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ROYAL GOVERNMENT OF BHUTAN  
MINISTRY OF INFRASTRUCTURE AND TRANSPORT  
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Terms of Reference (ToR)

for

For Hiring of Consultancy Services for Enhancing Road Asset Management Practices

for

Accelerating Trade and Transport in Eastern South Asia (ACCESS)Phase – 2 Bhutan

I. Abstract

Efficient road asset management is essential for ensuring the sustainability and resilience of road infrastructure, particularly in the face of climate change and increasing maintenance needs. The Department of Surface Transport (DoST), Ministry of Infrastructure and Transport, Bhutan, is working to enhance its Road Asset Management System (RAMS) to support data-driven decision-making and long-term investment planning. With support from the World Bank ACCESS Project, this initiative aims to strengthen data collection, analysis, and multi-year planning supported by a data driven decision making approach. To facilitate this process, DoST seeks to hire an international consultant for the provision of capacity building services. The consultant will play a key role in supporting DoST with RAMS enhancement by defining a high-level strategic approach and provision of extensive capacity building and training.

- i. **Project:** ACCESS Bhutan Phase-2
- ii. **Financing:** ACCESS Project financed by the World Bank
- iii. **Category:** Firm
- iv. **Implementing Agency/Procuring entity:** Department of Surface Transport (DoST), Ministry of Infrastructure and Transport, Thimphu, Bhutan.
- v. **Web:** <https://www.moit.gov.bt/en/departments/department-of-roads/background/>



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### III. Background

The Department of Surface Transport (DoST), Ministry of Infrastructure and Transport, Bhutan, is undertaking an initiative to enhance its Road Asset Management capacity to improve road maintenance efficiency and long-term investment planning. Bhutan's road infrastructure plays a crucial role in national connectivity and economic development, requiring a robust asset management proficiency and supporting data collection and analysis solutions to ensure sustainability and data-driven decision-making.

The following activity will be implemented as part of the World Bank financed ACCESS (Accelerating Transport and Trade Connectivity in Eastern South Asia) Phase-2 Bhutan project. To ensure sustainability of current and future investments, this subcomponent will strengthen the existing RAMS being used in Bhutan by improving data collection, analysis, and instrumentation and provide support for the initiative to establish a web-based RAMS. The system will support data driven decision making and the prioritization of climate-resilient maintenance interventions in a sustainable and transparent manner. By enabling timely maintenance, the new RAMS is expected to improve the resilience of the road network to climate hazards.

Currently, the RAMS Unit under the Maintenance Division of DoST is responsible for managing road asset data, planning maintenance activities, and ensuring optimal use of available resources. As per the Road Classification and Network Information of Bhutan\_2020, Bhutan's total road network spans approximately 18,265 km, including expressways, national highways, dzongkhag, urban, access, and farm roads. The Department of Surface Transport (DoST) is responsible for around 4,900 km, covering Primary and Secondary National Highways and Dzongkhag roads. All Primary National Highways are blacktopped (BT), 81% of Secondary National Highways, and over 60% of Dzongkhag roads are BT. The RAMS Unit has attempted RAMS through multiple initiatives, including an excel-based basic asset register, a preliminary version of the Bridge Management System (BMS), usage of portable road data collection devices, pavement roughness data collection vehicles (ROMDAS), and limited introduction of GIS software for planning.

Despite these efforts, DoST recognizes that technical and institutional gaps remain for fully operationalizing comprehensive RAMS. The current systems require enhancements in data collection protocols, life-cycle-based planning, and multi-year budgeting frameworks. Additionally, the RAMS Unit requires technical support for developing technical specifications, data collection, data management and integration of climate resilience considerations into maintenance planning.

These past experiences and organizational lessons are fully integrated into the design of the RAMS sub-component to ensure sustainability and scale-up readiness to mainstream RAMS. To address the challenges, DoST seeks to engage a consultant to provide technical expertise and capacity-building support. The consultant will assist in developing strategic planning documents, multi-year maintenance frameworks, and procurement specifications for critical data collection equipment,

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as well as supporting the procurement process to enhance RAMS implementation. This also includes, but is not limited to, capacity building for: successful implementation of RAMS sub-component of ACCESS, scale up of RAMS initiatives, and mainstreaming RAMS in DoST planning and operations activities.

