TERMS OF REFERENCE
FOR CONSULTING SERVICES FOR CONSTRUCTION SUPERVISION & CAPACITY DEVELOPMENT OF SASEC ROAD CONNECTIVITY

1. Background:

Royal Government of Bhutan (RGoB) applied for a loan and a grant to Asian Development Bank (ADB) to finance a part of the cost of South Asian Sub-regional Economic Cooperation (SASEC) Road Connectivity Project (the Project). The Department of Roads (DoR) under the Ministry of Works and Human Settlement (MoWHS) is the designated authority within the Royal Government of Bhutan in charge of implementing the project. The Project comprise of the following:

i) Construction of 68.30 km of south east-west highway between Nganglam and Deothang and

ii) Construction of about 1.2 km of access road to Pasakha industrial area (Pasakha access road).

The roads would be constructed to Primary National Highway (PNH) RNPII standard, in line with Environmental Friendly Road Construction (EFRC) guidelines and practices. This project would improve rural access and connectivity contributing to economic growth and would be part of Southern East – West Highways (SEWH) providing alternative to the existing East-West Highway via Bumthang.

2. Objectives:

The objective of the proposed Consultancy services is to assist Project Management Team, Department of Roads, Ministry of Works and Human Settlement in implementing the project as follows:

i) To conduct comprehensive supervision of project implementation activities carried out by the civil work Contractors ensuring complete compliance with the drawings, technical specifications and various stipulations contained in the Contract Documents.

ii) To ensure high standards of quality assurance in the execution of work and completion of the works within stipulated time.

iii) To assist Project Management Team in taking remedial actions to avoid slippages, cost over runs, delays by the civil works Contractor, etc.

iv) To ensure safety during construction and adherence to all requirements under the Environment Management Plan (EMP) prescribed under the Contract.

v) To train and develop capacity of DoR engineers in designing and implementing adequate road safety measures, road asset management and climate change adaptation measures for the project and other roads under DoR.

vi) To ensure the implementation of resettlement plans and the social and relevant gender features included in the design of the project, including monitoring of HIV and human trafficking community awareness activities, as well as compliance of core labor standards by civil works contractors.
3. Scope of Services:

As the Client's representative, the Consultant's nominated Senior Highway Engineer/Team Leader will supervise and administer the civil works contract and ensure that the works are constructed in accordance with the drawings, technical specifications and contract conditions. The Consultant will have all of those powers defined as being the Client’s representative, with the exception of the following, which will be retained and exercised by the Client:

i) issuing the order to commence the works;
ii) approving variation orders that have financial implications;
iii) approving significant variations in quantity;
iv) approval of design drawings;
v) approving subletting of any part of the works; and
vi) approving time extensions.

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

i) approving the contractor's work program, method statements, material sources, etc.;
ii) preparing and issuing reports as defined subsequently;
iii) approving and/or issuing working drawings, approving the setting out of the works, and giving instructions to the Contractor;
iv) reviewing the Quality Assurance Plans and Programs of the Contractor;
v) inspecting and testing all the materials and the works to ensure compliance with specifications and giving immediate notice to the Contractor in the event that such materials and works fail to comply with the specifications;
vi) accepting or rejecting any part or parts of the completed works;
vii) making measurements and keeping measurement records;
viii) maintaining records, correspondence, and diaries;
ix) certifying work volume and interim certificates for progress payments;
x) assisting the Project Management with the maintenance of consolidated project accounts, and with preparation of financial statements and withdrawal applications for submission to ADB;
xii) certifying completion of part or all of the works;
xxii) assisting the Project Management in preparing withdrawal applications;
xxiiii) periodically checking the remaining quantities, and undertaking constant monitoring of each contract costs;
xxiv) reviewing and recommending to the Project Management variation orders, extensions of time, claims, and other matters that may come from Contractors;
xxv) negotiating with the Contractors and recommending to Project Management the rates for any unscheduled items of work that may arise;
xxvi) advising the Project Management on all matters relating to the execution of the works; and assisting it in processing the Contractor's possible claims;
xxvii) ensuring compliance with the environmental and social safeguards requirements of civil works contracts, and providing information to ADB on those processes in the monthly progress reports;
xxviii) conducting trainings on Environmental Friendly Road Construction principles and methods for all members of the SASEC Project Management Team, other DoR field staff and key personnel of the selected Contractors;
xix) providing on-the-job or on-site advise and training to Contractors where necessary (such as when there are changes in personnel of Contractors or when EMP is not being followed properly) to ensure proper implementation of the EMP;

