



Kenya National Highways Authority

Quality Highways, Better Connections

LAKE VICTORIA BASIN DEVELOPMENT PROJECT (LVBDP)

GRANT No.: IDA E5920

TERMS OF REFERENCE (TOR)

**CONSULTANCY SERVICES FOR
PRELIMINARY ENGINEERING DESIGN OF CHAVAKALI - KAPSABET -
ELDORET ROAD [APPROX. 100KM], AND ASSOCIATED CIVIL WORKS
FOR FIBER OPTIC CABLE**

TENDER NO. KeNHA/2932/2026

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**DIRECTOR (HIGHWAY DESIGN & SAFETY)
KENYA NATIONAL HIGHWAYS AUTHORITY
P. O. BOX 49712 - 00100
NAIROBI.**

**DIRECTOR GENERAL
KENYA NATIONAL HIGHWAYS AUTHORITY
P.O. BOX 49712 - 00100
NAIROBI.**

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1 BACKGROUND OF THE STUDY

1.1 General

The Kenya Vision 2030 identifies transport infrastructure as a critical enabler under the Economic Pillar, aimed at reducing the cost of doing business, improving regional connectivity, and unlocking the productive potential of key economic corridors. In particular, the Lake Victoria Basin is recognized as a strategically important economic zone, supporting a large share of Kenya's fisheries-based livelihoods, cross-border trade, and associated logistics and service activities; yet continues to be constrained by weak transport networks and limited multimodal integration.

In addition, within the lens of BETA framework, improved road connectivity around Lake Victoria, enhanced integration with inland water transport, and deployment of digital transport enablers are critical to unlocking fisheries-based livelihoods, supporting MSMEs, and improving access to markets and basic services for lakeshore and island communities.

Consequently, the Government of Kenya (GoK), through the Kenya National Highways Authority (KeNHA) has received a grant from the International Development Association (IDA) of the World Bank towards the cost of preparing the Lake Victoria Basin Development Project (LVBDP) hereinafter referred to as "The Project". The GoK intends to apply part of proceeds from this grant to make eligible payments under the contract for the *Consultancy Services for Preliminary Engineering Design of Chavakali - Kapsabet - Eldoret Road [Approx. 100Km] and Associated Civil Works for Fiber Optic Cable* hereinafter referred to as "The Assignment". The Project seeks to address binding transport, safety, and connectivity constraints that limit economic productivity, regional integration, and resilience in the Lake Victoria Basin.

Despite its economic significance, the Basin continues to experience high generalized transport costs, driven by inadequate and poor road infrastructure, limited network reliability, climate-related disruptions, and weak integration between road, lake, and digital transport systems. These constraints increase vehicle operating costs, travel time, and uncertainty, while limiting access to markets, services, and economic opportunities for lakeshore and island communities. The Project adopts a corridor-based and multimodal approach, integrating road, inland water transport, and digital connectivity interventions to maximize economic returns, improve safety, and enhance resilience. By doing so, the Project operationalizes the strategic objectives of Vision 2030 and BETA at the corridor and community levels, translating national policy priorities into implementable, high-impact transport investments.

1.2 Project Description

The Lake Victoria Basin Development Project (LVBDP) is a key regional infrastructure initiative designed to enhance socio-economic growth, improve connectivity within the Lake Victoria Basin, and promote regional integration between Kenya and its East African neighbors.

At the core of the Project is the Lake Victoria Ring Road corridor, which functions as the principal terrestrial backbone linking lakeshore counties, ports, and fish landing sites, markets, and regional trade routes. The corridor also serves as the primary feeder and distributor network for inland water transport on Lake Victoria, making its performance critical to multimodal transport efficiency and regional integration. The Ring Road corridor traverses Busia, Siaya, Kisumu, Homa bay and Migori Counties and has an approximate total length of 730km comprising; 325km of main alignment and 405km of critical spur roads.

During earlier project preparation, the corridor was subjected to detailed engineering design under a traditional design–bid–build approach and was packaged into six major implementation Lots, reflecting geographic continuity, constructability considerations, and anticipated traffic demand. In addition, the earlier preparation activities for the corridor also included the associated environmental and social safeguards instruments, providing a strong technical foundation for investment.

As part of the broader Lake Victoria Basin Development Project, the Project will also support preparation of the **Chavakali – Kapsabet – Eldoret Road**, with an approximate length of 100 km, which has been identified as a strategic inland connector linking the Lake Victoria Basin to the North Rift region.

The corridor provides an important linkage between the Lake Basin and Eldoret International Airport, a key logistics and export gateway, and is expected to play a critical role in facilitating movement of goods and passengers between lakeshore counties, inland production zones, and national and regional markets. Improved connectivity along this corridor is therefore expected to support fisheries and agricultural value chains, enhance logistics efficiency, and strengthen multimodal integration between road, lake, and air transport systems.

At present, engineering designs have been partly prepared for this corridor, and critical spur roads connecting the corridor to surrounding economic nodes, markets, and service centers have not yet been identified. Accordingly, the corridor requires upstream technical preparation to define its alignment, functional standards, and implementation approach, and to ensure its integration with the wider Lake Victoria Basin transport network.

The Project Road starts in Chavakali, Vihiga County (at the junction with Road A1) and traverses the in an easterly direction through Chepsonoi, Kapsabet and Mosoriot in Nandi County before terminating at Eldoret City in Uasin Gishu County. The total length of the Assignment is approximately **100Km** as tabulated below.

Section Description	Total Length (Km)
Chavakali – Kapsabet - Eldoret	100

The existing corridor comprises an aged, paved road in varying condition, with isolated short sections with pavement strengthening near major towns. Most of the alignment is narrow, poorly drained, and prone to rutting and surface distress. Critical drainage crossings are undersized or lacking, resulting in seasonal isolation of communities and disruption of agricultural supply chains. The road passes through high-potential mixed farming and forestry zones. However, poor surface quality and inadequate drainage raise vehicle operating costs and discourage farm-to-market transport, particularly during peak production months.

The project aims to upgrade the road to appropriate traffic and geometric standards to enhance rural mobility, economic inclusion, and traffic flow. Further, in line with the global practice requirements for modern transport corridors, the Project incorporates digital connectivity and smart transport systems as enabling investments. Deployment of fibre optic infrastructure along transport corridors can significantly enhance traffic management, safety monitoring, logistics coordination, and digital service delivery. A structured technical and economic feasibility assessment is therefore required to determine optimal fibre deployment options, interfaces with Design-Build Road works, and appropriate implementation models.

1.3 Project Rationale

The project aims to upgrade these roads to appropriate bitumen standards to enhance rural mobility, economic inclusion, and traffic flow. Further, in line with the global practice requirements for modern transport corridors, the Project incorporates digital connectivity and smart transport systems as enabling investments. Deployment of fibre optic infrastructure along transport corridors can significantly enhance traffic management, safety monitoring, logistics coordination, and digital service delivery. A structured technical and economic feasibility assessment is therefore required to determine optimal fibre deployment options, interfaces with Design-Build Road works, and appropriate implementation models.

1.4 Location Map

The Project is located within the Kenyan portion of the Lake Victoria Basin, traversing and serving key lakeshore counties and economic nodes. A Location Map illustrating the Project Road alignment, major urban centers, ports, landing sites, and priority spur road connections has been included herein below (Figure 1) and forms part of the Project preparation outputs.

