) repayment schedule (c) contraction strategy, and (d) supervision and monitoring process.

(v) Identify a suitable phased investment plan and financial plan and quantify the financial and economic benefits of the proposed investment plan, which must include the cost of construction. The investment plan will be referenced with the maps, results and relevant summary findings of the other components of the feasibility study. The investment plan shall contain the following components: (a) implementation schedule, (b) schedule for procurement of goods and services, and (c) methodology for project benefit monitoring.

(vi) In conducting the economic analysis, the consultant may consider the economic feasibility of the said project. the consultant may also consider in the feasibility a phasing of investments given other complementary developments in concert with the demand for rail services from various origins to destinations.

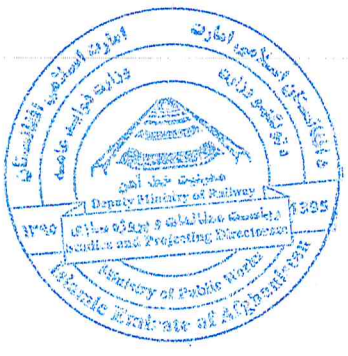
12.2 Reconnaissance Survey

An extensive reconnaissance survey shall be conducted by the Consultants in order to assess the existing conditions and possible alignments passing through the obligatory points. The Consultant can also make use of topo sheets of Survey of Afghanistan for acquiring knowledge of the area.

In addition to physical survey of the area the Consultants shall acquire satellite image and Digital elevation model (DEM) of the area and make use of it to ascertain the topography and other features in that area.

The reconnaissance survey, for these probable alignments will involve rough and rapid inspection of the area in order to ascertain general outline of the topography, both visual and instrumental and various physical characteristics between two predetermined points marked on the maps. The objectives of reconnaissance survey shall generally be:

i). To acquire the knowledge of physical features of the area such as the rivers, streams, channels/canals, bridges, valleys, mountains, cultivated lands, forests, villages/towns, existing roads etc. for deciding an appropriate alignment.



ii). to collect geological information including but not limited to the following points:

a). Nature of soil.
b). Surface formation of the ground.
c). Dip of the existing rocks.
d). Hill slopes.

iii). to collect information regarding availability of construction materials, labor and sources of water as permanent facilities for the proposed alignments.

iv). to have an idea about the most probable alignment keeping in view the physical site constraints.

v). to have an idea of rivers, canals and streams, which may cross the proposed alignment for determining suitable bridge sites for these. (Width and depth of flow and direction of flow).

vi). To locate various control points or obligatory points to decide from where the alignment shall pass and from where the alignment shall not pass.

vii). To decide the geometrical features of the alignment i.e. maximum curvature and gradient

viii). Approximate elevation of the area along the proposed alignment.

ix) rough location of various station sites

12.3 Working Procedures for Technical Survey

The survey procedures to be followed at the site are detailed here sequentially:

A. Pillar Construction

Bench marks pillars at every 250m on both sides along the route within the Railway ROW but as far as possible out of construction limit will be constructed. All these pillars have been established through Station GPS/GNSS and will have to be furnished with UTM Coordinates System. The pillars shall be of size 150x150x450 mm long and provided with

steel plates at the top. The pillars shall be embedded and concreted of which 100 mm shall remain above ground. A steel rod shall be fixed in the center for punching the point and finally these are to be painted yellow. The RL (Reference level) has to be marked on the pillars with red paint after leveling surveys. These pillars will officially be handed over to project officials.

At every 3th Km a pair comparatively larger pillars for Station GPS (600x600x1200mm size) shall be constructed. The pillars shall be embedded and concreted of which 500 mm shall remain above ground. These pillars will also have the steel plates and rod arrangements as in basic Bench mark pillars. The horizontal face of pillars should be absolutely flat and truly vertical with the ground. Reference marks with paint marks shall be made on pavement for pillars. Fixity of the BM and Station GPS pillars would be ensured by providing adequate

thickness of RCC below and around the pillars at the time of pillar construction. The pillars should be free of workmanship defects.

Temporary BM shall be fixed on all parapets of existing culverts, minor bridges, major bridges and nearby permanent structures (such as well, house, bus stand, etc.).

Note: The following survey activities would be taken up after completing pillar construction/fixation at site.

B. GPS Traverse

A closed-loop differential GPS/GNSS survey shall be conducted along the corridor. Pair of permanent GPS stations shall be left at every 3 KM. GPS readings in Latitude and longitude as well as converted UTM coordinate system shall be submitted. In case any horizontal control points exist along the corridor (Station GPS), they need to be connected and accuracy of existing GPS traverse control shall be verified.

C. Total Station Traverse

In every stretch traversing in loop has to be completed prior to detailed survey. Traverse shall be done from GPS to GPS. Maximum length of each loop shall not be more than 3 km. While traversing, stations will be established 200 to 300 m apart and all reference/BM pillars shall be connected. These points would be further used for detailed survey. The minimum accuracy of this survey will be 1:10,000. Traverse line diagrams for each closed loop traverse shall be submitted. Surveyor shall keep hand written survey notes for all the observations of traverse and the same shall be submitted with traverse data. Traverse loops shall be submitted in XLS, Rinex format. Distance & included angle observations format shall be used in traversing. Traverse lines shall also be run along the selected realignments and proposed bypasses along the project corridor, if any in same manner as described above.

All the existing traverse (control) stations shall be connected while doing the traverse and accuracy of existing horizontal control needs to be verified.