#### IV. Objectives

The assignment aims to strengthen road asset management in Bhutan by developing a national RAM strategy, enabling data-driven and life-cycle-based planning, and supporting the procurement of key systems and equipment. The Consultant will work closely with DoST and stakeholders to align efforts with national goals, deliver targeted capacity building, and recommend suitable international exposure programs.

#### V. Scope of Work

The ACCESS Program framework, in general, consists of 3 main pillars and Bhutan adopted the same framework as follows:

The scope of work is structured into two phases with a total of six core components. Activities under **Phase-II** are directly linked to the outcomes of Phase-I, and their implementation will be contingent upon the successful completion and approval of the corresponding deliverables.

**Phase-I** of the project will focus on laying the foundational elements necessary for road asset management and long-term sustainability of RAMS. This phase will emphasize strategic planning, institutional capacity building, and the establishment of key frameworks, guidelines, and technical documents required to guide subsequent implementation. It will involve close coordination with national stakeholders to ensure alignment with country-specific priorities, policies, and digital infrastructure.

Key activities under **Phase-I** include:

1. **(S1):** Institutional Strengthening including preparation of Road Asset Management Strategy and Action Plan.
2. **(S2):** Preparation of a Multi-Year Operational Program Framework and the Program itself, developed based on the life-cycle cost-benefit analysis approach with climate resilience considerations.
3. **(S3):** Development of Data Collection Guideline and Technical Specifications for Equipment Procurement.
4. **(S4):** Preparation bid documents including Terms of Reference (ToR) and Technical Specification for RAMS/BMS Solution.

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**Phase-II:**

Phase-II of the project will focus on supporting the procurement, implementation, and early-stage operationalization of the RAMS/BMS solution. During this phase, the Consultant will provide technical assistance to ensure a well-informed procurement process, including support in responding to queries. Following the procurement, the Consultant will assist with overseeing the initial implementation of the RAMS/BMS solution, and carry out an operational assessment to verify functionality, alignment with specifications, and readiness for institutional uptake. Phase II aims to ensure that the system is effectively deployed, technically robust, and positioned for long-term use by DoST. Key activities under Phase II include:

5. **(S5):** Providing technical support during the RAMS/BMS procurement process.
6. **(S6): Providing implementation/operational support and** conducting periodic implementation and operational assessment of RAMS/BMS Solution deployment and use by DoST

**Specific deliverables and activities for each key scope item are provided below.**

**Phase I**

**(S1): Institutional Strengthening.**

**S1.1. Road Asset Management Strategy and Implementation Plan**

- i. The Consultant shall hold consultations and workshops with key stakeholders to identify institutional objectives, needs, and constraints related to road asset management.
- ii. Based on the findings, provide recommendations and prepare a comprehensive Road Asset Management Strategy for Bhutan clearly outlining objectives, roles and responsibilities, processes, key performance indicators (KPIs), and monitoring and evaluation mechanisms. In order to develop the strategy document, the consultant will review all relevant information like the organizational mandate, current processes, challenges, resource allocation, capacity at different levels of the organization, use of technology, availability of resources, challenges ahead. The consultant will also engage in dialogue with internal and external stakeholders to develop the strategy document. The consultant will also prepare a maintenance Policy which will serve as a guiding framework for long-term maintenance planning of roads in Bhutan. This high-level Maintenance Policy should include and guide the Road asset management strategy document.
- iii. As part of the preparation of the Road Asset Management Strategy document, the Consultant shall conduct a comprehensive comparative analysis of implementation options for a Road and Bridge Asset Management System. The analysis shall evaluate two primary approaches: a Commercial Off-The-Shelf RAMS/BMS solution and Custom RAMS/BMS development. The comparison shall include a multi-criteria scenario analysis considering aspects such as implementation timeframes, scalability, adaptability, long-term maintenance needs, etc. The Consultant shall also assess risks, technical feasibility, and alignment with

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international best practices to ensure a realistic understanding of each option's benefits and trade-offs.