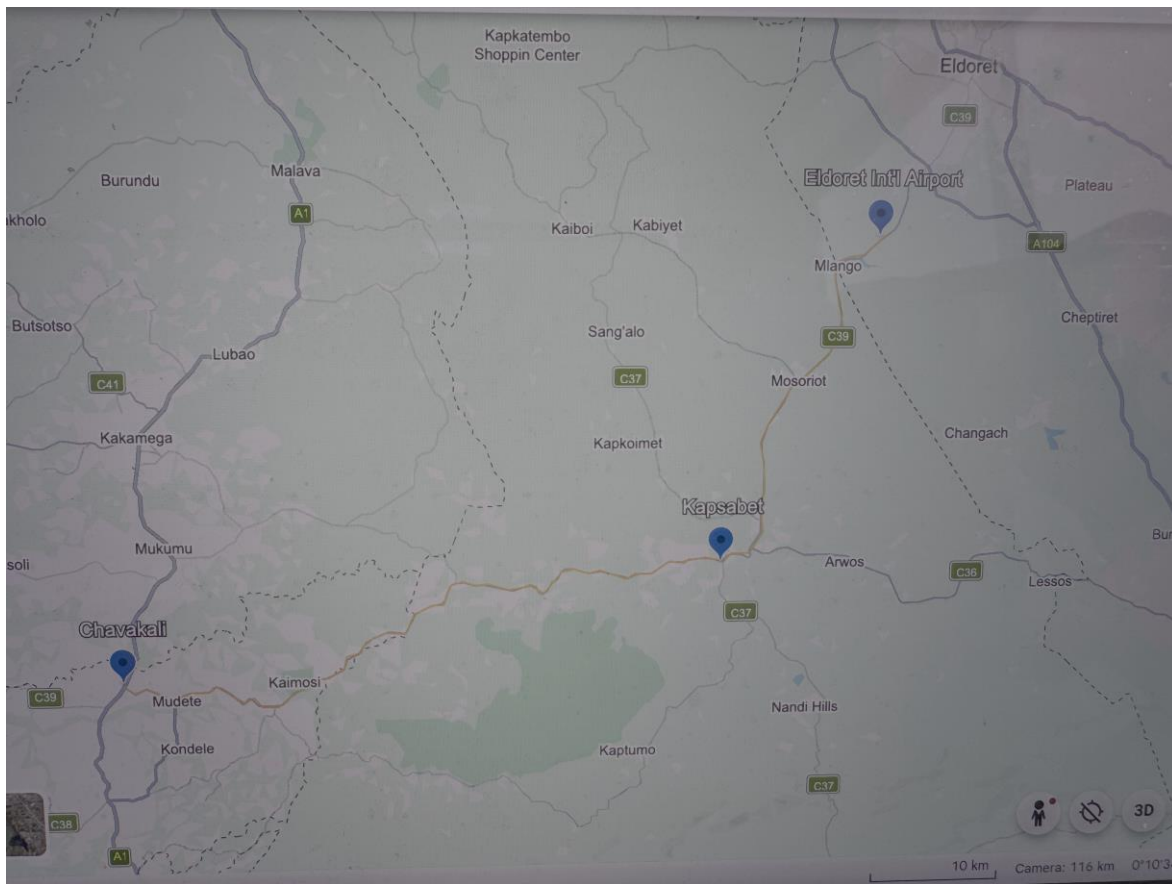


Figure 1: Location Map

2 OBJECTIVES OF THE ASSIGNMENT

2.1 Main objective

The key objective of this Assignment is to provide KeNHA with fit-for-purpose technical preparation that enables the *Chavakali – Kapsabet – Eldoret Road* transition from existing Design–Bid–Build (DBB)–based preparation outputs to Design–Build delivery model, by ensuring that main alignment, spur roads, and associated digital infrastructure components are procurement-ready, internally consistent, and aligned with appropriate risk allocation, without undertaking detailed engineering design or duplicating safeguards preparation.

The Assignment is intended to support procurement readiness and value for money, while preserving the role of future Design–Build contractors in undertaking detailed design and optimization.

2.2 Specific objectives

In pursuit of the above key objective, the assignment has the following specific objectives, reflecting the differing levels of preparation across project components.

- (i) To assess the Design–Build readiness of existing DBB-based engineering designs through a high-level review to the extent that identifies key assumptions, constraints, constructability issues, and risks, without undertaking full design review, re-design, or design verification.
- (ii) To support Design–Build procurement readiness by defining how existing designs can be retained, adapted, or translated into performance-based technical requirements, while preserving detailed design responsibility and innovation for future Design–Build contractors.
- (iii) To prepare spur roads at preliminary engineering level, including screening of priority links and development of indicative alignments, typical cross-sections, major structures, and indicative cost estimates, without progressing to detailed design.
- (iv) To integrate existing environmental and social safeguards instruments at an implementation-enabling level, by translating relevant safeguards commitments into technical and contractual requirements for Design–Build procurement, while avoiding duplication of safeguards review or preparation, which will be undertaken under a separate assignment.
- (v) To define at preliminary engineering level the associated civil works for fibre optic cable infrastructure, including indicative ducting and interface requirements and indicative cost estimates, without preparing detailed ICT layouts or full-scale engineering designs.
- (vi) To ensure integration, internal consistency, and value for money across the main alignment, spur roads, and digital connectivity components, delivering technical outputs that are proportionate, and aligned with project objectives and implementation needs.

2.3 Phasing of the Assignment

Given the short duration and focused nature of the Assignment, it shall not be implemented in formal or sequential phases. Instead, the Assignment shall be delivered through an integrated and concurrent approach, with activities undertaken in parallel as appropriate to achieve timely completion within the agreed contract period. The Consultant shall organize and sequence inputs efficiently to ensure that: Technical review of existing designs for Design–Build readiness; preliminary preparation of spur roads; concept-level definition of associated civil works for fibre optic infrastructure; and integration of safeguards commitments and procurement-oriented technical requirements are progressed concurrently and iteratively, rather than through discrete phases.

3 SCOPE OF SERVICES

3.1 General

The Consultant shall perform all technical, economic, financial, and environmental analyses necessary in support of preparation of priority investments under the Project. The services shall be designed to deliver procurement-ready, fit-for-purpose technical outputs that support transition to Design–Build (DB) implementation, while maintaining clear limits on the level of technical effort and avoiding duplication of existing studies, detailed design, or safeguards preparation.

Given the preparatory nature of the Assignment, the Consultant shall implement the services through an integrated and concurrent approach, ensuring consistency and alignment across components. All activities shall remain strictly within the bounds of DB preparation, preserving detailed design responsibility and innovation for subsequent DB Contractors. In executing the services, the Consultant shall apply a risk-informed and value-for-money–oriented approach, focusing on identification of key assumptions, constraints, interfaces, and implementation risks with implications for procurement and delivery.

The Preliminary Engineering Design shall be carried out in conformity with the current Kenya Road Design Manuals (Volumes 1–6, 2025 Edition), the Eurocodes (for Bridge Design), the ICT Authority Standards (for Fibre Optic Infrastructure),. The Design shall be developed to a level of detail sufficient to achieve the following objectives: freeze the Right of Way corridor for land acquisition planning; define the Employer's Requirements that will form the basis for 2017 FIDIC Plant & Design-Build (Yellow Book) Form of Contract; generate accurate quantities for preliminary cost estimation with an accuracy of $\pm 20\%$; and support rigorous economic and financial analysis using verified road characteristic parameters.

3.2 Design-Build Readiness and Preparation of Employer's Requirements for the Main Alignment (Partly Designed)

The Consultant shall prepare the Employer's Requirements (ER) and Technical Specifications that will form the technical foundation for 2017 FIDIC Plant & Design-Build (Yellow book) Form of Contract. These documents shall define the functional and performance requirements for the project while preserving appropriate design flexibility for the future Design-Build Contractor.

3.2.1 Technical Baseline Review and Design–Build Readiness Assessment

The Consultant shall focus on the structured transition of the designed main alignment prepared under a Design–Bid–Build (DBB) approach into a Design–Build (DB) procurement-ready technical framework, including but not limited to:

- (i) Review all existing DBB-based engineering designs, cost estimates, and safeguards instruments to confirm key design standards, identify gaps or outdated assumptions and establish a consolidated technical baseline;
- (ii) Assess the suitability of the existing designs for DB delivery, focusing on constructability, geometric adequacy, pavement design standards applied and lifecycle expectations, drainage and climate resilience considerations;
- (iii) Identify key technical, implementation, cost drivers, and risk allocation issues that may affect Design–Build pricing, scheduling, or performance;

- (iv) Clearly define elements that should be retained, modified, or converted into performance-based requirements and ensure internal consistency between technical requirements, safeguards commitments, and cost assumptions;
- (v) Develop a consolidated Design–Build Risk Register and Risk Allocation Matrix; and
- (vi) Prepare consolidated documentation including Technical Review & DB Readiness Report and Updated Cost Summary Memorandum;

This review shall remain at a strategic and procurement-readiness level, without detailed recalculation, redesign, or preparation of construction drawings.

3.2.2 Preparation of Employer's Requirements

The Consultant shall prepare comprehensive Employer's Requirements defining functional and performance requirements for the project while preserving appropriate design flexibility and innovation for the Design-Build Contractor.

The Employer's Requirements shall be prescriptive for functional standards, performance criteria, quality requirements, and safety and environmental compliance, but flexible regarding design solutions, construction methodology, and innovation opportunities. The ER shall be sufficiently detailed to enable prospective Design-Build Contractors to understand project scope, assess risks, develop detailed designs, and prepare competitive proposals, but not so prescriptive as to eliminate design flexibility, predetermine solutions, or erode the benefits of Design-Build procurement.