D. Leveling

A closed circuit leveling shall be run along the entire route. Maximum length of each loop shall not be more than 3 Km. It is required to locate GTS benchmarks along the project corridor, details of which shall be submitted along with the survey/leveling error distribution methodology to DIMTS before finalizing the leveling data. All the leveling shall be with respect to the GTS (Great Trigonometrical Survey) Bench Mark. During the course of leveling all the traverse stations/bench marks established at intervals of 250m above shall be connected. Apart from these benchmarks shall also be left on permanent structure available route. All traverse stations and pillars will be connected. The accuracy of leveling will be of the order of $12mm\sqrt{k}$ where k is the loop length in km. Precision Auto levels/ digital levels will be used for this purpose. Three hair level readings have to be recorded as per standard format.

Leveling shall also be run along the selected realignments and proposed bypasses along the project corridor in same manner, if any as described above.

E. Detailed Survey

This survey would involve picking up of all surface features for the specified corridor width of 200 mts. on either side of the existing centerline 100 Mts. on either side of the proposed centerline. The survey should also cover major and important features, if any, within 50 mts of the Railway ROW. At sharp curves (R<1200m) the survey will extend up to 300 mts on either side and at important road junctions and railway crossings, small streams survey will extend up to 350 mts. on either side. Total stations will be used for this purpose.

Collection of DTM (Digital Terrain model) data would begin from two known station points and close at a third known station but not the back sight station. compulsory check shots would be taken at known points before changing the occupied station or stopping the survey work and detail of the same should be submitted progressively in soft as well as in hard copy. Point data collected will be strictly as per a uniform code list. The code list used would be provided to the Client.

The detailed survey shall depict the following information on the ground:
Existing road details, Tress, forests, water bodies, existing infrastructures, and other features
Details of existing cross drainage structures such as length, width, and height of culverts, bridges, High Flood Level, Water Level, River Center, River Bank, etc., details about bridge span, riverbank structures, and Gully or Streams, etc. if any Existing water supply line details such as trunk sewers, branches, manholes, location/position of septic tanks and soak pits of the adjacent building on both sides of the road within Right of Way (ROW).

F. Longitudinal Section

The collection of Longitudinal Centerline Points would be 20m apart in straight sections (Except in Curve Locations). On the vertical and horizontal curves, it have to be 5m to 10m apart depending on the nature of the curve. degree of sharpness of the curve. For very sharp curves, if any, the distance may be 2 to 5 m apart. Apart from this, in the case of vertical curves and causeways, the points should be captured in such a fashion by which the crest and bottom most points of the curve and the extent of causeways should not be missed Cross Sections at Horizontal Curves

At curves, the track cross-sections should be taken at closer intervals to get the arc to chord tolerance within an acceptable limit (say 0.1 m). In any case, it shall not be more than 5m.

G. Level Crossing

A level crossing is where a railway line is crossed by a road or right of way on the level: that means without the use of tunnel or bridge. And survey will be extended up to 300 -500m on both sides of the main line. The swath width to be covered along the level crossing would be at least 200 m. Roads that cross the main railway line should be studied according to road category and traffic intensity.

H. Cross Drains at culverts/bridges and Rivers

The cross sections shall be taken as detailed below.

For small drains across cross-drain works, at least three cross sections shall be taken, namely one at the selected site, one upstream, and one downstream. For major bridges, drains and streams cross sections shall be taken as follows:

- The survey shall be carried out for bridges along 1000m upstream and 1000m downstream, at 20m intervals on upstream and downstream sides, and the river bed level, river bank level, HFL (high flood level), and existing bridge elevations shall be taken. In case of a bend in the river alignment, an additional cross section shall be taken to represent the bend.
- The survey shall be carried out for the culvert and causeway which have furnace runoff and the bed and bank elevations of the stream along 200 m upstream and 200 m downstream shall be taken.
- The survey shall be carried out for irrigation culverts and the bed, the bank elevation of channel, inlet, and outlet elevations along 150 m upstream and 150 m downstream shall be taken.

For major drains/streams (catchment up to 3.0 sq. km), cross sections shall be taken for a distance of 250m on both upstream and downstream sides. Survey work of the river/stream shall fully comply with the abovementioned detail and data requirement for hydraulic analysis.

I. Trees

Location of individual tree having girth width of more than 0.3m coming within the proposed right of way 30m on either side has to be collected along with their broad categorization and girth.

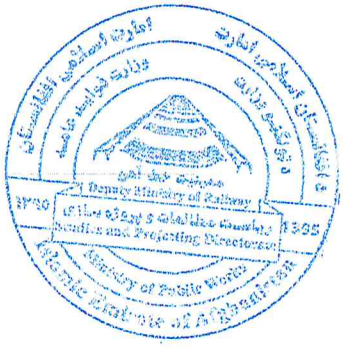
J. Safety Precautions

Contractor is responsible for the safety of his / her staffs and equipment's deployed at site during survey work. Adequate safety precautions shall be taken for working during the night viz., providing lamps with red light reflectors, safety reflectors with red band/strips, torches, and red jackets for crew.

K. Accuracy of the Survey

The contractor is fully responsible for the accuracy of the survey. The maximum permissible error in horizontal measurement shall be: 10,000 (according to USACE classification, Third-order Class I), and error in vertical control survey should not be more than $(12 * \sqrt{k}\ )$mm (according to USACE classification, Third-order Class I). Where k = distance in kilometers .

12.4 Survey & Reports Submittals (Deliverables)



The Consultant shall perform the survey services indicated in this scope of work. In these services the following data and information should be provided:

1. Topographic survey including the realignment where it is required or the existing rail alignment is in floodway or the existing rail gradient is very steep.
2. Survey report including traverse report and calculations
3. Structure assessment report which expresses the condition of existing structure and shows the proposed structure, photos in survey report it should be consider.
4. Technical Survey inventory also attached with survey report.
5. Survey recommendation with regards to drainage, proposed structure and existing structure shall be prepared.
   The, reports, and all other submittal items for this scope of work shall be prepared using metric units of measurement and following the survey requirements.