xx) conducting training to DoR and Dzongkhag officials on ADB social safeguard requirements and Resettlement Plan (RP) implementation;

xxi) conducting monitoring visits to ensure proper implementation of EMP and RP;

xxii) updating EMP and RP based on changing field conditions and accordingly inform relevant agencies and field staffs;

xxiii) prepare semi-annual monitoring reports on implementation of safeguards for review and approval by DOR and further submission to ADB for disclosure on the ADB website;

xxiv) undertaking project performance management system in the format acceptable to the Client and ADB;

xxv) assisting in preparing a consolidated project completion report in a format provided by ADB after the completion of Contract works;

xxvi) checking and certifying as-built drawings for the works prepared by the Contractors;

xxvii) providing the Client with complete records such as inception, monthly, quarterly, completion reports, etc.;

xxviii) conducting on-site training where required for DoR field staff on Quality Assurance and Contract Administration;

xxix) monitoring the implementation of climate change adaptation measures during the construction stage and advising DoR and the Contractor of the remedial measures as necessary;

xxx) conducting training for DoR staff on climate change adaptation measures and its implementation methods for road construction and maintenance works. This training should be in principle based on the consultant’s assessment of existing design standards in Bhutan, but new design standards for the country should be introduced such as incorporation of future projected climate conditions into the road designs;

xxxi) introduce incorporate new design principles for climate change resilient road and bridges;

xxxii) conducting training for DoR staff on road safety aspects during construction, operations and maintenance periods through demonstration of engineering mitigation measures. Road safety audits should be conducted for the project as well as for other ongoing and completed roads projects;

xxxiii) conducting training for DoR staff on road asset management. This should involve intensive consultations with DoR staff on suitable inventory management scheme including the customization of existing road asset management system in DoR. The Consultant should work out a road asset management system (RAMS), including customization of existing HDM4-based RAMS or development of a simple-to-use software program, suitable for the project and for one existing highway segment. The road asset management system and scheme developed should be replicable to other roads;

xxxiv) conducting training for DoR staff on improving integration of social and gender mainstreaming features into future project design;

xxxv) develop and operate a quantitative and qualitative project performance monitoring system (PPMS) in consultation with ADB and DoR to monitor and evaluate the performance of the project in relation to its goals, purposes and outputs. Baseline values should be established by the Consultant in accordance with the target indicators in the Design and Monitoring Framework of the project. The values for these indicators would be measured at necessary agreed frequency during the project. Measured values of these indicators, together with relevant comments would be included in the Quarterly Progress reports and
the Project completion report; and
xxxvi) the financial proposal shall include provisional sum as specified for capacity
development training (ex-country) for DoR engineers to get exposure to newer
technologies, procurement of survey equipment, software and utility vehicles.

4. Reports and Documents:

The Consultant shall prepare and submit the reports and documents as listed below to the Client on
the format prepared by the Consultant and approved by the Client.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Report</th>
<th>Frequency</th>
<th>Due Date</th>
<th>No. of Copies</th>
<th>No. of CDs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Inception Report</td>
<td>One Time</td>
<td>Within 30 days after commencement of services.</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>Progress Report Monthly &amp; Quarterly</td>
<td>Every month and every three months</td>
<td>10&lt;sup&gt;th&lt;/sup&gt; of month following the reporting month/quarter</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>Construction Supervision Manual</td>
<td>One Time</td>
<td>60 days after commencement of services</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>Road safety audit Manual</td>
<td>One Time</td>
<td>Within 12 months after commencement of service</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>Road asset management system Manual</td>
<td>One Time</td>
<td>Within 12 months after commencement of service</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>Climate adaptation design, construction and maintenance Manual</td>
<td>One Time</td>
<td>Within 12 months after commencement of service</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>7.</td>
<td>Consultant’s Work Completion Report</td>
<td>One Time</td>
<td>Within 15 days after completion of service</td>
<td>10</td>
<td>5</td>
</tr>
</tbody>
</table>

i) Inception Report:
The Inception Report shall contain the details of all meetings held with the Client and any initial
meetings held with the Contractor and decisions taken therein, review of construction Contract
documents including specifications, the resources mobilized by the Consultant as well as the
Contractor and the Consultant’s perception of the management/supervision of the project and
capacity development needs for road safety, road asset management and climate change
adaptation measures. The report shall also include the master work program and resources
mobilization plan for the project prepared by the Contractors and approved by Client.
ii) **Progress Reports:**
The Monthly Progress Report shall contain details of all meetings, decisions taken therein, mobilization of resources (Consultant and the Contractors), physical and financial progress and the projected progress of works for the forthcoming periods and implementation of environment, social and resettlement safeguard requirements. It shall also include details of actions taken for capacity development assignments on road safety, road asset management and climate change adaptation measures. The reports shall clearly bring out the delays, if any, reasons for such delay(s) and the recommendations for corrective measures. The reports shall also contain the performance data for Contractor’s plant and equipment.