The structure for the ER shall be as illustrated in Table 4.2.2 below and shall align with the Kenyan Road Design Manuals and Specifications, 2025 Editions; World Bank ESF requirements (where technically applicable); and international good practice for performance-based road contracts.

Table 4.2.2: Employer's Requirements Document Structure

Section	Title	Required Contents
Part A	General Requirements	The General Requirements shall provide a comprehensive statement of Employer objectives including project purpose, connectivity improvements, economic development objectives, and service standards to be delivered. This section shall establish the contract administration framework defining the Engineer's role and authority in accordance with FIDIC Sub-Clauses 3.1-3.7, quality management system requirements per Sub-Clause 4.9, design submission and approval procedures per Sub-Clause 5.2, and programming and progress reporting requirements per Sub-Clause 8.3.
Part B	Environmental and Social Requirements	The Environmental and Social Requirements shall specify obligations derived from the ESIA and RAP, addressing FIDIC Sub-Clauses 4.6 (co-operation with environmental and social monitoring), 4.8 (health and safety obligations), 4.18 (environment protection including the Contractor's Environmental and Social Management Plan), 4.21 (site security per ESS4), 4.23 (archaeological chance finds per ESS8), and 6.2/6.5 (labour conditions per ESS2). The section shall include

Section	Title	Required Contents
		SEA/SH prevention requirements including Code of Conduct, grievance mechanisms, and incident response protocols.
Part C	Scope of Works	The Scope of Works shall define functional and performance requirements rather than prescriptive design solutions, specifying geometric design standards with alignment corridor and mandatory control points, pavement performance criteria including design life, terminal International Roughness Index values, and structural capacity requirements, drainage system performance including design flood return periods, erosion control standards, and discharge requirements, structures load capacity and durability requirements in accordance with Kenya Road Design Manual and Eurocodes, fibre optic duct and network specifications per ICT Authority standards, and road safety feature requirements. The section shall include Key Performance Indicators and measurable completion criteria that the Design-Build Contractor must achieve for works acceptance, including drainage systems passing hydraulic performance tests, schedule milestones, quality assurance requirements, environmental compliance criteria, and social safeguards implementation requirements. All completion criteria shall be objective and verifiable through testing and inspection procedures specified in the contract documents.
Part D	Site Information	The Site Information section shall present factual data compiled from all investigations conducted during the Feasibility Study, provided without warranty for Contractor risk assessment and design development. The data shall include topographical survey data and control network information, geotechnical borehole logs and laboratory test results, hydrological data and flood records, traffic count data and axle load survey results, environmental and social baseline conditions, existing utilities records, and land ownership status and acquisition progress.
Part E	Contractor's Key Personnel	The Key Personnel section shall specify minimum qualifications including academic credentials, years of experience, and specific project experience requirements for the Contractor's Representative, Design Manager, Construction Manager, Environmental Specialist, Social Specialist, Health and Safety Specialist, SEA/SH Expert (for high-risk projects), and Survey Manager at minimum. The Consultant may propose additional Key Personnel for the Contractor.
Part F	Specifications	The Specifications shall define technical standards based on Standard Specification for Road and Bridge Construction (Kenya, 2023 Edition) adapted to reflect the Design-Build procurement approach. The section shall include materials

Section	Title	Required Contents
		quality standards and workmanship requirements for earthworks, pavement layers, drainage works, structural works, road furniture, and fibre optic civil works, together with testing methods, acceptance criteria, non-conformance procedures, and traffic management requirements during construction.
Part G	Drawings	The Drawings section shall include drawings developed during the Preliminary Engineering Design phase, clearly labelled as guidance demonstrating feasible solutions rather than mandatory design requirements. The Preliminary Engineering Design shall provide sufficient detail to enable prospective Contractors to understand scope and prepare realistic cost estimates. The drawings shall include general arrangement showing project limits, plan and profile drawings at appropriate scales, typical cross-sections, pavement typical sections showing reference layer thicknesses and materials, drainage layout with major structure locations, preliminary bridge general arrangements, junction layouts, and fibre optic route alignment and network architecture.
Part H	Supplementary Information	The Supplementary Information section shall comprise supporting documents bound separately and cross-referenced to the main Employer's Requirements, including complete geotechnical investigation reports, hydrological analysis reports, traffic survey reports, materials source investigation reports, ESIA and RAP executive summaries with reference to full documents, and the economic analysis report. This section shall also include the Project Risk Matrix identifying all significant technical, geological, environmental, social, and commercial risks that could affect project delivery. For each risk, the matrix shall specify which party bears primary responsibility, what mitigation measures are required, and what mechanisms exist for managing risks that materialize during implementation. The Risk Matrix shall reflect the Design-Build procurement approach where the Contractor assumes substantially more design and construction risk than in traditional Employer-design contracts.

3.2.3 Tender Documentation Quality Requirements and Coordination Protocol

The Consultant shall ensure procurement documents are internally consistent with all cross-references correctly specified, technically complete, compliant with the required Procurement Regulations and Standard Procurement Documents and aligned with 2017 FIDIC Yellow Book contractual framework. documents shall be of sufficient quality that Client finalization work is limited to administrative updates and incorporation of specific requirements, not substantive redrafting of procurement strategy or contractual framework.

The Consultant shall coordinate with Safeguards Consultants during procurement documentation preparation through joint coordination meetings in Months 5, 6, and 7 to review Environmental and Social Impact Assessment and Resettlement Action Plan progress, identify requirements ready for integration, and plan incorporation of findings into Employer's Requirements. The Consultant shall provide Preliminary Engineering Design information to Safeguards Consultants to support their assessments, shall review safeguards instruments as they become available, and shall extract requirements for incorporation into Employer's Requirements including environmental management measures, social mitigation measures, resettlement requirements, and monitoring and reporting obligations.

The Consultant shall submit complete sets of supporting documentation including all engineering investigation reports, analysis calculations, design reports, traffic models, economic analysis files, and other technical materials that underpin Employer's Requirements and specifications.

3.3 Preliminary Engineering Design for Undesigned Sections and Priority Spur Roads

Within the scope of Preliminary Engineering Design for the critical links/spur roads, the Consultant shall conduct all topographical surveys, hydrological studies, sub-surface soil exploration, material surveys, traffic surveys and modelling, and other field and laboratory investigations that are required for the examination of the proposed alignment and the location of suitable construction materials and water, and the preliminary engineering design. This shall comprise, inter alia:

- a) Review of the climatic, topographic, geological and bio-diversity data in the project study area and producing an economic feasibility study report;
- b) Topographical surveys covering the selected alignment corridor, including cross-sections at appropriate intervals, longitudinal profiles, and plans at scales specified in the Kenya Road Design Manuals;
- c) Hydrological and hydraulic studies for the design of drainage systems and water crossings;
- d) Geotechnical investigations, material testing, soil investigation, and pavement evaluation using design standards compliant with the Kenya Road Design Manuals for optimization of the road alignment;
- e) Preliminary Materials Investigations for Pavement Design, including identification and testing of potential material sources along the alignment;
- f) Analysis of capacity and structural soundness of existing structures along the alignment, including load capacity assessment and recommendations for rehabilitation or replacement;
- g) Carrying out traffic survey and traffic modelling using appropriate software along the project road and especially at intersections, proposed parking areas and other areas susceptible to traffic conflict.
- h) Pavement evaluation for existing paved sections of the alignment if it is a standard pavement, including surface roughness, structural strength, and distress surveys;
- i) Engineering concept design for associated civil works for the fibre optic cable infrastructure, including network and route designs;
- j) Preparation and submission of the Preliminary Design Report for the road works, including drawings, cost estimates, economic analysis results, and the Project Risk Matrix;

- k) Preparation of Employer's Requirements and associated bidding documents for the various spur roads
- l) Preparation of the Preliminary Engineering Design Report for the proposed civil works for Fibre Optic network, including full financial modelling and business case analysis.

3.3.1 Climate, Topography, Geology and Vegetation.

The Consultant shall describe the climatic conditions of the study area by providing details of Rainfall (monthly distribution and intensity, including rain days per month); Temperature (minimum, median, and monthly ranges throughout the year); and other climatic features of importance (e.g. wind, erosion, effects of extreme temperatures on the selected pavement materials and drainage structures) to infrastructure.

The Consultant shall provide a topographical description of the area traversed by the road, including the effects of relief on the vertical alignment.