12.5 Detailed Technical Survey & Reports:

The consultants will carry out detailed technical survey of the project.

The Consultant's responsibilities will include, but not limited to the following:

- Carry out detailed topographic surveys with accurate existing horizontal and vertical layout, profiles, existing drainage structures, and cross sections, and drainage structure evaluations.
- Establish horizontal control points, bench marks, and reference points as required to prepare detailed engineering designs and to enable construction quantities to be calculated with reasonable accuracy.
- The contractor shall survey cross section of all irrigation structure particular cross section of rivers, streams and wades at least 300m from the centerline of the centerline at both sides. The Contractor shall, as part of their survey, conduct inspections and evaluations of all existing drainage structures and provide their findings and recommendations in a report as part of this assignment. The report shall describe the structure. length, width, height, etc. and contain at least 3 photos (a photo from upstream to downstream, downstream to upstream and from rail side).

12.6 Design Criteria

12.6.1 Codes and Standards

The recommended codes and standards are of the following authorities. The contractor shall follow them in the execution of the work.

- Standard gauge

The specific codes and standards of the above-named authorities are to be in the design and execution of the works. The contractor shall also maintain on site and for the duration of the contract at least two copies of the latest version or edition of each standard or code to which a reference is made in the design and specifications.

12.6.2 **Alignment**

Alignment shall be design, shortly, Safe, reliable, sustainable, Economically, and observed all environments, socials and technical characteristics.

12.6.3 **Axle Load**

The axle load is defined as the maximum allowable load of each axle on any given wagon or locomotive which can be placed on the rails. The consultant should use the standard gauge (1435).

12.6.4 **Design Speed**

Main track operating speeds selected for the project is as per proposed speed in feasibility study report or consultant may have better recommendation.

- Passenger Trains – 120km/h with an allowance for future speeds at 160km/h;
- Mixed and Local Freight Trains – 80km/h;
- Container Trains – 100km/h.

12.6.5 **Super-Elevation and Spirals**

Super-elevation and have been accounted for in the alignment. Based on a bearing distance of 1,494mm for Standard Gauge, and in accordance with AREMA standards, the design of the alignment permits a maximal super-elevation of 80mm on Standard Gauge.
Also, spiral (transition) curves requirements for both safety reasons and a controlled change in the centrifugal acceleration for passenger comfort are taken into account and the longest transition needed to satisfy both criteria used

12.6.6 **Horizontal Curvature**

The larger the horizontal curve radius, the less wear is experienced by the rail; therefore, large radii curves are advantageous. Where the application of large radii causes significantly increased construction costs, smaller radii curves will be considered. It is common practice to use curves with radii between 1,746m (1°0') and 3,493m (0°5') on mainline railways and radii as low as 500m (3°49') are acceptable where topography or geotechnical conditions impose unreasonable construction costs. However, MoPW has expressed a wish that the alignment be designed to accommodate passenger operations with a speed up to 160 km/h. In light of this, the target minimum radius of curvature has been set at 1,810 m. This radius allows for a 160 km/h operation on Standard Gauge as well.

12.6.7 Gradient

The maximum gradient selected for the design of a railway line has a direct impact on the composition of freight trains operating over the line; steeper grades can better fit local topography and save capital investment but require shorter trains or additional locomotives for operations.

It is important to recognize the potential of the locomotive to pull or push both loaded and empty car sup a grade. Typically, a loaded unit train weighs three times that of an empty one, which is reflected in the ratio of the maximum gradients in the loaded and empty directions for designs

with a predominance of loaded trains in one direction. Experience has shown that a maximum grade of 0.5% loaded and 1.5% unloaded, permits an optimal operation for heavy haul operations. Since in this particular project, trains are expected to run loaded or partially loaded in both directions, no directional distinction has been made in the application of grades and a maximum 1.5% gradient was targeted. This value is "uncompensated", which means it is simply the rate of vertical chan.

12.6.8 **Vertical Curve Standards**

A vertical curve is introduced between changes in gradient in the longitudinal profile. It shall design on Standards Gauge for vertical curve design.

12.6.9 **Track Centres**

Mainline track centers should be designed in accordance with standard Gauge.

12.7 Earthworks

12.7.1 Typical Earthworks Section

Define the criteria selected for cut and fill slops depending on the geology along the corridor. The cut, fill and slope of earthwork shall be designed as Standard gauge.

In this project shall be considered Standard gauge recommendations.

12.8 Bridges and Culvert Structures

Standards and Codes

The design of bridges and culverts complies with the following standards:

- Standard gauge for Bridges and Culverts design.
- Steel railway bridges have been considered as Dynamically Loaded Structures.

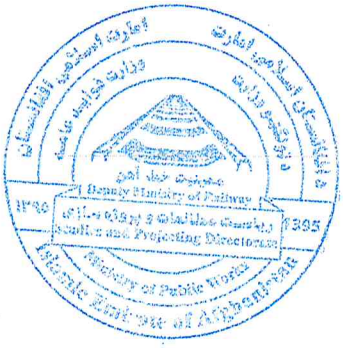
13.8.1. Design Loads

Design loads for Bridges, viaducts, and culvert shall be considered UIS standards and/or Standards Gauge, which can perform the requirements of the project.

13.8.2. Bridges Structure

The consultant shall perform a comprehensive economic analysis for consideration of types of prestressed and/or cast-in-place bridges based on the economical and durability variant. and should prefer and recommend the types of cost-effective and suitable bridges and also use it in detail design of this project.