The Quarterly Progress Report shall summarize the overall progress for the quarter and highlight the main issues and the action being proposed to address those issues.

iii) **Construction Supervision Manual:**
The Construction Supervision Manual is a guideline for administration, supervision and management of the project and the construction contracts to be implemented. It will serve as a guide and reference to the various staff in the management and supervision of the project in discharging their duties in a smooth and systematic manner.

iv) **Road Safety Audit Manual:**
The Consultant shall develop an appropriate road safety audit manual for designing roads with appropriate road safety considerations by DoR and for conducting road safety audits at each stage of road development, i.e. design, pre-construction, construction and maintenance stages. This should be based on the findings of actual needs of DoR through the discussions and training during the assignments. The Consultant shall prepare the manual during the first 12 months of construction works to be used for follow-up trainings for DOR staff during the consulting services.

v) **Road Asset Management System Manual:**
The Consultant shall develop an appropriate road asset management system and a manual during the assignments. This manual should be based on the findings of actual needs of DoR through discussions and trainings during the assignments. The manual should be based on the road asset management scheme developed by the Consultant suitable for the project and for one existing highway segment, which should be replicable to other roads. The manual shall be prepared during the first 12 months of construction works to be used for follow-up trainings of DoR staff during the consulting services.

vi) **Climate Change Adaptation Manual:**
The Consultant shall develop an appropriate climate change adaptation manual for DoR to incorporate climate change adaptation measures into the designs of newly constructed roads and maintenance works of the existing roads. This should be based on the existing guidelines for design of roads and bridges in Bhutan as well as applicable international best practices. The Consultant shall prepare the manual during the first 12 months of construction works to be used for follow-up trainings of DOR staff during the consulting services.
vii) Consultant’s Work Completion Report:

The Consultant shall prepare a comprehensive final completion report of the construction contract packages after completion of all civil works packages. The report shall incorporate summaries of the methods of construction, the construction supervision performed, reference to as-built drawings of the construction, problems encountered and solutions undertaken thereon and recommendations for future projects of similar nature to be undertaken by DoR. The report shall also summarize the details of actions taken for capacity development assignments on road safety, road asset management and climate change adaptation measures, assessment of DoR’s current capacity and recommendations on future capacity development on these aspects.

The Consultant shall attach the self-appraisal report to the Final Report in compliance with ADB requirements for project completion report of executing agencies, including detailed data and information gathered and recorded during the project implementation and those on PPMS indicators:

5. Key Project Personnel:

The input for key Project Personnel in person-months is provided in the table below:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Position/ Expertise</th>
<th>Nos.</th>
<th>Person-months</th>
<th>Total person-months</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 1</td>
<td>Senior Highway Engineer/ Team Leader</td>
<td>1</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>A 2</td>
<td>Bridge Supervision Engineer</td>
<td>1</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>A 3</td>
<td>Material Engineer</td>
<td>1</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>A 4</td>
<td>Road Safety Specialist</td>
<td>1</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>A 5</td>
<td>Road Asset Management Specialist</td>
<td>1</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>A 6</td>
<td>Climate Change Specialist (Adaptation)</td>
<td>1</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>B 1</td>
<td>Resident Engineers</td>
<td>3</td>
<td>45+40+28</td>
<td>113</td>
</tr>
<tr>
<td>B 2</td>
<td>Quantity Surveyor</td>
<td>1</td>
<td>42</td>
<td>42</td>
</tr>
<tr>
<td>B 3</td>
<td>Site Inspectors (Field Engineers)</td>
<td>5</td>
<td>2<em>45+2</em>39+1*27</td>
<td>195</td>
</tr>
<tr>
<td>B 4</td>
<td>Survey Engineer</td>
<td>1</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>B 5</td>
<td>Laboratory Technicians</td>
<td>3</td>
<td>42+36+24</td>
<td>102</td>
</tr>
<tr>
<td>B 6</td>
<td>Environmental Specialist</td>
<td>1</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>B 7</td>
<td>Wildlife Specialist</td>
<td>1</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>B 8</td>
<td>Resettlement and Social Specialist</td>
<td>1</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>B 9</td>
<td>Road Management Specialist</td>
<td>1</td>
<td>42</td>
<td>42</td>
</tr>
</tbody>
</table>
6. **Qualification and Experience Requirements of Key Experts:**

Qualifications and experience requirements for Key Project Personnel of the Consultant are as below.