- iv. In addition, the Consultant shall provide an indicative financial analysis that highlights the short-term and long-term financial implications of each approach. This shall include estimates of licensing or development costs, customization efforts, system upgrade and maintenance costs, staffing and training needs, etc. The findings will inform strategic decision-making on the most cost-effective and sustainable approach for long-term RAMS/BMS implementation.
- v. As an annex to the Strategy, the Consultant shall develop a detailed Implementation Plan with clearly defined activities, timing of the actions, role of different stakeholders, resource requirements, a risk register, and means to measure efficacy of the actions to transition to modern road asset management practices. The consultant will assess all relevant data and facts necessary for the development of an action plan.
- vi. The consultant will lay out and document the outcome of adopting a Road Asset Management Strategy and implementation of the Action plan.

**S1.2. Develop SOPs and Job Descriptions for RAMS Unit**

- i. For supporting activities identified under the Action Plan, the Consultant shall define the operational processes and functions of the RAMS unit within DoST, aligned with international best practices and prepare Standard Operating Procedures (SOPs) covering activities of the RAMS unit, including data collection, validation, data processing, asset condition evaluation, maintenance planning, reporting, etc. As part of this effort, the Consultant shall also support the HDM-4 Technical Working Group (TWG) established by DoST in preparing a dedicated SOP for HDM-4 operations and sustainability, and develop a formal Terms of Reference (ToR) defining the TWG's mandate, structure, and responsibilities.
- ii. The consultant shall also develop job descriptions for key RAMS unit positions, clearly specifying roles, required skills, qualifications, responsibilities, reporting lines for the effective operation of the unit.
- iii. Develop standard reporting outline for DoST. For each recurring report describe key items like the rationale, contents, generation process, lead time, frequency and target audience.
- iv. Assist and DoST with several cycles of report preparation with the goal of staff being able to develop the reports independently.

**S1.3. Long Term Capacity Building Plan and procurement document including TOR for International Training**

- i. The Consultant shall prepare an overall capacity building plan to support long-term operation of the RAMS Unit. within the Department of Surface Transport (DoST). This

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shall include recommendations for a series of international training courses and technical workshops.

- ii. In addition, the Consultant shall prepare bid documents, specifically Terms of Reference (ToR) for the engagement of a training vendor to provide international training services. The training program, with an expected duration of two weeks, shall target both management-level and technical-level staff, ensuring a balanced representation that promotes institutional understanding and technical proficiency. The training shall be hosted in close collaboration with a road agency that operates a modern and well-established RAMS framework, enabling practical exposure to RAM workflows. The ToR shall specify the objectives, expected outcomes, selection criteria for the host agency, required training content, and logistical considerations. It should also emphasize interactive formats such as case studies and system demonstrations.

**S1.4. Training Plan**

- i. The Consultant shall prepare a comprehensive Training Plan during the initial phase of the assignment. This plan shall outline a structured schedule of training activities to be implemented throughout the duration of the project, closely aligned with key deliverables and milestones.
- ii. The training approach should prioritize hands-on learning in close collaboration with DoST counterpart staff on a daily basis, complemented by regular technical sessions, on-the-job mentoring, and targeted meetings.
- iii. These capacity-building activities will be designed to progressively enhance the skills and knowledge of the DoST team, enabling them to actively follow and to the project's technical processes and progress. While most of the training will be conducted in the form of small-scale, frequent technical sessions at the DoST office, the Consultant shall also organize a number of large-scale workshops at key stages of the project.
- iv. These workshops will be planned and agreed upon with DoST. Where necessary, the cost of external venues for these larger events will be covered under a designated Provisional Sum item included in the contract.

**S1.5. Capacity Building Material and Multimedia Training Archive**

- i. The consultant will prepare a comprehensive multimedia training package based on training and capacity building sessions delivered under this assignment. This training package will consist of organized multimedia files, including recorded training sessions videos, presentations, manuals and relevant instructional documentation facilitating knowledge retention and providing effective resources for training both existing staff and newly recruited personnel.
- ii. In addition to comprehensive hands-on training with HDM-4, GIS tools (such as QGIS/ArcGIS), and any other relevant software used as part of data processing for

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HDM-4, the Consultant will develop and deliver all multimedia training materials in a user-friendly digital package. This will include structured, easy-to-follow manuals or quick reference guides (in PDF format), narrated screen recordings, presentations, and other instructional content illustrating the use of these tools for preparing multi-year forward programs. The recordings will cover data inputs, analysis steps, maintenance standards modelling, and results interpretation. The complete package will serve as a practical resource for DoST, enabling efficient re-training and long-term knowledge transfer.