The aforementioned criteria is also applicable for the culverts.



before applying the recommended Type of bridge. it has to be approved by MOPW and also MOPW prefers safe, comfortable, cost-effective, and standardization.

13.9. VIADUCTS Structure

The design of Viaducts shall be fulfilled as per the Standards Gauge and/or UIS standards, which could fulfil all the requirements.

Viaducts differ from bridges in that they essentially serve to allow the railway to cross areas where fill would be excessively high and potentially unstable. They also allow water to flow and act as drainage structures, but in most cases, a lower and much shorter bridge would provide a sufficient drainage capacity. Due to the ruggedness of the terrain crossed by the kandahar to Spinboldak line, the profile cannot always follow closely the natural ground and viaducts are needed.
The design of Viaducts shall be fulfilling by the Standards Gauge, which could fulfil all the requirements.

The Viaducts structure are based on recommendation of feasibility study report.

13.10. Maintenance Considerations

All bridges will be constructed with ballasted decks. The particularity of this type of bridge is that the ties are not anchored directly to the bridge, but rather sit on ballast. This permits better load distribution and thus reduces the longitudinal forces transmitted to the bridge. Since the same type of tie can be used on the bridge as on regular track, this type of bridge also ensures continuity of the track which helps to reduce maintenance.

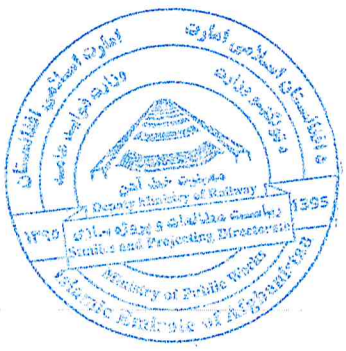
13.11. Track

13.11.1. Rail

The design assumes Standard Gauge rail throughout the project. This rail section is commonly used throughout central Asian and other countries the consultant will study feasibility studies and advance his design process in coordination with the MOPW authorities.

13.11.2. Ties

Concrete ties are the common tie of choice in the region, so concrete ties are used in whole projects as per the Standard Gauge specification. Following is the typical recommended tie cross section.



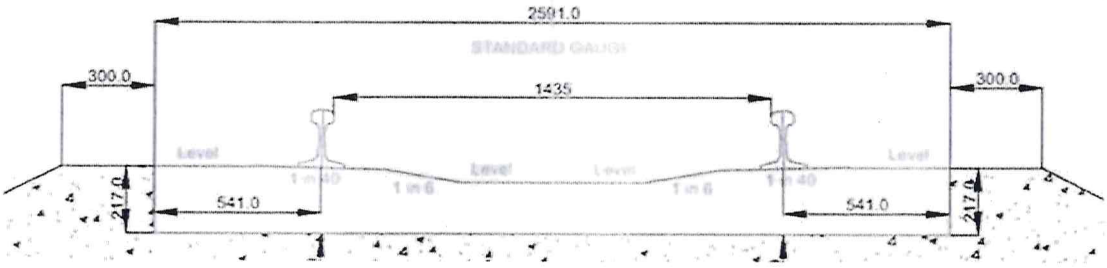


Figure 9-5: Standard Gauge Main Line Typical Tie Cross-Section

13.11.3. Fastenings

The purpose of the rail fastening system is to maintain track gauge and to transmit the forces (torsional, lateral, longitudinal, and vertical) acting on and in the rails to the ties, which, in turn, transmit these forces into the ballast. An elastic fastening system has been selected as it significantly contributes to the control of longitudinal movements of rail. An appropriate toe hold for elastic fasteners will be developed on the basis of climatic norms for procurement purposes.

13.11.4. Track Structure

The design of track structures shall be as per international accepted models, with reference to the Standard Gauge.

13.11.5. Turnouts

The turnout shall be designed as per gauge requirements and reference to the Gauge Standard.

13.11.6. Guard Rails

At a minimum, guard rails will be provided on all tracks installed on bridges of more than 9m (30ft) in length or on 2-degree (875m radius) curves. Guardrails will extend 15.2m (50ft) beyond the ends of the bridges or other structures on which they are installed.

13.11.7. Derails

Derails will be installed on both ends of the tracks wherever there is a possibility that parked equipment could be moved by wind or gravity and obstruct the mainline or siding. Generally, derails will be installed where unattended rolling stock is regularly stored.

13.11.8. Bumping Posts

Bumping posts (buffer stops) shall be provided at the ends of all dead-end tracks.

13.11.9. Clearances

a) Clearance Diagram

The clearance diagrams to be applied to the railway design have been developed to ensure that Standard Gauge traffic is not restricted in its movements by the presence of way-side structures or installations and it have to be considered MoPW or other international Right of way Roles.

13.11.10. Pipeline

All pipelines crossing or paralleling the railway will require protective (gas, oil, water...etc) measures to avoid overstressing the pipes and to protect the railway against catastrophic situations. The standards to be applied to the pipeline crossing designs shall be developed from internationally-recognized standards and approved by the appropriate Afghanistan authority.

13.11.11. Wire Lines

The types of wire lines that may be crossed by the railway are:

- Telephone;
- Low voltage power transmission;
- High voltage power transmission.
- Buried power lines
- Optical Fibre cable (OFC)

The minimum clearance requirements to be applied for power transmission lines crossing or running parallel to railway lines will be based on appropriate international standards and approved by the appropriate Afghanistan authority.