The Consultant shall compile a catalogue of the relevant geological features of the study area including a description of the soils and rocks along the road's alignment and their effect and influence on such factors as route location and design. The influence of geology and the availability of road construction materials and water are to be regarded as of great importance by the Consultant. The Consultant shall provide, as far as possible, the information on the quantities, quality and potential sources of water required for construction purposes. Basic water abstraction requirements as per Ministry of Water and NEMA should be adhered to.

The Consultant shall provide a description of the type and density of the vegetation as well as existing and potential agricultural land use within the study area.

3.3.2 Topographical Surveying and Mapping

The Consultant shall undertake topographic surveying services required to support the preliminary engineering design of the listed spur roads. The survey scope shall be proportionate to early-stage design requirements and sufficient to define alignment options, terrain characteristics, constraints, and indicative earthworks quantities.

The Consultant to establish both horizontal and vertical survey controls by any suitable method. The monument type for survey controls shall be presented in the Inception Report of the project, and the coordinates of all control points shall be tied to the National Survey Grid, (UTM) and levels tied to the National Benchmarks. The Consultant shall specify the adjustment techniques for controls establishment.

It is a requirement that the established controls are submitted to the Survey of Kenya for approval before proceeding to detailed preliminary Engineering design.

3.3.2.1 Establishment of Survey Control

The Consultant shall establish an appropriate geospatial reference framework to support preliminary engineering design of the listed spur roads. The scope shall include but not limited to:

- (i) Establishment of primary and secondary control points tied to the national coordinate reference system using GNSS (RTK or static methods);
- (ii) Provision of permanent benchmarks at appropriate intervals along each spur road;
- (iii) Preparation of a control register including coordinates, elevations, and descriptions;

- (iv) Integration of available cadastral mapping and land reference information for preliminary overlay and corridor analysis.

The control density shall be proportionate to preliminary design needs and shall not reflect construction-level precision.

3.3.2.2 Corridor Topographic and Terrain Survey

The Consultant shall undertake a strip topographic survey along each listed spur road sufficient to define alignment options, terrain constraints, and indicative earthworks. The scope shall include but not limited to:

- (i) Corridor strip survey generally between 20 m and 40 m width, adjusted based on nature of terrain and built-up areas;
- (ii) Capture data of ground levels along proposed centerlines (where a road exists), sufficient for preliminary vertical alignment;
- (iii) Produce longitudinal profiles and generate cross-sections at intervals typically between 50 m and 100 m, adjusted for terrain and critical locations;
- (iv) Mapping of existing road features and drainage structures; buildings and structures within the corridor; visible property demarcations; watercourses and drainage paths; and
- (v) Generation of Digital Terrain Models (DTM) suitable for preliminary earthworks estimation.

UAV/photogrammetry methods may be used where appropriate to improve efficiency across dispersed spur road sections.

3.3.2.3 Mapping of Utilities

The Consultant shall undertake targeted surveys to identify key physical and infrastructure constraints affecting preliminary alignment and costing. The scope shall include but not limited to:

- (i) Survey of stream and drainage crossings, including channel width, bed levels, bank elevations, and provide sufficient data for preliminary culvert/bridge sizing;
- (ii) Mapping of visible utilities and major service crossings, identification of potential major conflicts affecting alignment and provision approximate utility locations for preliminary planning;
- (iii) Preliminary identification of areas with potential land acquisition sensitivity;

3.3.3 Hydrological Investigations

The Consultant shall provide a complete description of the hydrological features of the area, including information about soils drainage along the alignments, such as sub-soils drain ability, drainage impedance, flooding of flat areas; characteristics of required water crossings; and storm water drainages features and characteristics.

Sufficient information shall be obtained by the Consultant based upon the guidelines provided in the Road Design Manuals and Supplemented by other relevant sources of information to justify and provide the basis for the preliminary engineering design of all drainage systems and structures, and for preliminary costing purposes. The Consultant shall be fully responsible for obtaining all the data and information necessary for him to carry out hydrological and drainage investigations and designs.

3.3.4 Drainage Structures Investigations

The Consultant shall

- a) Provide complete inventory and condition survey of all existing structures within the alignment. The information shall include the type of structure, whether a bridge, a box culvert, Armco culverts, timber bridge or masonry bridge.
- b) Provide sufficient details on the condition survey on the existing drainage structures that includes crack width and the distribution, condition of bridge bearings and any other structural deterioration.
- c) Carry out flood estimate to ascertain the capacity of the existing structures and advice whether there is need for any replacement.
- d) Carry out materials test on the existing structures and compute durability index that will enable the Client to make decision on whether to replace the structure with a new one.
- e) Submit details required to facilitate the decision making on the existing structures at Preliminary design stage.

3.3.5 Traffic Survey and Analysis

The Consultant shall determine existing traffic conditions through analysis of available data and the execution of traffic counts and origin–destination studies sufficient to establish current freight and passenger movements. Additional investigations shall be undertaken as required. Traffic studies shall include classified volume counts, composition and occupancy surveys, origin–destination studies, axle load surveys, traffic forecasting (normal, generated, and diverted traffic by vehicle type), and traffic modelling.

Traffic and axle load surveys shall be conducted over seven (7) consecutive days, recording both directions separately. Counts shall cover a minimum of 16 hours per day, including at least one 24-hour weekday count and one 24-hour weekend count. Short-duration counts shall be adjusted to 24-hour volumes using derived factors. Surveys of less than seven days shall not be accepted, and abnormal traffic periods shall be avoided.

Axle load surveys shall clearly distinguish between wheel and axle loads in the raw data. Empty and partially loaded vehicles shall be recorded and weighed. Roadside interviews shall be conducted for a minimum of three days at each station. Surveys shall comply with TRL Overseas Road Note 40. A detailed methodology shall be submitted for approval prior to fieldwork.

The Consultant shall assess traffic-generating factors within the project influence area and prepare annual traffic forecasts for ten (10) years post-completion, with indicative projections for a further ten (10) years. A calibrated traffic model shall be developed and subjected to sensitivity testing.

3.3.6 Preliminary Soil Investigations and Pavement Evaluation

The Consultant shall undertake all preliminary soil investigations and tests and identify type and sources of construction materials necessary for preliminary design, detailed design, and construction phases of the project. These sources should be considered when selecting final alignments.

In the case of paved spur roads, the Consultant shall carryout an evaluation of the existing pavement and determine appropriate intervention measures. The Evaluation shall include but not be limited to the following as appropriate:

- (i) Visual inspection and assessment, recording and quantifying of defects
- (ii) Surface roughness measurements, IRI
- (iii) Deflection measurements using falling weight reflectometer (FWD), measurements being taken at 100m intervals for both directions.
- (iv) Subgrade strength and drainage analysis may include Dynamic Cone Penetrator tests (DCP).
- (v) Existing pavement structure analysis. Will include trenching sampling and testing

The availability of suitable conventional road construction materials and the appropriate and economic use of the same are viewed as key factors influencing the choice of alignment, pavement and wearing surface design. The possibility for specific problems arising from the use of proposed materials which may be particular to the area under study shall be assessed, quantified and appropriate countermeasures shall be recommended. The consultant shall identify possible material sites near and along the project road, preferably not more than 5km apart.

3.3.7 Preliminary Safeguards Screening and Integration Support

The Consultant shall undertake a preliminary environmental and social safeguards screening to support engineering feasibility, corridor selection, and Design-Build procurement preparation, ensuring early integration of safeguards considerations into technical planning and risk allocation, in coordination with the Client's separate safeguards assignment.

For the main alignment sections, where safeguards instruments were prepared under a previous Design-Bid-Build approach, the Consultant shall conduct a high-level review solely to assess engineering implications. The review shall identify key constraints, mitigation commitments, land requirements, sensitive areas, and compliance conditions affecting Design-Build implementation. The Consultant shall not revise or update existing safeguards instruments but shall translate relevant commitments into implementation-oriented technical and contractual provisions for inclusion in the Employer's Requirements and risk allocation framework.

For the identified spur roads, where no safeguards instruments exist, the Consultant shall carry out a preliminary screening to identify environmental and social sensitivities that may affect alignment feasibility, cost, or sequencing. The screening shall include desk review of available environmental and land-use data, limited field reconnaissance coordinated with engineering surveys, and identification of potential risks such as environmentally sensitive areas, settlements, utilities, cultural or heritage sites, and potential land acquisition or resettlement impacts. This screening shall not constitute an ESIA or ESMP preparation, which will be undertaken under the separate safeguards assignment.