- iii. To ensure effective absorption and avoid information overload, the Consultant shall implement a phased training and knowledge transfer approach, wherein training sessions are conducted progressively, aligned with the completion of each key activity or milestone. This will allow DoST personnel to internalize and apply knowledge in a timely and practical manner throughout the project duration. The complete digital training package will serve as a lasting resource for DoST, supporting both immediate application and future capacity-building needs.

## **S2: Life-cycle Cost Benefit Analysis Based Multi-Year Operational Program**

The following scope item shall focus on two key deliverables, first, the Consultant shall prepare a multi-year planning framework document considering the Life-cycle cost benefit analysis approach and the potential of incorporating climate resilience considerations. Based on the framework document the Consultant will prepare a data driven operational program based on life-cycle cost benefit analysis. The prioritization methodology of interventions under the operational program shall be based on the standard Cost Benefit Analysis (CBA) method in combination with socio-economic and other factors with the use of a multi-criterial analysis approach. In doing so, the consultant will review relevant information and align with the past initiatives like the Road Master Plan exercise by DoST in 2024-2025 and Highway Master Plan to avoid duplication of work where necessary.

### **S2.1. Operational Program Framework Document**

- i. The program framework shall be defined based on the use of objective asset data such as road condition, traffic volumes, functional classification, socio-economic indicators, etc. and shall include both an unconstrained needs analysis—reflecting the full scope of network requirements—and constrained scenario options that align with available funding and policy priorities. The finalized framework will serve as the basis for preparing the data driven Multi-Year Operational Program.
- ii. The purpose of the Multi-Year Operational Program framework is to define and agree upon the structure, methodology, and key content elements of the operational program document that will guide road sector investment planning. This framework will serve as a baseline reference for the DoST to periodically update and maintain the operational program as part of RAMS operations. By establishing a clear, data-driven approach, the framework shall

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enable DoST to ensure consistency, transparency, and alignment with sector priorities in future updates, while also supporting long-term institutionalization of evidence-based planning practices.

**S2.2. Life-cycle Cost Benefit Analysis Based Multi-Year Operational Program**

- i. Upon review and approval of the operational program framework document by DoST, the Consultant, based on available data and tools (HDM4, GIS, etc.) shall prepare the initial multi-year operational program for the 5-year period. Activity will be replicated during the second year of project implementation by the consultant and will update the operational program with road condition data to be surveyed by DoST.
- ii. As part of operational program preparation, the Consultant will work closely with the DoST counterpart team to ensure capacity transfer and knowledge retention expected to be achieved through extensive hands-on training sessions.

**S3: Development of Data Collection Guideline and Technical Specifications for Equipment Procurement**

The Consultant shall support DoST in standardizing and modernizing its road asset data collection practices. This will include the preparation of a comprehensive Data Collection Guideline that defines the required data types, collection methodologies, quality assurance protocols, and frequency of updates for various asset classes including pavements, structures, traffic, etc. In parallel, the Consultant shall develop detailed technical specifications and procurement documentation for essential data collection equipment.

**S3.1. Data Collection Guideline**

- i. The Consultant shall evaluate existing road asset data collection methods, frequency, coverage and equipment used by DoST.
- ii. Assess and identify data collection gaps and formulate an optimal data collection approach for all road assets considering a phased approach that should prioritize most critical data required for data driven decision-based planning and annual RAMS operation. A clear segregation will be made by the consultant to demonstrate how DoST can begin with the minimum data needed for decision making and transition towards broader coverage of data collection consistent with the RAMS implementation plan.
- iii. Based on the assessment, develop a practical Data Collection Guideline specifying data items, procedures, methodologies, data formats, quality assurance and quality control (QA/QC) processes, frequency of data collection, and recommended equipment and software tools.
- iv. Data collection guidelines shall also describe data items that can support the integration of climate resilience considerations into asset management and planning processes. This