13.11.12. Seismic

Afghanistan is located in the tectonically active alpine-Himalayan orogenic belt. Moderate to large magnitude earthquakes cause serious damage, not only through strong ground shaking and faults rupturing the ground surface but also through liquefaction and extensive landslides. The project area is located in the Chaman fault system extending from the Hindu Kush region in northeastern Afghanistan south-southwestward through eastern Afghanistan into western Pakistan (USGS 2007). This domain covers much of Afghanistan and Pakistan. Therefore, the consultant should take into account the prediction of large amounts of earthquakes during the design so as not to have problems on the future in artificial building such as bridge. etc.

13.12. Signalling

The design of signal shall be fulfilling as per Standard Gauge which can perform safe and efficiency operation.

13.12.1. Signalling & Telecommunications

This shall focus on the following point:

i). Defining signaling and telecommunication system based on traffic forecasts and resulting density of traffic for each section/network

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). Signalling and telecommunication plans for the selected route.

vii). Cost estimates of the equipment, recurring expenditure, availability of spares, cost of training ..etc.

viii). Establishment of maintenance workshops and centres, maintenance structure and organization…etc.

As a minimum, the signaling system and wayside equipment should respond to the following functional requirements:

TABLE 1 FUNCTIONAL REQUIREMENTS

FUNCTION	DEFINITION
Computer-Assisted Manual Block System	Centralised and computerised OCS to govern the movement of trains with management of conflicts in non-signalled territory.
Train Integrity Assurance	The integrity of the train consists is ensured by EOT devices.
Wayside Defect Detection	Each defect detector site will consist of a Hot Bearing Detector (HBD), a Hot Wheel Detector (HWD) and a Dragging Equipment Detector (DED). A defect detector site will be installed every 40km.
Level Crossing Warning System	➢ Flashing lights with bell (FLB) ➢ Flashing lights, bell and gates (FLBG) The type of Level Crossings (LC) has been determined for each location based on the volume of traffic, the type of road being crossed by the railway, and a safety assessment.

13.13. Telecommunications

A telecommunication system is required to provide a communication link at all times between the dispatcher, train crews, and maintenance personnel.
This system must meet two objectives:

- Cover all the requirements of the railway operation;
- Ensure the safety of personnel at all locations.

The design criteria of the telecommunications system for the railway do not depend on the track geometry or on the anticipated gauge for the project.

13.13.1. Telecommunications Requirements

As a minimum, this system should provide for the following:

TABLE2 FUNCTIONAL REQUIREMENTS

FUNCTION	DEFINITION
Dispatching centre to any track location	For train operation and communication at all times between dispatchers and any railroad location (passenger stations, switches, level crossings, etc.)
Point-to-point calls	The operational voice communication system allows point-to-point calls.
Group calls	The dispatcher shall be able to talk to trains, maintenance staff, and station masters.
Voice recording	An operational voice communication recording system shall record all railway communications.
Fault-tolerant operation	The failure of any item of equipment within the system shall not cause failure of the entire system nor create a potential danger to train operation.
Availability	The global availability of the telecommunication system shall be of 99.95%.
Network Management System (NMS)	The system shall include an NMS which provides supervision and control of the entire system equipment.
NMS - Alarm Management	The NMS shall allow the gathering, classification, and logging of alarm events from components of other systems (e.g., signalling).
Ease of Maintenance and Fault Diagnosis	All equipment shall be of modular type and easily replaceable for maintenance of faulty items. The telecommunication system shall also incorporate self-diagnosis to detect local and remote failures.
Extent of Radio Coverage	Continuous at all locations along the railway.
Users	Direct communication between dispatchers, train or track vehicle operator, and track work gangs.
Infrastructure	Radio towers and base stations located, where possible, in stations or close to sidings for easy access from the railway and to simplify maintenance interventions, time, and cost.
Types of voice call	Types of radio communications: point-to-point call, group call, emergency/high priority call, broadcast call.
Identification	Identify the call originator.

Priority calls	To overcome radio network congestion, emergency or high-priority calls can take precedence over other lower priority calls.
Calls from drivers to dispatchers	Direct calls without numbering from the driver to the controlling dispatcher.
Transmission	Communication between all radio sites (e.g., base station, core network) shall be conducted over the access and core transmission networks.
Data transmission	A Local Area Network (LAN) will provide access points to connect telecommunications and signalling equipment located along the railway line.
Master clock	Provide an accurate time to all railway systems, in station displays, and all telecommunication systems.

Note: the above-mentioned requirements as per feasibility study report, but it will not have limited to above mentioned requirements. Consultant shall have better alternative for mentioned project.

13.14. Rolling Stock

The Consultants shall make a preliminary assessment of workshop, maintenance facilities and define the type of rolling stock to be maintained. The scope of work will include:

i. Define the type of rolling stock to be maintained
ii. Design standards and criteria for the new rolling stock
iii. 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. refer to the feasibility study

13.15. Design of Buildings

The design of buildings are Contin, amongst others, the functional, architectural, structural, mechanical, HVAC, firefighting system for station buildings, firefighting system for station area and electrical requirements for the construction of the passenger and grand stations. The consultant should provide the detailed plans and drawings which shall include, but not limited to the following:

Design of station buildings, yards, workshops, and locomotive maintenance buildings including design of facilities, access roads, platform (passenger and grand) shall be as per requirements and international standards or MOPW specifications.

12.8.1 **Building Facilities**

The Contractor shall be responsible for the detailed design of buildings facilities, while respecting the requirements stated in this document. The Consultant should provide the detailed plans and drawings which shall include, but not limited to, the following:

- Concrete water tower

- leach field (septic tank and absorption well)

- Enclosed water well.