The Consultant shall prepare a concise Safeguards Screening Memorandum covering both the main alignment and spur roads, identifying key risk categories, potential triggers under the World Bank Environmental and Social Framework (ESF), areas of elevated constraint, and recommendations for incorporation into Design-Build procurement documents. For spur roads, the memorandum shall indicate the likely scope of subsequent safeguards instruments. The Consultant shall coordinate with the stand-alone safeguards consultant to ensure consistency while maintaining clear delineation of responsibilities.

3.3.8 Economic Evaluation

The Consultant shall undertake a comprehensive economic evaluation of the proposed road investments, including the main alignment sections and listed spur roads, using HDM-4 or other

World Bank–acceptable methodologies. The analysis shall comply with World Bank guidelines for transport appraisal and assess the viability of individual sections and the overall program.

The Consultant shall define homogeneous analysis sections, establish “without project” and “with project” scenarios, and adopt an appropriate analysis period and discount rate consistent with national and World Bank practice. All required input data shall be collected, validated, and prepared, including traffic by vehicle class, growth projections, pavement condition, geometry, capital and maintenance costs, vehicle fleet characteristics, fuel prices, values of time, and accident cost parameters. Where local calibration data are unavailable, internationally recognized default parameters may be applied with documented assumptions.

For main alignment sections and moderately trafficked spur roads, HDM-4 shall be applied to estimate vehicle operating cost savings, travel time savings, accident reduction benefits (where justified), and maintenance cost savings. Economic indicators shall include EIRR, NPV, and BCR for each section and for the aggregated investment program.

For low-traffic spur roads, a conservative and calibrated approach shall be adopted to avoid overestimation of benefits. Traffic growth and generated or diverted traffic assumptions shall be realistic and evidence-based. Where volumes are very low, simplified HDM-4 or alternative methods (e.g., cost-effectiveness analysis) may be applied. Travel time benefits shall use conservative rural values of time, and overall benefit composition shall remain credible.

Sensitivity and risk analyses shall be undertaken for all spur roads, including lower traffic growth, capital cost increases, implementation delays, and combined downside scenarios. Switching values shall be calculated to determine threshold traffic or cost conditions for viability. For economically marginal sections, alternative standards or phased implementation options shall be assessed and recommendations provided. The results shall be presented transparently, including section-by-section summary tables showing length, traffic, capital cost per kilometer, EIRR, NPV, BCR, and benefit composition, together with sensitivity results and switching values. Cash flow tables and graphs may be included. For spur roads, a concise narrative shall describe economic justification, distributional impacts, and qualitative benefits, clearly distinguishing quantified from non-quantified effects.

The Consultant shall submit all model files (where applicable), input datasets, and Draft and Final Economic Analysis Reports suitable for World Bank appraisal documentation.

3.3.9 Preliminary Cost Estimates

The Consultant shall prepare comprehensive Preliminary Cost Estimates with an accuracy of plus or minus twenty percent for all project components. The cost estimates shall be prepared using current market prices and shall be presented in both financial prices and economic prices to support both loan amount determination and economic analysis. The Consultant shall prepare preliminary quantities estimates for all major work items, with an accuracy of $\pm 20\%$, based on measurements taken from the Preliminary Engineering Design drawings and supported by calculations documented in the design reports. The quantity estimates shall include:

- a) earthworks quantities comprising clearing and grubbing, common excavation, rock excavation, and embankment fill, all calculated from cross-sections taken at appropriate intervals along the alignment;
- b) pavement quantities comprising subgrade improvement materials, subbase materials, base course materials, and surface course materials, calculated based on pavement layer thicknesses from the pavement design and carriageway dimensions from the typical sections;

- c) drainage structure quantities comprising pipe culverts of various sizes, box culverts, side drains, cross drains, and erosion protection measures, enumerated from the drainage layout drawings;
- d) structures quantities comprising bridge deck areas, foundation volumes, pier and abutment concrete quantities, and reinforcement steel tonnages for all major bridges;
- e) fibre optic infrastructure quantities comprising duct lengths, chamber numbers, cable lengths, and network equipment items.;
- f) road furniture and appurtenances comprising road signs, pavement markings, guardrails, delineators, and other safety features.

The Consultant shall develop unit prices for all major work items, with an accuracy of $\pm 20\%$, through **detailed buildup from first principles** using basic resource costs including labour rates, equipment hire rates, material prices, and contractor overheads and profit margins appropriate for projects of this nature in Kenya.

3.3.10 Applicable Design Standards

The Preliminary Engineering Design shall, unless otherwise agreed with the Client, be carried out in conformity with the standards contained in the 2025 Kenya Road Design Manuals, the Standard Specification for Road and Bridge Construction, relevant Eurocodes for structural design, and ICT Authority Standards for fibre optic infrastructure. The Consultant shall be responsible for all design details within this framework, ensuring that the Preliminary Design is sufficiently complete and well-documented to serve as the basis for Employer's Requirements in the future FIDIC Plant & Design-Build (Yellow Book) contract.

The methodologies used in the design of pavements, earthworks, drainage systems, and structures shall be based on sound engineering principles as codified in the Kenya Road Design Manuals and internationally accepted practice. The design shall optimize the use of locally available materials to minimize project costs while meeting required performance standards. The Consultant shall investigate potential material sources during the geotechnical investigation phase and shall design pavement structures, embankments, and other works to make maximum economic use of materials available within reasonable haul distances from the project site. The Consultant shall ensure, at all times, the design shall achieve an appropriate balance between capital construction costs and whole-life maintenance costs, as demonstrated through the HDM-4 economic analysis.

The metric SI system shall be used throughout all design calculations, drawings, cost estimates, and reports. The standards for design of different road classes and bridge types as stipulated in the Kenya Road Design Manuals shall be adhered to where technically feasible and economically justified. Where site-specific conditions, economic analysis results, or other technical considerations indicate that alternative standards or design approaches would be more appropriate than those specified in the design manuals, the Consultant shall provide detailed technical justification for the proposed alternatives and shall obtain written approval from Client before incorporating such alternatives into the Preliminary Engineering Design.

3.4 Preliminary Design of Associated Civil Works for Fibre Optic Cable Infrastructure

The Consultant shall undertake the preliminary engineering design of the associated civil works required to enable installation of fibre optic cable (FOC) infrastructure along the main alignment and the listed spur roads. The objective of this assignment is to define technically feasible, cost-effective,

and constructible civil works provisions that can be integrated into the Design–Build procurement framework, while preserving detailed design responsibility for subsequent contractors and avoiding preparation of detailed ICT system designs.

The Consultant shall assess the strategic role of digital connectivity within the project corridors, considering the requirements for intelligent transport systems, traffic management, asset monitoring, logistics coordination, safety improvements, and potential shared infrastructure use. This assessment shall identify priority segments along the main alignment and spur roads where integration of fibre optic civil works would yield the greatest operational and economic value. The Consultant shall review available information on existing and planned fibre optic networks within or near the project influence area and identify opportunities to leverage existing infrastructure, minimize duplication, and ensure compatibility with national broadband strategies.

Based on this assessment, the Consultant shall develop preliminary engineering definitions of the civil works required to accommodate fibre optic cable within the road reserve. This shall include identification of feasible routing options within the right-of-way, considering geometric design constraints, drainage infrastructure, utilities, structures, environmentally sensitive areas, and constructability considerations.

The Consultant shall define indicative ducting arrangements, trenching approaches, and typical cross-sections showing the location of ducts relative to carriageway, shoulders, and drainage elements. Alternative installation methods—such as trenching within shoulder zones, installation within service corridors, or integration with drainage or structural elements—shall be evaluated at concept level for technical feasibility, cost implications, and construction risk.

The Consultant shall identify key interfaces between fibre optic civil works and road construction activities under the Design–Build framework, including staging considerations, protection of installed ducts during pavement construction, coordination with utilities, and sequencing of works. Attention shall be given to minimizing disruption to traffic and reducing rework risk during future fibre cable installation. The Consultant shall define clear interface provisions and responsibilities suitable for inclusion within the Employer’s Requirements for Design–Build procurement.

For both the main alignment and spur roads, the Consultant shall prepare indicative cost estimates for the associated civil works based on concept-level quantities and prevailing market benchmarks. Cost estimates shall distinguish between trenching and duct installation, access chambers and handholes, crossings of structures and drainage elements, and any additional protective measures required in sensitive or high-risk sections. Key cost drivers, assumptions, and risks shall be clearly identified.