**A 1. Senior Highway Engineer/ Team Leader**

<table>
<thead>
<tr>
<th>a) Qualification</th>
<th>Minimum: Bachelor’s degree in civil engineering. Preferable: Post graduate degree in civil engineering or its related disciplines.</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Total Professional Experience</td>
<td>20 years minimum</td>
</tr>
<tr>
<td>c) Project-related Experience</td>
<td>- Minimum 10 years experience as Team Leader/Project Manager in supervision or contract administration of highway or road construction contracts, preferably having managed multiple contracts.</td>
</tr>
<tr>
<td></td>
<td>- Sound knowledge of International/RGoB competitive bidding procedures.</td>
</tr>
<tr>
<td></td>
<td>- Good knowledge and experiences of EFRC practices</td>
</tr>
<tr>
<td>d) Overseas/ Country Experience</td>
<td>Preferably with substantial experience in Himalayan mountainous condition/ Bhutan.</td>
</tr>
</tbody>
</table>

**A 2. Bridge Supervision Engineer:**

<table>
<thead>
<tr>
<th>a) Qualification</th>
<th>Minimum: Bachelor’s degree in civil engineering. Preferable: Post graduate degree in civil engineering or its related disciplines.</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Total Professional Experience</td>
<td>15 years minimum</td>
</tr>
<tr>
<td>c) Project-related Experience</td>
<td>Minimum experience as supervision Engineer in construction supervision of at least 5 permanent concrete or steel highway bridges or flyovers.</td>
</tr>
<tr>
<td>d) Overseas/ Country Experience</td>
<td>Preferably with substantial experience in Himalayan mountainous condition/ Bhutan.</td>
</tr>
</tbody>
</table>

**A 3. Material Engineer:**

<table>
<thead>
<tr>
<th>a) Qualification</th>
<th>Minimum: Bachelor’s degree in civil engineering. Preferable: Post graduate degree in civil engineering or its related disciplines.</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Total Professional Experience</td>
<td>15 years minimum</td>
</tr>
<tr>
<td>c) Project-related Experience</td>
<td>Minimum 8 years experience Material Engineering or as Asst. Material Engineering in highway construction projects with</td>
</tr>
</tbody>
</table>
various experiences in material testing, mixes such as GSB, WMM, Bituminous mixes, concrete mixes, etc.

d) Overseas/ Country Experience

<table>
<thead>
<tr>
<th>Experience</th>
<th>Preferably with substantial experience in Himalayan mountainous condition/ Bhutan.</th>
</tr>
</thead>
</table>

A 4. Road Safety Specialist:

<table>
<thead>
<tr>
<th>a) Qualification</th>
<th>Minimum: Bachelor’s degree in civil engineering/ relevant field. Preferable: Post graduate degree in civil engineering or its related disciplines.</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Total Professional Experience</td>
<td>10 years minimum</td>
</tr>
</tbody>
</table>
| c) Project-related Experience | - Minimum 5 years experience as Road Safety Specialist.  
- Conversant with iRAP model |
| d) Overseas/CountryExperience | Preferable. |

A 5. Road Asset Management Specialist:

<table>
<thead>
<tr>
<th>b) Qualification</th>
<th>Minimum: Bachelor’s degree in civil engineering/ relevant field. Preferable: Post graduate degree in civil engineering or its related disciplines.</th>
</tr>
</thead>
<tbody>
<tr>
<td>c) Total Professional Experience</td>
<td>10 years minimum</td>
</tr>
</tbody>
</table>
| d) Project-related Experience | Minimum 5 years experience as Road Asset Management Specialist, including experiences in developing road asset management systems in developing countries.  
Working experience in mountainous countries/areas is a plus. |
| e) Overseas/CountryExperience | ➢ Preferable. |

A 6. Climate Change Specialist (Adaptation):

<table>
<thead>
<tr>
<th>a) Qualification</th>
<th>Minimum: Bachelor’s degree in civil engineering/ relevant field. Preferable: Post graduate degree in civil engineering or its related disciplines.</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Total Professional Experience</td>
<td>10 years minimum</td>
</tr>
<tr>
<td>c) Project-related Experience</td>
<td>Minimum 5 years experience as Climate Change Adaption Specialist.</td>
</tr>
</tbody>
</table>
### B 1. Resident Engineer:

<table>
<thead>
<tr>
<th>a) Qualification</th>
<th>Minimum: Diploma in Civil Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Total Professional Experience</td>
<td>Minimum of 10 years for Diploma holder or 5 years for Bachelor degree holder.</td>
</tr>
</tbody>
</table>
| c) Project-related Experience | - Minimum 5 years experience as Project Manager/ Asst. Project Manager in supervision or contract administration of highway or road construction contracts, preferably having managed multiple contracts.  
- Sound knowledge of International/RGoB competitive bidding procedures.  
- Good knowledge and experiences of EFRC practices, bridge construction works and material testing.  
- Preferably with substantial experience in Himalayan mountainous condition/ Bhutan |
| d) Experience in working with international organizations/ agencies | Preferable. |

### B 2. Quantity Surveyor

| a) Qualification | Minimum: Bachelor’s degree in civil engineering  
Preferable: Post graduate degree in civil engineering or its related fields. Membership of professional institutions. |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Total Professional Experience</td>
<td>15 years minimum</td>
</tr>
<tr>
<td>c) Project-related Experience</td>
<td>Minimum five years as quantity surveyor/assistant quantity surveyor (at least 2 projects of similar nature costing over US$ 10 million each administered under FIDIC contract conditions). Familiarity with international and Indian design standards. Hands-on experience in using various quantity-estimation software.</td>
</tr>
<tr>
<td>d) Experience in working with international organizations/ agencies</td>
<td>Preferable.</td>
</tr>
</tbody>
</table>
### B 3. Site Inspectors (Field Engineers)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a)</strong> Qualification</td>
<td>Minimum: Diploma in Civil Engineering</td>
</tr>
<tr>
<td><strong>b)</strong> Total Professional Experience</td>
<td>5 years minimum</td>
</tr>
</tbody>
</table>
| 6 Project-related Experience | - Minimum 5 years’ experience in highway or road construction contracts, preferably having good knowledge and experiences of EFRC practices.  
- Preferably with substantial experience in Himalayan mountainous condition/ Bhutan. |
| 7 Experience in working with international organizations/ agencies | Preferable |

### B 4. Survey Engineer

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| **a)** Qualification | Minimum: Diploma in civil engineering  
Preferable: Bachelor’s degree in civil engineering or its related fields. Membership of professional institutions. |
| **b)** Total Professional Experience | 8 years minimum for degree holder.  
10 years minimum for diploma holder. |
| **c)** Project-related Experience | Minimum five years as Surveyor/Assistant Surveyor/Survey Engineer on highway projects of similar nature (at least 2 projects of similar nature costing over US$ 20 million each). |
| **d)** Experience in working with international organizations/ agencies | Preferable. |

### B 5. Lab Technicians:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>8</strong> Qualification</td>
<td>Minimum: Diploma in Civil Engineering/relevant field</td>
</tr>
<tr>
<td><strong>9</strong> Total Professional Experience</td>
<td>5 years minimum</td>
</tr>
</tbody>
</table>
| **10** Project-related Experience | - Minimum 3 years experience in highway or road construction contracts.  
- Preferably with substantial experience in Himalayan mountainous condition/ Bhutan |
<table>
<thead>
<tr>
<th></th>
<th>Experience in working with international organizations/agencies</th>
<th>Preferable</th>
</tr>
</thead>
</table>

**B 6. Environment Specialist:**

<table>
<thead>
<tr>
<th></th>
<th>Qualification</th>
<th>Total Professional Experience</th>
<th>Experience in working with international organizations/agencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Minimum: Bachelor’s degree in Environmental Science/ Natural Resources Management/ Engineering or its related disciplines.</td>
<td>5 years minimum</td>
<td>Preferable.</td>
</tr>
<tr>
<td>b)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c)</td>
<td>Minimum 5 years’ experience in environmental mitigation measures for road works, environment management and bio-engineering techniques particularly in respect of slope stabilization and protection.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d)</td>
<td>Preferable.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**B 7. Wildlife Specialist**

<table>
<thead>
<tr>
<th></th>
<th>Qualification</th>
<th>Total Professional Experience</th>
<th>Project-related Experience</th>
<th>Experience in working with international organizations/agencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Minimum: Bachelor’s degree in Forest and Wildlife Management or its related disciplines. Membership of professional institutions.</td>
<td>10 years minimum</td>
<td>Minimum five years as Wildlife expert with experience of management of flora and fauna of Himalayan ecosystems. Familiarity with Wildlife rules and regulation of Bhutan. Hands-on experience of wildlife mitigation measures in a highway project.</td>
<td>Preferable.</td>
</tr>
<tr>
<td>b)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**B 8. Resettlement and Social Specialist:**

<table>
<thead>
<tr>
<th></th>
<th>Qualification</th>
<th>Total Professional Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Minimum: Bachelor’s degree in Economics or Sociology or its related disciplines.</td>
<td>5 years minimum</td>
</tr>
<tr>
<td>b)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
c) Project-related Experience
Minimum 5 years experience in designing or implementing social components of developmental projects in Bhutan preferably with work experience in transport sector funded by an external donor.

d) Experience in working with international org./agencies
Preferable.