13.15.1. complex stations (passenger and grand)

Sizes of complex stations vary according to the expected traffic specifically the estimated peak traffic. While complex traffic growth can be easily accommodated with complex traffic operations (for example by increasing the number of trips and goods), increasing the size of stations can be difficult. To ensure that growth can be supported, the station sizes were determined based on the high peak passenger and goods estimates.
Passenger stations fall under 3 categories:

- Major Stations – Annual passenger forecast.
- Medium Stations – Annual passenger forecast.
- Minor Stations - Annual passenger forecast.

Every station has amenities for passengers, commercial property and for equipment and staff. The criteria used for determining the required area for each complex amenity and for staff and support areas are as per Standard Gauge. Refer to the feasibility studies.
The consultant should consider and complete the design of railway substations along the route according to international standards and also according to the need of the field.

Passenger stations shall be required at the following three locations:

13.15.2. Detail site plan of Complex Stations

The detail site plan of the complex station contains, the field location of each specific "work point" in the field, and the location of each building and facility including the rail sub-line if needed have to be adjusted as per technical prioritization.

13.16. YARDS AND SIDINGS

The track requirements are selected at each of the yards based on the recommended train service and traffic levels. and the consultant should evaluate the comprehensive technical options for the orientation and locating of the yard and siding. For detail information for help on the yard and station please inquire from the MOPW and you will receive specific information based on the feasibility study report that has already been conducted.

13.16.1. Terminal and/or Yard Criteria

The yard shall be designed as per recommendations of standard Gauge recommendations. The track requirements are selected at each of the yards based on the recommended train service and traffic levels.

13.16.2. Sidings

Sidings are an important element in determining the capacity of both train and traffic levels of a rail network. Not only are sidings key to determining the number of trains the network can handle, but they also determine the acceptable length of trains. The critical factors of a siding are the length and distances between two consecutive sidings.

Right of Way (RoW) Maintenance Buildings provide a work base for the track maintenance gangs and are located at the recommended sidings as described in feasibility study report or the number and selections of sidings location shall be as per requirements and or as per international standards.

The diagram below illustrates the recommended siding infrastructure design.

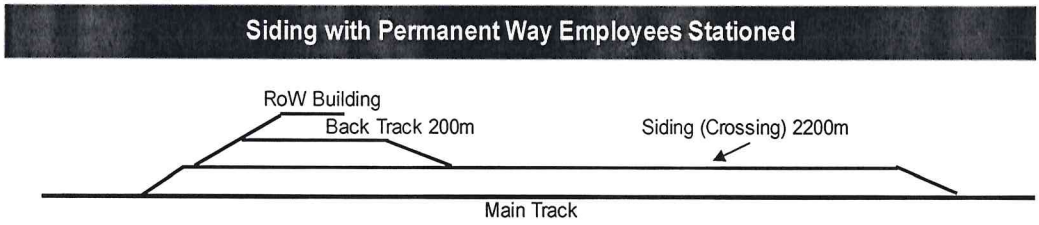


Figure 2 Recommended Siding Infrastructure

13.16.3. road crossings

depending on the type of road crossed (highway, major road, local road) level crossing of different types has been provided at different locations on the alignment. They allow safe road and rail traffic while keeping the communities accessible the systems used to warn road users that a train is about to pass are either flashing lights, bell and gates or flashing lights with bell. The consultant should consider and design the level crossing in accordance with the standard so that there are no problems during the construction.

13.17. Horizontal Control

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

13.18. Vertical Control

Vertical misclosure within the leveling net shall not exceed + 10 Km where K is the length of leveling line in Kilometer.

13.19. Longitudinal Profile and Cross Sections

The Consultants shall prepare longitudinal profile and cross sections of railway route also

compute the quantities of cut and fill.

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

Cross Sections shall be observed at 20-meter center to center in the plains detailing the levels across the entire corridor on either side of the center line. This will be reduced to 20 meter in undulating, rough/rolling areas. The cross section will be plotted in 1/200 horizontal and 1/20 vertical scale or as amended by the Employer. The cross sections interval will be reduced to 10.0 meter in hilly areas.

The longitudinal profile at the center of the proposed alignment shall be plotted on 1/2000 horizontal and 1/200 vertical scale.

14.Geotechnical and Geological Investigations

The purpose of the geotechnical investigation is to determine the subsurface material and condition under the proposed railway alignment, evaluate the engineering properties of soil material, and recommend the design criteria for the foundation of the railway alignment.

14.1. Geotechnical investigation of Alignment, Culverts, and Retaining wall

Along the route, the consultant should perform geotechnical research according to the changes in the materials of the field or perform his work according to the geotechnical norms. The consultant must take at least one sample of the culverts for testing. Sampling should also be done from the retaining walls, etc.

14.2. Geotechnical investigation for Bridge

The contractor shall carry out a ground investigation at the sites of the bridge to be constructed to provide data for the design of the bridge foundations.
A minimum of two boreholes shall be drilled at the location of each abutment and pier, to a depth of at least 30 m (in normal material). If rock is encountered, the drilling can be terminated after penetrating the rock for a minimum depth of 4m.

In-situ standard penetration tests shall be carried out in each borehole.
The bridge foundation ground investigation shall be carried out according to the Standard Gauge manual on subsurface investigations, the latest version updated.
The Consultant shall collect and interpret the following data from the Geological survey of Afghanistan and other concerned departments with reference to the proposed alignments.

a). Geological maps.
b). Location of geological fault lines.
c). Earthquake records.

The Geotechnical Investigation report should comprise, but not limited to the following refer to the feasibility study:

- Bearing Capacity Curves for Shallow foundation
- Pile Capacity Curves for deep foundation
- Type of foundations required for bridges
- Requirement of protection works against landslides.
- Results of all tests / investigations and Recommendations.