The Consultant shall also identify potential implementation and institutional options for fibre optic infrastructure, including integration within road Design–Build contracts or alternative packaging approaches. Risks associated with coordination between road works and future ICT service providers shall be assessed, and mitigation measures shall be proposed.

4 KEY STAFF REQUIREMENT AND QUALIFICATIONS

4.1 Staffing Inputs

Consultants are advised to have each proposed Key Expert sign their Curriculum Vitae to confirm their commitment to the assignment and their acceptance of the experience claims made on their behalf. The Consultant is responsible for providing all support staff necessary to enable the Key Experts to perform their duties effectively and to ensure successful completion of all assignment activities within the specified timeframes and quality standards.

4.1.1 Key Staff Inputs

Table 5.1 presents the Key Expert positions and minimum staff-month inputs required for the Feasibility Study and Preliminary Engineering Design services. The total estimated effort is **34 staff-months** to be deployed over the eight-month design period. Consultants shall ensure that the proposed deployment schedule provides adequate staffing throughout the design period, with particular attention to peak activity periods such as field investigation campaigns, stakeholder consultation workshops, interim report preparation, and final deliverable compilation.

Table 5.1.1: Key Staffing Inputs

S/No.	Description	Minimum Months	Staff-
1.	Project Director	3	
2.	Highway Engineer	4	
3.	Pavement & Materials/Geotechnical Engineer	4	
4.	Engineering Surveyor	4	
5.	Fibre Optic Infrastructure Specialist	3	
6.	Traffic Engineer / Transport Economist	3	
7.	Structural Engineer	3	
8.	Hydrologist/Climate Resilience & Drainage Specialist	2	
9.	Road Safety Audit Expert	2	
10.	Procurement and Contracts Specialist	2	
11.	Environmental Safeguards Specialist	2	
12.	Social Safeguards Specialist	2	
	Total	34	

4.1.2 Support Staff Inputs

The following are the staff requirements and man-months for the design and supervision inputs regarding the support staff for Design Review and Updating of Tender document and Feasibility Study and Preliminary Engineering Design for the missing links/spur roads Stage.

Table 5.1.2: Support Staffing Inputs

S/No.	Description	Minimum Months	Staff-
1.	Assistant Highway Engineer	6	
2.	Assistant Pavement & Materials /Geotechnical Engineer	6	

S/No.	Description	Minimum Months	Staff-
3.	Assistant Structural/Bridges Engineer	6	
4.	Assistant Fibre Optic Infrastructure Specialist	6	
5.	Assistant Engineering Surveyor (2 Nos)	12	
6.	CAD Technicians (2 No.)	12	
7.	Office Administrator	6	
	Total	54	

Note to Consultants on Support Staffing:

The Consultant will provide the necessary local support staff (To be identified by the Consultant/their local Partner– including junior engineers, draftsmen, field surveyor, laboratory technicians, inspectors/field supervisors and office support staff – needed to carry out the assignment and discharge the consultant’s responsibilities effectively.

4.2 Key Staffing Qualifications

This section establishes the minimum qualification requirements for each Key Expert position listed in Tables 5.1.1 and 5.1.2. Where a proposed Key Expert is registered in a jurisdiction outside Kenya, the consultant shall demonstrate that the foreign registration body is recognized by the corresponding Kenyan regulatory authority such that the Kenyan authority would, upon application, grant correspondent local accreditation. Alternatively, Consultants may commit to obtaining Kenyan registration for foreign-registered Key Experts prior to contract commencement if such registration is legally required for performance of the services in Kenya.

(i) Key Expert 1: Project Director

The Project Director shall hold a Master’s degree in Civil Engineering or equivalent from a recognized university and be registered with a recognized professional engineering body eligible for corresponding registration by the Engineers Board of Kenya. The expert shall have at least fifteen (15) years of post-registration professional experience, including substantial project management and team leadership on infrastructure assignments. He/She shall have served in a senior leadership role (Project Director/Team Leader or equivalent) on at least three (3) road feasibility or design assignments completed within the past ten (10) years, each with estimated construction costs exceeding USD 20 million. At least two (2) assignments shall have been financed by the World Bank or other multilateral development banks, and at least one (1) shall have involved preparation of Employer’s Requirements for Design-Build procurement under FIDIC-based contracts. The expert shall demonstrate capacity to represent the firm at senior-level engagements with government and development partners, including participation in appraisal missions or similar high-level forums.

(ii) Key Expert 2: Highway Engineer

The Highway Engineer shall hold a Bachelor’s degree in Civil Engineering from a recognized university and be registered with a recognized professional engineering body eligible for corresponding registration by the Engineers Board of Kenya with a valid practicing license. The expert shall have at least twelve (12) years of post-graduation experience in geometric and

pavement design and preparation of construction drawings for road projects. He/She shall have served in a senior design role on at least three (3) road design assignments completed within the past ten (10) years, each involving detailed geometric design of not less than 30 km of road. At least two (2) assignments shall have involved road upgrading or rehabilitation projects with estimated construction costs exceeding USD 20 million per project. At least one (1) assignment shall have involved preparation of Preliminary Engineering Design for Design-Build procurement under FIDIC Yellow Book or equivalent. The expert shall have proficiency in modern highway design software such as AutoCAD Civil 3D or equivalent is required.

(iii) Key Expert 3: Pavement & Materials Engineer / Geotechnical Engineer

The Pavement and Materials / Geotechnical Engineer shall hold a Bachelor's degree in Civil Engineering or equivalent from a recognized university and be registered with a recognized professional engineering body eligible for corresponding registration by the Engineers Board of Kenya with a valid practicing license. The expert shall have at least twelve (12) years of post-graduation experience in pavement design and evaluation, materials testing, geotechnical investigations, foundation design, and quality control for road projects. He/She shall have served in a relevant role on at least three (3) road design or construction supervision assignments completed within the past ten (10) years, each involving projects with estimated construction costs exceeding USD 20 million. At least two (2) assignments shall have involved pavement structural design for new construction or major rehabilitation projects, and at least one (1) assignment shall have involved comprehensive pavement evaluation of existing roads using deflection testing and structural investigations. At least one (1) assignment shall also have included comprehensive geotechnical investigations comprising borehole drilling, in-situ and laboratory testing, and preparation of geotechnical design reports.

(iv) Key Expert 4: Traffic Engineer / Transport Economist

The Traffic Engineer / Transport Economist shall hold a Bachelor's degree in Civil Engineering, Transport Economics, or a related field from a recognized university and be registered with a recognized professional body eligible for corresponding registration by the Engineers Board of Kenya with a valid practicing license (where applicable). The expert shall have at least ten (10) years of professional experience in traffic surveys, forecasting, traffic analysis, economic evaluation of transport investments, and preparation of feasibility studies for road projects. He/She shall have served in a relevant role on at least three (3) road feasibility or design assignments completed within the past ten (10) years, each involving projects with estimated construction costs exceeding USD 20 million. At least two (2) assignments shall have involved economic evaluation using HDM-4 or equivalent tools, including calibration, vehicle operating cost estimation, maintenance forecasting, and calculation of economic performance indicators. The expert shall demonstrate experience in traffic forecasting, capacity analysis using recognized methodologies such as the Highway Capacity Manual, and application of economic analysis techniques including shadow pricing and use of standard conversion factors.

(v) Key Expert 5: Structural/Bridges Engineer

The Structural / Bridges Engineer shall hold a Bachelor's degree in Civil Engineering from a recognized university and be registered with a recognized professional engineering body eligible for corresponding registration by the Engineers Board of Kenya with a valid practicing license. The expert shall have at least twelve (12) years of post-graduation experience in structural design of bridges and culverts, drainage design, and hydraulic analysis for infrastructure projects.

He/She shall have served in a relevant role on at least three (3) road design assignments completed within the past ten (10) years, each involving structural design of multiple bridges or major culverts with a combined deck area of at least 1,000m² or bridges with spans of not less than 20 meters. At least two (2) assignments shall have involved preparation of structural design calculations and construction drawings in accordance with Eurocodes or equivalent standards. The expert shall also demonstrate experience in foundation design, hydrological and hydraulic analysis for waterway crossings, and design of erosion protection works.