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includes both asset-specific data—such as structural vulnerability indicators, historical damage records, freeboard levels, drainage capacity, material types, and maintenance history—which help assess the sensitivity and adaptive capacity of individual assets. The Consultant shall also outline relevant external datasets that characterize hazard severity and exposure, such as flood risk maps, landslide susceptibility zones, extreme weather event frequency, and seismic activity data. These datasets may be sourced from public platforms or obtained through coordination with national agencies such as meteorological departments, disaster risk authorities, and geological institutes. The Consultant shall assess the availability, resolution, and update frequency of such data for Bhutan, and recommend optimal integration methods.

**S3.2. Procurement Documents for Data Collection Equipment**

- i. The Consultant shall prepare the procurement documents including the technical specification and cost estimates for procuring the mobile and permanent traffic counter equipment and portable falling weight deflectometer. The Consultant shall also assess the current ROMDAS road survey system and propose potential upgrades as required.
- ii. The consultant shall define the functional and technical specifications for the equipment considering current technological developments. Both types of mobile and permanent counters shall be based on the non-intrusive Video Analytics approach facilitated by the vehicle classification algorithms.
- iii. For modernizing the data collection process the consultant shall also prepare the TOR for piloting the AI based image analytics for road surface distress data collection. The pilot is expected to test the viability of using the approach for incorporating it under the DoST data collection practices.
- iv. The Consultant shall provide support during the procurement process of the equipment, including document review and feedback for the DoST procurement team.
- v. The consultant shall ensure that DoST receives all the necessary manuals and training to use and the equipment in good condition. This will include clear and practical video demonstration covering the installation, calibration, and operational procedures of data collection equipment procured under the project. This also includes detailed demonstrations for mobile and permanent traffic counters, as well as the portable Falling Weight Deflectometer (FWD).

**S4: Preparation of procurement document including Terms of Reference (ToR) and Technical Specification for RAMS/BMS Solution.**

Based on the outcomes of the comparative analysis and the subsequent agreed-upon decision with DoST on COTS vs Custom RAMS/BMS approach assessed as part of S1 scope item, the consultant shall prepare a full Bid document package with comprehensive Terms of Reference

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(TOR), Cost Estimates and detailed Technical Specifications necessary for procuring the RAMS/BMS solution. These documents should clearly outline functional and technical requirements, performance criteria, data interoperability standards, training and capacity-building provisions, as well as any critical implementation steps and support services required to successfully establish and operate the selected RAMS/BMS solution within DoST.

During the preparation of the RAMS/BMS procurement documents, the Consultant shall work in close coordination with DoST and the Government Technology Agency of Bhutan (GovTech) to ensure that the proposed system architecture, technical specifications, and operational requirements align with national ICT standards, cybersecurity protocols, and sustainability objectives. The Consultant shall engage with GovTech early in the process to incorporate country-specific requirements related to data hosting, system interoperability, and long-term support mechanisms. All technical specifications, procurement documents, and system requirements developed under this assignment will be subject to review and approval by GovTech prior to finalization, to ensure compatibility with Bhutan's broader e-governance infrastructure.

## **Phase II**

### **S5: Providing technical support during RAMS/BMS procurement process**

The Consultant shall provide technical support during the procurement process for the RAMS/BMS solution, without being directly involved in the evaluation of vendor proposals. This support shall include reviewing draft procurement documents, offering feedback to ensure clarity and technical completeness, and assisting the Client in responding to queries from potential vendors during the bidding process. The Consultant may also be requested to participate in clarification meetings or provide written explanations to support the procurement team in addressing technical questions, ensuring that the procurement process is well-informed and aligned with the intended system requirements.

### **S6: Implementation/ Operational Support and Assessment of RAMS/BMS Solution deployment and use by DoST**

The Consultant, during the implementation process of the procured RAMS/BMS solution shall support the DoST to ensure that the software is deployed by the software vendor as per the contract requirements. Secondly it will ensure that the software vendor has provided all the necessary trainings and knowledge transfer to the DoST to use the software to its full potential consistent with the strategic documents prepared in the Phase I of the consultancy.