In addition to the detailed design work required under this Contract, the Contractor shall be responsible for organizing and carrying out a geotechnical investigation program to a level of detail which will provide sufficient information for the detailed design.

The object of this investigation is to determine the geotechnical properties of soils, and rock shear strength parameters, in support of the design of foundations, earthworks, and the locations of borrow areas. It shall, therefore, be directed towards acquiring the following information:

- The natural properties and sequence of soil and/or rock.
- The depth, thickness and composition of each soil and rock stratum.
- The physical, chemical, and mechanical properties of soil and rock.
- The location, variations, and chemical properties of ground water.

Note: The consultant is obliged to perform all the necessary tests that meet the needs of the field at the time of design and must perform them according to the conditions of the field.

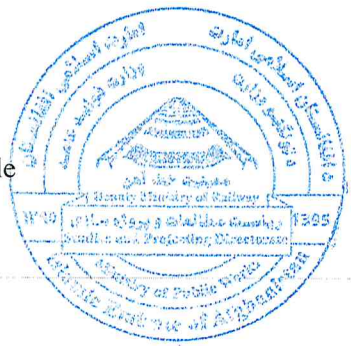
15.Hydrological Study

The Consultants should conduct hydrological studies, including the collection, analysis, evaluation, and accurate calculations of climate statistics, hydrometeorology and hydrology of the route and areas of railway projects using software and formulas that are used worldwide. The amount of surface water flows are measured and estimated by taking into account the effective factors and predicting the maximum rainfall and possible flood events in100-year for Bridge and 50-year flood for culverts, and ensuring the flow capacity of the bridge, gutter, retaining wall irrigation channel, drainage system, etc. have the required water in all annual periods.

The peak design discharge of major rivers is recommended to estimate by frequency analysis of the measured data using the Log-Pearson Type II method. The design discharge of rivers at bridge locations is recommended to be determined using the Bürkli-Ziegler Formula based on the catchment areas, and measured flow data prorated for the 100-year flood.

Information will be collected from each site and studies, comprising the evaluation of the following parameter.

- Catchment Analysis
- Catchment Flows
- Collection of Site Map to scale
- soils of catchment analysis



- Rainfall Analysis
- Hydrogeology
- Water logged areas; slushy/marshy lands called "hamuns"
- Saline area.
- Overland flow/Runoff Assessment
- Watercourse Hydraulics
- Flood Risk Assessment
- Evidence of flooding
- Drainage Impact Assessment
- Waterway area of existing structure
- Nature of the stream bed

15.1. Meteorological Data

Hydrometeorological data for the relevant rainfall stations will be collected from government meteorological offices and other agencies, for rainfall intensity, duration, and frequency analysis.

A. Flood Records

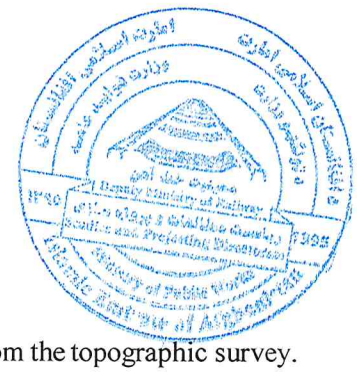
i. Available flood flow data of major streams at or near their crossing points will be collected from the concerned department and other concerned agencies. Dependable high-water marks for major rivers crossing project routes will be collected by site inspection and by local enquiry from the residents.

ii. Major structures on the roads adjacent to proposed railway alignments may have withstood unusual floods after their construction, Information on any such occurrences and the depth of flooding will be collected from the concerned departments and residents of the area.

B. Irrigation Canals

The following data on irrigation canals adjacent to or crossing the project routes will be obtained from the Provincial Irrigation Department as the case may be:

- Maximum design discharge
- Velocity of flow in the canal bed
- Bed level and full supply level including freeboard
- Bed width, top width, bed and side slopes
- Closure period of canal
- Any future planning of new canals, scrap drains etc.



C. Site Plans

Site plans for major streams/rivers crossing sites shall be obtained from the topographic survey. The plans will show important features and the cross section of such streams and rivers.

D. Evaluation

The hydrological analysis shall be conducted to determine the discharge of streams crossing the rail-road and to calculate waterway structure and hydraulic capacity. All the sources that are used for hydrological research must have references and international sources should be used.

In this respect, the Consultants will undertake the following activities.

- Compile daily rainfall data for the relevant stations
- Prepare Intensity-Duration-Frequency curves
- Calculate catchment areas, stream lengths and slopes from Standard Operation Procedure SOP maps
- Calculate stream discharge and associated waterway openings for streams crossing the railway line.

The following major parameters shall be kept in view for streams crossing the railway line.

- Maximum flood discharge for 100-year return period for bridges.
- Maximum flood distance for 10-100 years return period for culverts
- Velocity of flow at peak discharge

The hydrological investigations shall comprehensively examine 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.

15.2. Preparation of Cost Estimates

The Consultant shall prepare cost estimates for both construction and operation.

The Consultant shall provide the approximate rate (DC Price and market value) of land per acre within the project corridor and in the vicinity shall be ascertained and noted. The boundaries of districts and sub-divisions shall be noted and marked on the plans for ease of reference.

Based on the results of the engineering investigations, the Consultants will prepare detailed design / tender design, estimate the quantities of work and costs for each project section. 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.

15.3. 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.

15.4. Guidelines for Preparation of Maps / Plans

Units of measurements

A metric system shall be used for the preparation of plans/drawings.