(vi) Key Expert 6: Hydrologist/Climate Resilience & Drainage Specialist

The Hydrologist shall hold a Bachelor's degree in Civil Engineering, Water Resources Engineering, Hydrology, or a related field from a recognized university and be registered with a recognized professional body eligible for corresponding registration by the Engineers Board of Kenya with a valid practicing license. The expert shall have at least ten (10) years of post-graduation experience in hydrological analysis, flood frequency analysis, catchment modelling, and application of hydrological methods to infrastructure design. He/She shall have served in a relevant role on at least three (3) infrastructure projects completed within the past ten (10) years involving hydrological studies for road works, flood control, or similar civil works. At least one (1) assignment shall have involved use of hydrological modelling software such as HEC-HMS, HEC-RAS, SWMM, or equivalent tools. The expert shall also demonstrate experience in rainfall data analysis and application of GIS tools for catchment delineation and terrain analysis using digital elevation models.

(vii) Key Expert 7: Fibre Optic Infrastructure Specialist

The Fibre Optic Infrastructure Specialist shall hold a Bachelor's degree in Telecommunications Engineering, Electrical Engineering, Information and Communication Technology, or a related field from a recognized university. The expert shall be a Registered Engineer with the Engineers Board of Kenya or equivalent regulatory body, or hold a valid professional license issued by the Communications Authority of Kenya or an equivalent telecommunications regulator. Professional certification in fibre optic technology (e.g., Certified Fiber Optic Technician or equivalent) is required. He/She shall have at least ten (10) years of professional experience in fibre optic network design, Outside Plant (OSP) engineering, telecommunications feasibility studies, and implementation of telecom infrastructure projects. The expert shall have served in a relevant role on at least three (3) fibre optic infrastructure projects completed within the past ten (10) years, each involving deployment of networks totalling at least 100 km. At least two (2) assignments shall have involved integration of fibre optic infrastructure with road or railway projects, and at least one assignment shall have included preparation of a telecommunications feasibility study covering demand assessment, technical design, cost estimation, and financial and economic analysis.

(viii) Key Expert 8: Road Safety Audit Expert

The Road Safety Audit Expert shall hold a Bachelor's degree in Civil Engineering, Transportation Engineering, Traffic Engineering, or a related field from a recognized university and be registered with a recognized professional body eligible for corresponding registration by the Engineers Board of Kenya with a valid practicing license. The expert shall hold current certification as a Road Safety Auditor from a recognized provider (e.g., iRAP, TRL, or equivalent) at practitioner level or higher. He/She shall have at least eight (8) years of post-graduation experience in road design, traffic engineering, or road safety engineering. The expert

shall have served as Road Safety Auditor or Specialist on at least four (4) road safety audit or improvement assignments completed within the past eight (8) years, each covering road sections of at least 50 km. At least three (3) assignments shall have involved formal road safety audits conducted at design, pre-opening, or existing road stages in accordance with internationally recognized methodologies, and at least one (1) assignment shall have involved audit of highway project demonstrating understanding of road safety considerations, including design speed, alignment safety, roadside hazard management, and vulnerable road user provisions.

(ix) Key Expert 9: Engineering Surveyor

The Senior Surveyor shall hold a Bachelor's degree in Survey and Photogrammetry, Geomatics Engineering, Land Surveying, or a related field from a recognized university and be registered with a recognized professional body eligible for registration by the Institute of Surveyors of Kenya (Chapter of Engineering Surveyors). The expert shall have at least ten (10) years of post-graduation experience in topographical, control, and engineering surveys for infrastructure projects. He/She shall have served in a senior role on at least three (3) road or infrastructure projects completed within the past ten (10) years, each involving corridor surveys of at least 100 km or sites exceeding 100 hectares. At least two (2) assignments shall have involved establishment of control networks tied to national geodetic systems and use of modern survey equipment (GPS, Total Stations), and at least one (1) assignment shall have involved aerial photogrammetry or LiDAR surveys, including supervision and processing of deliverables into topographical maps and digital terrain models.

(x) Key Expert 10: Procurement and Contracts Specialist

The Procurement and Contracts Specialist shall hold a Bachelor's degree in Civil Engineering, Transportation Engineering, or a related field and have at least eight (8) years of professional experience in procurement documentation, contract administration, claims management, and dispute resolution for infrastructure projects. He/She shall have served in a relevant role on at least three (3) infrastructure projects completed within the past eight (8) years, each involving preparation of bidding documents and contract administration for contracts exceeding USD 20 million. At least two (2) assignments shall have involved preparation of Employer's Requirements for FIDIC-based Design-Build contracts under World Bank-financed projects, and at least one (1) shall have involved integration of environmental and social requirements into procurement documentation. The expert shall demonstrate strong knowledge of FIDIC Yellow Book, World Bank Procurement Regulations for IPF Borrowers, and Standard Procurement Documents, including drafting of Special Conditions of Contract, development of evaluation criteria, and structuring of risk allocation for Design-Build delivery.

(xi) Key Expert 11: Environmental Safeguards Specialist:

The Environmental Safeguards Specialist shall hold a university degree in Environmental Science or a related field and have at least ten (10) years of post-graduation experience. The Specialist shall be registered with a recognized professional body eligible for accreditation by NEMA as a Lead Expert and demonstrate strong working knowledge of the World Bank Environmental and Social Framework (ESF). He/She shall have served in a similar role on at least three (3) road design assignments completed within the past ten (10) years, each involving road sections of at least 30 km. At least two (2) assignments shall have involved rural road upgrading or highway improvement projects with estimated construction costs exceeding USD 20 million. The Specialist shall demonstrate substantial experience in ESIA preparation, climate

resilience analysis, and assessment of pollution prevention and biodiversity impacts in accordance with ESF requirements. Fluency in written and spoken English and Swahili is required.

(xii) Key Expert 12: Social Safeguards Specialist:

The Social Safeguards Specialist shall have a university degree in Social Science, development sociology/anthropology or equivalent and a minimum of ten (10) years post-graduation experience. The Specialist shall have served in similar role on at least three (3) road design assignments successfully completed within the past ten (10) years, with each assignment involving preparation of preliminary and/or detailed designs for road sections totalling at least 30 kilometres. At least two (2) assignments shall have involved rural road upgrading or highway improvement projects with total estimated construction costs exceeding USD 20 million per project. He/She shall have good working knowledge of World Bank's Environment and Social Safeguards Framework (ESF), implementation of resettlement action plans, monitoring of community liaison and communication with local authorities. Fluency in both written and spoken English and Swahili is essential.

5 REPORT AND TIME SCHEDULE

5.1.1 Coordination with Environmental and Social Safeguards Consultants

While the ESIA and RAP are not deliverables of the design consultant, certain deliverables under this Assignment require coordination with and inputs from the Safeguards Consultants. The design consultant shall coordinate closely with the safeguards consultant throughout the assignment to ensure that environmental and social considerations are appropriately integrated into the design work. Specifically, the design consultant shall obtain and incorporate inputs from the ESIA consultant regarding environmental constraints that may affect alignment selection, environmental design requirements for drainage structures and roadside features, environmental mitigation measures that must be reflected in the Employer's Requirements and Technical Specifications, and cost estimates for implementation of the Environmental and Social Management Plan. The design consultant shall obtain and incorporate inputs from the RAP consultant regarding census data on affected persons and properties for preparation of Land Acquisition Plans, compensation and resettlement cost estimates for inclusion in the overall project cost estimates, and social safeguards requirements that must be reflected in the Employer's Requirements for the works contractor. The design consultant shall participate in joint coordination meetings with the ESIA and RAP consultants as convened by the Client to ensure consistency and integration of outputs across all consulting assignments. The design consultant shall allow adequate time in the work program for receipt of necessary inputs from the ESIA and RAP consultants and shall promptly notify the Client of any delays in receiving required information that may affect the design consultant's ability to meet reporting deadlines.

5.1.2 Quality Standards and Professional Accountability

All reports and deliverables shall meet the highest standards of professional quality appropriate for use in project appraisal and loan negotiation processes. Technical reports shall present clear and logical analysis supported by appropriate data, calculations, and references to recognized standards or methodologies. Design reports and drawings shall be internally consistent, properly coordinated across disciplines, and free from errors or ambiguities that could lead to misinterpretation during the subsequent works procurement and construction phases. Economic analyses shall employ internationally accepted methodologies and shall clearly document all assumptions, data sources, and calculation procedures to facilitate independent verification. The Consultant shall implement appropriate quality assurance procedures including independent technical checking of calculations and drawings, peer review of reports by senior staff not directly involved in preparation of the work, and editorial review to ensure clarity and correctness of written communication. The Consultant remains professionally liable for the technical accuracy and quality of all deliverables regardless of any review or acceptance by the Client.