B 9. Road Management Specialist:

<table>
<thead>
<tr>
<th>a) Qualification</th>
<th>Minimum: Bachelor’s degree in civil engineering/relevant field. Preferable: Post graduate degree in civil engineering or its related disciplines.</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Total Professional Experience</td>
<td>10 years minimum</td>
</tr>
<tr>
<td>c) Project-related Experience</td>
<td>Minimum 5 years’ experience in the areas of road construction, road asset management and road safety.</td>
</tr>
<tr>
<td>d) Experience in working with international org./agencies</td>
<td>Experiences in working for technical assistance projects of international organizations/agencies on road asset management and road safety aspects are preferable.</td>
</tr>
</tbody>
</table>

7. Tasks and Responsibilities of Key Experts:

The position-based job responsibilities are only indicative. The Consultant needs to propose its own working arrangements, based on the overall requirements of ToR.

A 1. Senior Highway Engineer/Team Leader
- Responsible for contract management and the overall assignment of supervision Consultant
- Responsible for quality control and overall activities of team members
- Review engineering design for completeness or consistency
- Advice on overall project planning and logistics
- Coordinate the input of Consultants
- Review and edit draft reports produced by Consultants
- Ensure full compliance with EFRC practices
- Provide instruction and training, in particular with regard to EFRC and Contract Administration
- Report to the Project Coordinator

A 2. Bridge Supervision Engineer
- Responsible for overall supervision of all the bridge works
- Review bridge design drawings for completeness or consistency before commencement of Contract works.
- Carry out measurements and review billings for bridge works
A 3. Material Engineer
- Undertake overall management of quality control related to Construction Work packages
- Provide protocols for material testing; assist with test formats, procedures of quality control tests required by the project
- Overall quality control and quality administration/ assurance
- Verify and approve the quality control test reports
- Verify and approve material test certificates
- Provide technical backstopping on designs, technical standards and specifications
- Undertake test check of construction material samples
- Specify and monitor quality assurance plans and quality control tests being conducted in all packages
- Work in close coordination with Project Engineers, REs and SIs
- Report to and take instruction from the Project Coordinator, APC and Team Leader

A 4. Road Safety Specialist
- Review road designs on safety aspects and suggest measures if adequate safety is not incorporated in the design
- Prepare manual and standards on road safety aspects as to incorporate them during construction period
- Conduct road safety audits during pre-construction and construction stages
- Supervise and advise Contractors on all aspects of safety measures.
- Provide trainings to DoR engineers and Contractors on all road safety aspects
- Develop detailed plans of road safety awareness campaign along the project road (appropriate users’ behaviors, community-based monitoring mechanisms etc.) to be conducted by DOR in cooperation with local communities, based on international best practices and in good consultation with DOR.
- Maintaining records, correspondence and diaries
- Report to Team Leader and work in close coordination with Project Management Team

A 5. Road Asset Management Specialist
- Prepare manual for road asset management system
- Develop a road asset management system (including customization of the existing RAMS or development of a simple-to-use software programs) suitable for the project and for one existing highway segments
- Develop detailed plans of road asset management awareness campaign (routine
maintenance by communities, road users’ manner etc.) along the project road to be conducted by DOR in cooperation with local communities, based on international best practices and in good consultation with DOR.

- Carry out series of consultations and discussions with DoR engineers both at HQ and field level including field visits to existing roads before developing road asset management system
- Provide trainings to DoR engineers on road asset management system including the usage of software programs.
- Report to Team Leader and work in close coordination with Project Management Team

A 6. Climate Change Specialist (Adaptation)

- Review the climate change study prepared for the Nganglam – Deothang road and climate change resilient design incorporated in detail design
- Prepare manual/report to incorporate climate change adaptation measures based on relevant international best practices into the designs of newly constructed roads and maintenance works of the existing roads
- Provide trainings to DoR engineers on the aspect of climate change resilient designs, other practical measures based on relevant international best practices during construction and maintenance
- Coordinate and recommend institutions for training DoR engineers on climate change resilient design of road infrastructures
- Provide necessary guidance to the national Environmental Specialist on monitoring implementation of adaptation measures during construction
- Report to Team Leader and work in close coordination with Project Management Team