15.4.1. Scale and size of drawings

Mapping on drawings shall be plotted to a scale of 1:1000 unless otherwise specified. Following scales and sizes of drawings shall be adopted for different plans

i). Index plan and profile (showing alignment in colure).
- Scale 1:250,000
- Size 90 cm x 120 cm

ii). Index Plan and profile (Showing alignment)
- Scale 1:50,000
- Size 90 cm x 120 cm

iii). Detailed plan and profile (for the final alignment)
- Scale
  - o Horizontal 1:2000
  - o Vertical 1:2000
- Size 90 cm x 120 cm

iv). Plan, cross-section of rivers.
- Scale 1:3000
- Size 33 cm x 120 cm

v). Yard Plans
- Scale 1:2000
- Size 33 cm x required size

vi). Cross Sections
- Scale
  - o Horizontal 1:200
  - o Vertical 1:20

vii). Land Plans
- Scale
  - o Horizontal 1:2000
  - o Vertical 1:200

Contour maps
- Size 50 cm x required size

Details to be shown

All the natural and manmade features falling in the Right of Way (ROW) of the alignment including all the features detailed in the topographic survey.

The Consultant shall prepare plan and longitudinal profile on agreed format for permanent record of Afghanistan Railways showing the natural ground level, proposed formation level, proposed rail level, gradient and cut/fill etc.

16.Guidelines for Track & Other Related Parameters

- Degree of curvature should be compatible with the proposed speed of 100 Km/h and unnecessary curves shall be avoided.
- All circular curves shall be provided with parabolic transition curves at the ends.
- Curves shall be avoided in and near station yards, close to large bridges, in deep cuttings, and at places where the view is obstructed.
- The gradients should be adequate to cater for the speed of 120 Km/h & speed restrictions should be avoided.
- Changes of grade shall be avoided within 100 meters of points & crossings and in the vicinity of bridge abutments.
- Steep upgrades in the direction of stations just outside the outer signal and within 1000 meters of it shall be avoided.
- In undulating areas, grades shall be so regulated that cutting and filling shall be optimum balanced.
- Track will be of Standard Gauge and its structure would comprise this standard.
- For speed of 120 Km/h, pre-stressed concrete sleepers with elastic fastenings and as per Standard Gauge.
- The Consultants have to propose Points for high, medium & low speeds.
- Important cross drainage lines requiring major bridges shall, as far as practicable, be crossed on the square. Large bridges shall never be put on the skew.
- The roads shall cross the Railway line as far as possible at right angles.
- The alignment will be such that it gives shortest route between two points and in the design profile the cut and filling shall be proportionally.
- Straights shall be, as long as possible, close to the obligatory points.
- Any reliable information about high flood levels shall be frequently observed and noted as being useful when deciding on the formation level.
- The Consultant will also provide track parameters and tolerance for the maintenance of the proposed track.
- As far as possible there should be no level crossing. Over-head/underpass bridges shall be proposed by the Consultants for all road crossings.
- The track will be fenced in the station area and needed area. The Consultants will propose the type of fencing with the sketch and also pedestrian road crossings where required.

17.MODE OF PAYMENT

Payment of installments shall be linked to the deliverables specified in TOR on their submission and approval by the Client as per the following schedule. It should be mentioned that the execution of payment is subject to the approval of Submitted documents by MoPW at every stage:

S.	Upon submission of Deliverables	Percentage (%) Payment
1.	30% Design Submittal - Design Criteria and detail design plan & profile - Survey data report and drawings. - Hydrological report and drawing, Seismological investigation report. - Environmental plan. - Geotechnical and geological Report with details. - Railway track Structure Design (Embankment, Subgrade, Sub ballast, Ballast, Sleeper, rail and…etc.). - Design of Bridges and culverts. - Retaining wall design as per requirement. - Design of Viaduct with all details. - Design of overpass on the road if required. - Railway Crossing investigation and design. - Design of railway Sidings. - Design of platforms. - Design of stations (Transit station and grand station). - Railway passenger and freight station buildings. - architectural and structural design with details. - Design of Yards (roads, track layout, platform, drainage and with other necessity services.) - Signaling and communication facilities. - Outline of Technical Specifications - Alignment Drawings	20 (Twenty) % is payable when MoPW approves the whole package assigned at this stage.

2.	60% Design Submittal - Design Analysis/Calculations - Alignment & Profile Drawings - Design railway track and Cross Sections at 20m intervals with drawings - Detail Drawings (Drainage, geometric design, structures, railway stations, platform, sidings, yards) - Design and analysis report of Station buildings and workshops. - Detailed design of Railway Crossing and with detailed drawings. - Hydrology and Hydraulic Report - Technical Specifications - Detail design and drawing of Signaling and communication facilities - Bill of Quantities	30(Thirty) % is payable when MoPW approves the whole package Assigned in this stage.
3.	Design of Station, bridges and culverts, viaduct, retaining wall, drainage with all drawings and specifications.	20 (Twenty) % is payable when MoPW approves the whole package assigned at this stage.
4.	Financial & Economic Analysis Report	10 (Ten)% is payable when MoPW approves the whole package Assigned at this stage.
5.	Signaling & Telecommunication Report and Electric Traction & Electric Power design report	
6.	Rolling Stock Report	
7.	90% - 95% Design Submittal Final and detailed design package of the projects analysis report, technical specifications and Drawings. - Final Drawings - Final Technical Specifications - Final Design Analysis/Calculations - Final Reports - Final Bill of Quantities - Final Cost Estimation	10(Ten) % is payable when MoPW approves the whole package Assigned at this stage.
8.	100% For Construction Set Submittal - Final plans, specifications, design analysis/calculations, reports and BoQ incorporating all corrections and comments from Engineering reviews.	10(Ten) % is payable when MoPW approves the whole package Assigned at this stage.

NOTE: The consultancy company should present its price in the form of a lump sum considering the above-mentioned activities.