The consultant will conduct a RAMS/BMS Implementation and Operational Assessment for key milestone periods in line with TOR requirements. The objective of the assessment is to confirm

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that implementation activities remain aligned with technical specifications, and established project timelines. During the duration of Phase II, the total of two assessments is expected to be conducted.

In addition to evaluating compliance, the Consultant shall identify potential risks, challenges, or other issues that could impact project delivery, and recommend actionable mitigation measures.

The Consultant shall also assess the adequacy and effectiveness of capacity-building activities, documentation completeness, reporting, sustainability arrangements, and the readiness of the DoST counterpart staff to independently operate the new RAMS/BMS solution.

## VI. Reporting and Deliverables

The consultant will report to the RAMS Sub-Project Implementation Team (SIT). Will closely collaborate with the RAMS unit. Provide periodic progress reports and technical briefings. The consultant is expected to deliver the following:

SL. No	Deliverable	Content and Timeline
<b>Phase I</b>		
1	Inception Report	The Inception Report shall be delivered within <b>one month</b> after commencement of the services. The report will describe the approach to be used by the Consultant in carrying out the services, proposed training plan and detailed project work plan including work breakdown structure (WBS)
2	Monthly Progress Note	Starting from month two, for <b>each month</b> the Consultant shall submit a short Monthly Progress Note indicating the activities carried out, the progress achieved and listing the activities planned for the upcoming month. The note will highlight potential risks and issues faced and proposed mitigation measures.
3	Interim Report #1	The Interim Report #1 shall be delivered within <b>4 months</b> after commencement of the services and shall include the required deliverables outlined under S1 and S2 scope items.
4	Interim Report #2	The Interim Report #2 shall be delivered within <b>7 months</b> after commencement of the services and shall include the required deliverables outlined under S3 and S4 scope items.
5	Phase I Final Report	Within <b>10 months</b> after the commencement and shall combine all final versions of documents including relevant training materials
<b>Phase II</b>		

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SL. No	Deliverable	Content and Timeline
6	RAMS/BMS Implementation Assessment #1	<b>Month 16</b> of the commencement date.
7	RAMS/BMS Implementation Assessment #2	<b>Month 20</b> of the commencement date.
8	RAMS/BMS Implementation Assessment #3	<b>Month 24</b> of the commencement date.
9	Phase II Final Report	<b>Month 27</b> of the commencement date.
10	Monthly Progress Note	At the end of <b>each month</b> , the Consultant shall submit a short Monthly Progress Note indicating the activities carried out, the progress achieved and listing the activities planned for the upcoming month. The note will highlight potential risks and issues faced and proposed mitigation measures.

#### VII. Project Duration and contract type

The Consultant will carry out the activities listed in the scope of work over a period of 30 months

- Phase-I for 12 months and
- Phase-II for 18 months.

The Consultant is required to provide a detailed implementation schedule as part of its technical proposal. The expected commencement date for the services is August 2025.

#### VIII. Experts Inputs

The combined expected inputs of Phase I and II of Consulting services is summarized in the table below. All key international and national experts will be evaluated. International experts are expected to spend at least 50% of their total input time on the field. The majority of the Consultant's input is expected to be provided during **Phase-I** of the assignment.

No.	Expert	Phase I (Month)	Phase II (Month)	Total (Month)
<b>Key International Experts</b>		<b>26</b>	<b>7</b>	<b>33</b>
IK-1	Team Leader/RAMS Specialist	12	3	15
IK-2	Transport Economist/HDM4 Specialist	6	1	7

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No.	Expert	Phase I (Month)	Phase II (Month)	Total (Month)
IK-3	RAMS Data Collection/GIS Specialist	4	1	5
IK-4	Climate Data/Risk Analysis Specialist	1	0	1
IK-5	Procurement Specialist	3	2	5
<b>Key National Experts</b>		<b>20</b>	<b>8</b>	<b>28</b>
NaK-1	Deputy Team Leader/RAMS Specialist	12	6	18
NaK-2	Data Processing/GIS Specialist	8	2	10
<b>Total:</b>		<b>46</b>	<b>15</b>	<b>61</b>

#### IX. Key Experts' Qualification Requirement

In addition to the individual experience requirements specified for each key expert, all international key experts are generally expected to have experience in similar fields of work—such as road asset management in at least two countries outside their country of nationality. They should also have completed at least two assignments, irrespective of technical area, in regional contexts comparable to Bhutan, such as South Asia or other mountainous developing countries with similar institutional and infrastructure environments.