B1. Resident Engineer

- Provide technical management and supervision of all Construction Works
- Manage and coordinate all works of the site inspectors and other experts
- Respond to all technical issues of Contractors
- Carry out field design for un-designed portion of rocky cliff
- Undertake quality control and verification of measurement bills
- Provide backstopping to the Site Inspectors
- Provide interpretation of the Technical Specification where necessary
- Advice on work deviations (modifications and additional works)
- Advice on claims, disputes and contract interpretation
- Plan and prepare work schedules and procurement plans in consultation with Project Coordinator
- Monitor progress of work through field visits
- Ensure smooth implementation of all project activities and provide support required to supervising engineers
- Prepare and review progress monthly/quarterly reports
- Work in close coordination with the Project Management Team, experts and specialists
- Report to and take instruction from Team Leader.

B 2. Quantity Surveyor

- Measure quantities of work, record measurements and verify BoQ items / Work quantities executed in the contractors monthly statement.
- Verify and examine interim payment certificates received from contractors.
Maintain a permanent record of all measurement for the work quantities.

B 3. Site Inspectors
- Undertake overall site management of one Construction package
- Supervise and guide the contractor
- Assist the Project Manager
- Ensure environment compliance
- Oversee implementation of quality assurance plans and quality control tests
- Provide technical backstopping to Contractors
- Maintain all books of accounts and prepare cash flow requirements
- Conduct weekly meetings
- Conduct joint measurement
- Assist the Project Engineer in bill verification
- Report to and take instructions from Senior Civil Engineer, Bridge Supervision expert and Material Engineering expert and Project Engineer
- Undertake site measurement
- Provide daily supervision of Construction works
- Check work quality
- Ensure progress of Construction works
- Work in close coordination with the Project Management Team, experts and specialists
- Report to and take instruction from Resident Engineer and Project Manager/Engineer.

B 4. Survey Engineer
- Scrutinize topographic survey data, if any, in the contract drawings and associate and scrutinize the contractors updated topographic survey data.
- Monitor survey and setting out operations and verify data and details Carry out detailed checking and verification of setting out data

B 5. Laboratory Technician
- Assist Resident Engineer and Material Engineer on all matters relating to construction material testing.
- Keeping test report’s record for technical audit.

B 6. Environmental Specialist
- Support DOR to ensure proper implementation of all environment safeguard requirements underall works packages
- Update the Environment Management Plan as and when necessary
- Collect baseline data during pre-construction stage as necessary in accordance with the EIA and IEE report prepared for the two project components
- Oversee planning and implementation of environmental mitigation measures as well as climate adaptation measures
- Organize training workshops and provide onsite technical advice to the contractor as necessary
- Prepare the semi-annual monitoring report on implementation of the EMP including implementation of climate adaptation measures for review and approval by DOR and further submission to ADB for disclosure
- Support the International Climate Change Specialist in training relevant DOR staff on incorporation of climate adaptation measures in road design
B 7. Wildlife Specialist

- Review the EIA and IEE report prepared for the two project components to understand the wildlife related issues and activities proposed under the project.
- Study the details of Wildlife including flora and fauna of the project construction area and update the wildlife conservation/mitigation related activities in the detailed EMP as necessary.
- Provide technical advice to contractors on implementation of the wildlife conservation related activities in the EMP.
- Monitor movement and behavior of wildlife species during construction and in consultation with local forestry and wildlife officials make adjustments to the mitigation/enhancement activities as given in the EMP where necessary.
- Monitor the effectiveness of the wildlife mitigation and enhancement measures during operation for at least two years.
- Prepare annual monitoring reports to document wildlife related experiences and measures taken during construction as well as operation stage.

B 8. Resettlement and Social Specialist

- Verify compensation and assistance for all persons affected by the project in accordance to RP.
- Provide support to DoR to update resettlement plan, if necessary.
- Conduct training to DOR officials on how better to integrate gender design features into future projects.
- Coordinate awareness building sessions for project affected communities in gender-mainstreaming, HIV/AIDS, and human trafficking.
- Assess needs of facilities or signage to be provided along the project road, such as benches, rest spaces or zebra crossings to make the project roads more user-friendly especially for women, elders and children and propose to DOR for incorporation into the project.
- Monitor, report and advise on social issues, including gender, HIV/AIDS, human trafficking and core labor standards due to project implementation.
- Prepare the semi-annual monitoring report on social safeguard for review and approval by DoR and further submission to ADB for disclosure.
- Report to Team Leader and work in close coordination with Project Management Team.