##### 1. IK-1: Team Leader/Road Asset Management Specialist (International)

**Education:** The candidate shall have a master's degree or higher in civil engineering or relevant field.

**Experience:** The candidate shall have at least 15 years of specific experience in leading similar assignments such as road asset management, preparation of strategic level documents, capacity building and training activities, preparation of operational programs based on data driven decision making and MCA, use of lifecycle analysis tools such as HDM4. Prior experience of maintenance policy analysis and policy formulation for highway agencies necessary. Desired experience and skills to develop training content on road maintenance, RAMS, and relevant topics. Candidates shall have experience in both developed and developing countries and at least 10 years of experience as a project manager or team leader. The candidate shall be fluent in English and be skilled in report writing.

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**2. IK-2: Transport Economist/HDM4 Specialist (International)**

**Education:** The candidate shall have a master's degree or higher in civil engineering or economics or relevant field.

**Experience:** The candidate shall have at least 10 years of specific experience in using HDM4 to carry out strategy and program analyses for large road networks, experience in conducting MCA analysis and constrained budget scenario analysis. The candidate shall be fluent in English and shall be skilled in report writing.

**3. IK-3: RAMS Data Collection/GIS Specialist (International)**

**Education:** The candidate shall have a bachelor's or higher degree.

**Experience:** The candidate shall have at least 10 years of experience as a data analyst/GIS Specialist in the road sector including the experience in road asset data collection systems and equipment. The candidate should have sound knowledge of diverse techniques and tools of road asset data collection. Excellent familiarity of data collection equipment specifications, supply side and market trends. The candidate shall be fluent in English and shall be skilled in report writing.

**4. IK-4: Climate Data/Risk Analysis Specialist (International)**

**Education:** The candidate shall have a degree in Environmental and/or Climate Change Science or another related field.

**Experience:** The candidate shall have 10 years of experience with specific emphasis on climate risk assessments, environmental risk assessment, risk/hazard mapping, climate modelling, and/or climate change adaptation measures design and monitoring. Prior experience of being able to provide a sound analysis with limited data availability conditions and familiarity with the open data sources for analyzing hazard risk for transport assets. The candidate shall be fluent in English and shall be skilled in report writing.

**5. IK-5 Procurement Specialist (International)**

**Education:** The candidate shall have a bachelor's degree or higher in contract law or a related field.

**Experience:** The candidate shall have 12 years of experience in preparing procurement documents for goods and services, preferably in the road sector. Prior procurement experience of RAMS hardware data collection hardware, software or other relevant procurement is preferred. The candidate shall be fluent in English and shall be skilled in writing.

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**6. NK-1: Deputy Team Leader/RAMS Specialist (National)**

**Education:** The candidate shall have a master's or higher degree in civil engineering from an accredited university.

**Experience:** The candidate shall have relevant experience in road and bridge data collection and in road asset management. The candidate should have at least 15 years of relevant experience in the road sector of Bhutan. The candidate shall be fluent in English and shall be skilled in report writing.

**7. NK-2: Road Data Collection Specialist/GIS Specialist (National)**

**Education:** The candidate shall have a bachelor's or higher degree in information technology, preferably specializing in GIS.

**Experience:** The candidate shall have at least 5 years of experience as a GIS specialist and shall have relevant experience in spatial data analysis. The candidate shall be fluent in English and shall be skilled in writing.

**X. Counterpart Support**

DoST will provide the Consultant with copies of relevant reports on previous RAMS efforts. Additionally, DoST will facilitate communication with underlying units and other stakeholders such as GovTech to supply the Consultant with necessary information.

**XI. Selection procedure**

The Consultant will be selected following the Quality and Cost-Based Selection (QCBS) method as set forth in the World Bank Procurement Regulations for IPF Borrowers, September 2023.

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