B 9. Road Management Specialist

- Support the International Road Safety Specialist and Road Asset Management Specialist in training relevant DOR staff on capacity development activities on road safety and road asset management, including drafting manuals and developing a road asset management system.
- Conduct small scale training sessions regularly based on the inputs from international consultants, including manuals and road asset management system. Main target of the training is DOR staff, and staff in other ministries and Thromde engaged in road projects will also be invited to join the training.
- Survey existing road conditions with DOR staff on a sample basis and provide technical advice on road safety and road asset management to DOR staff. Key issues identified during the survey should be incorporated in the manuals and road asset management system to be prepared/developed by international consultants.
Facilitate awareness campaigns on road safety and road asset management issues based on the plans developed by international consultants and support DOR to conduct the campaigns in cooperation with local communities.

Act as a focal point of road safety and road asset management activities during the absence of international consultants from Bhutan. Play coordination roles between DOR staff and international consultants and provide appropriate advice and inputs for better implementation of road safety measures for the project and for better road asset management planning.

Report progress and issues during the implementation to team leader on a regular basis.

8. Laboratory test to be confirmed out by the Consulting Firm:

Almost all the basic field equipment shall be built in the works contract. Some major laboratory testing facilities would be set up at site by Contractors or hired from nearby service providers. Although the Contractor would carry out the required test as per Technical Specifications and standard practices, the Consulting firm need to confirm the following test carried out by Contractors;

i) Sieve Analysis (Fine and Course)
ii) Liquid Limit/Plastic Limit
iii) Proctor Test
iv) CBR
v) Specific test and bulk density
vi) Field density
vii) Slump Test
viii) Compression test
ix) Flakiness test
x) Penetration test
xi) Softening test
xii) Specific gravity and water absorption
xiii) Marshall test
xiv) Tensile strength test
xv) Mix designs and trial mixes and
xvi) Any other tests required as per ToR and technical specifications

9. Additional Services:

The Consultant shall, if so required by the Client, provide any additional service at rates or on man-month rates as per the contract, or as mutually agreed upon, as a variation order.

10. Support Services & Facilities to be provided by the Client:

The following services and facilities would be provided by the Client:

i) Assist the consultants in monitoring the construction works, verification of contract bills, conduct monthly meetings etc. The Project Management Team from the Client shall comprise of Project Coordinator, Assistant Project Coordinator, Financial Controller and three Project Managers/Engineers. The Project Coordinator, Assistant Project Coordinator and Financial Controller shall be for the entire projects whereas; the Project Managers/Engineers would be
assigned each specific project sites with Consultant’s Resident Engineers as counterpart engineers of the Client.

ii) All the available studies, reports and data, design drawings, etc. relevant to the project will be provided by the Client.

iii) Assist the Consulting firm to process for Visa, Work Permits & Special Route Permits for foreign nationals.

iv) The establishment of field laboratory including supply of equipment, operation and maintenance shall be built-in the civil contract works.

v) The site office for Project Managers/ Engineers, Resident Engineers and Site Inspectors shall be built in the civil work contract package.

vi) Utility vehicles (four-wheeled drive) – Total 5 Nos. with drivers (2Nos will be shared within PCU & Consultant’s in main Project office, 3Nos will be used in 3 site Project offices within PMU & RE and

vii) 5 bikes for Site Inspectors.

11. Support Services & Facilities to be arranged by the Consulting Firm:

The consulting firm shall arrange the following as a part of the supervision consultancy contract:

i) Main Project Office in a central location (SamdrupJongkhar)

ii) Computer or laptops facilities.

iii) Adequate internet and e-mail facilities.

iv) Monthly operating expenses for Xerox, Telephone, Fax and email.

v) Safety equipment for the consulting engineer.

vi) Maintenance of vehicle/fuel cost and other operating expenses

vii) The consultant is required to detail what additional facilities are required.

The consultant is required to detail what additional facilities he requires in the performance of his work on this Project, and specify their cost in his financial proposal. All vehicles and equipment procured by the consultant for the performance of his services will remain the property of the Government.

12. Consultant’s Proposal submission

These TOR are prepared to address the construction supervision and capacity development package in a general way. The shortlisted consultants are advised to inspect the project sites and acquaint themselves with the ground realities. The consultants are also advised to go through the bidding documents of the construction packages which will be put to tender by the Employer before submission of the proposal and include the provisions required thereof meeting the contract requirements.