5.2 Reporting Requirements

The Consultant shall prepare and submit the reports and deliverables specified in Table 5.2 during Preliminary Engineering Design Study period. Final deliverables shall be clearly marked as "FINAL" with the final submission date indicated on the cover page.

Table 5.2: Reporting Requirements

Report No.	Report Type	Description	Format and Copies	Delivery Timeline
ADMINISTRATIVE REPORTS				
R1	Inception Report	This report shall summarize the Consultant's understanding of the assignment objectives and scope; present the proposed methodology and approach for conducting the preliminary engineering design; provide a detailed work plan with activity schedules and milestones, present the deployment schedule for Key Experts showing when each expert will be mobilized; identify any issues or constraints that may affect the assignment, and propose solutions for addressing identified constraints.	2 hard copies + 2 soft copies (USB) in PDF and MS Word formats	Within 14 days of commencement of services
R2	First Stakeholder Consultation Workshop Report	This report shall document the proceedings of the first stakeholder consultation workshop held during the early stages of the assignment. The report shall include the date and venue of the workshop, list of participants, agenda and program, summary of presentations made by the Consultant, record of questions and comments raised by stakeholders, the Consultant's responses to stakeholder input, photographic documentation, and recommendations for incorporating stakeholder feedback into the design work.	2 hard copies + 2 soft copies (USB) in PDF and MS Word formats	Within 2 weeks following the stakeholder workshop, approximately 2 months after commencement
DRAFT DELIVERABLES (Month 3)				
R3	Preliminary Engineering Design Report	The deliverables shall include but not limited to. a) Executive Summary Report b) Package 1: For the Main alignment (designed Section) shall include: (i) Design-Build Readiness Report (ii) Employer's Requirements – Main Alignment.	4 hard copies + 4 soft copies (USB) in PDF and MS Word formats	3 months after commencement (submission) and 0.5 months (client's approval meeting)

Report No.	Report Type	Description	Format and Copies	Delivery Timeline
		(iii) Bidding Documents. c) Package 2: For each Spur Road shall include: (i) Feasibility Summary Report (ii) Preliminary Engineering Design report (iii) Preliminary Materials Report (iv) Book of Drawings (A3 size) – Plan and Profile Drawings including Intersection Drawings (v) Book of Drawings (A3 size) – Structural Drawings (vi) Preliminary ESIA report (vii) Preliminary Cost estimate (viii) Employer's Requirements - Spurs d) Package 3: For Associated Civil Works for FOC: (i) Preliminary Engineering Design report – Civil Works (ii) Employer's Requirements – Civil Works (iii) Preliminary Cost estimate		
R4	Second Stakeholder Consultation Workshop Report	This report shall document the proceedings of the second stakeholder consultation workshop held during the latter part of the assignment to present draft preliminary design findings. The report shall give particular emphasis on stakeholder feedback regarding the proposed alignment, typical cross-sections, major structures, land acquisition requirements, and project cost estimates.	2 hard copies + 2 soft copies (USB) in PDF and MS Word formats	Within 2 weeks following the second stakeholder workshop, approximately 4 months after commencement
DRAFT FINAL DELIVERABLES (Month 4.5)				
R5	Draft Final Preliminary Engineering Design Report	This report shall incorporate revisions and include but not limited to: a) Draft Final Executive Summary Report b) Package 1: Main Alignment – Design–Build (i) Draft Final Design–Build Readiness Report	2 hard copies + 2 soft copies (USB) in PDF and native formats	4.5 months after commencement (submission) and 0.5 months (client's

Report No.	Report Type	Description	Format and Copies	Delivery Timeline
		(ii) Draft Final High-Level Cost Review (iii) Draft Final Employer's Requirements (Main Alignment) (iv) Draft Final bidding Documents c) Package 2: Spur Roads – Design–Build Packages (Per Spur Road): (i) Draft Final versions of the Package 2 Preliminary Engineering Reports in R3 above. d) Package 3: Fibre Optic Associated Civil Works (i) Draft Final versions of the Package 3 Preliminary Engineering Reports in R3 above. e) Response Matrix		approval meeting)
FINAL DELIVERABLES (Month 6)				
R6	Final Preliminary Engineering Design Report	This shall be the finalized report incorporating all outstanding comments and delivering consolidated report for Design–Build procurement structuring including: (i) Volume 1: Final Bidding Documents including Bills of Quantities and Special Specifications (Integrated) (ii) Volume 2: Final Employer's Requirements (Integrated) (iii) Volume 3: Final Drawings (2 velo copy and 2 Blueprints each) (iv) Volume 3A: (A3 Size) Plan and Profile Drawings, mass haul diagram, cross-sections, layout of junctions, traffic signs, road marking, standard drawings, etc. (v) Volume 3B: Standard Details and Structural Drawings. (vi) Volume 4: Final Reports for Package 2 of R5 above. (vii) Volume 5: Final Reports for Package 3 of R5 above.	10 hard copies + 10 soft copies (USB) in PDF and native formats	6 months after commencement

Note to Consultants:

The Client shall review all draft submissions and provide consolidated comments to the Consultant within two/three weeks of receipt. The Consultant shall revise all draft deliverables to address the Client's comments and shall submit the final deliverables shall incorporate all agreed revisions and shall be of sufficient quality and completeness to support development partner appraisal of the project and subsequent loan negotiations.

5.3 Reporting Schedule

The reporting schedule for the consulting assignment is presented in Table 5.3 covering the eight-month Feasibility Study and Preliminary Engineering Design period. The timelines specified in Table 6.3 are measured from the effective date of commencement of services as defined in the Contract. The Consultant shall adhere to the reporting schedule and shall notify the Client immediately if any circumstances arise that may cause delay in submission of scheduled deliverables.

Table 5.3: Reporting Schedule

Report No.	Report Type	Timeline After Commencement
R1	Inception Report	14 days (0.5 months)
R2	1 st Stakeholder Consultation Workshop Report	2 months
R3	Draft Preliminary Engineering Design Report	3 months
	Client Review Period	14 days (0.5 months)
R4	2 nd Stakeholder Consultation Workshop Report	4 months
R5	Draft Final Preliminary Engineering Design Report	4.5 Months
	Client Review Period	14 days (0.5 months)
R6	Final Preliminary Engineering Design Report	6 months

5.4 Cost of Production

The Consultant shall bear all costs of report production, printing, reproduction, courier services, and submission. These costs shall be deemed as included in Contract price, and no separate payment shall be made. The Consultant shall provide satisfactory explanation for any delayed submissions beyond specified timeframes and shall implement remedial measures to address delays.

5.5 Return of Documents, Soft Copies and Software to the Client

Upon completion of the consulting assignment or upon termination of the Contract for any reason, the Consultant shall return to the Client all documents, data, reports, drawings, computer files, and any other materials obtained from the Client or generated during the assignment.

The Consultant shall deliver to the Client all original drawings prepared during the assignment including all A1 size original sheets in transparent material suitable for archival storage and subsequent reproduction. The Consultant shall deliver all field survey records including field survey books, level books, survey computation sheets, and cadastral survey records in their original form as well as in scanned digital format. The Consultant shall deliver all laboratory test records including laboratory

registers, test certificates, and raw data sheets documenting all materials testing and geotechnical investigations conducted for the project.

The Consultant shall deliver to the Client all computer files and photographic digital data generated during the assignment in native file formats as specified in Section 5.6 of this Terms of Reference as well as in portable document format. The Consultant shall deliver all specialized software, models, or analytical tools developed specifically for this assignment to the Client along with comprehensive user documentation enabling Client staff to operate the software or tools effectively. If proprietary third-party software was used during the assignment, the Consultant shall provide the Client with information regarding licensing requirements and sources for obtaining the software should the Client wish to acquire it for future use. However, the Consultant is not required to transfer licenses for commercial software packages to the Client.

The Consultant shall prepare and deliver to the Client a comprehensive inventory documenting all materials, documents, and digital files being returned. The inventory shall organize materials by category and shall provide sufficient description to enable the Client to locate and identify specific items within the delivered materials. The inventory shall clearly identify the storage location of all digital files using the folder structure and file naming conventions specified in Section 6.6 of this Terms of Reference.

The Consultant shall not retain copies of any confidential documents including cost estimates, commercially sensitive information, or materials marked as confidential by the Client. The Consultant may retain one archival copy of non-confidential technical reports and drawings for the Consultant's own records and for use in demonstrating experience and qualifications on future assignments. However, the Consultant shall not disclose or disseminate any project information or documentation to third parties without prior written authorization from the Client. The return of documents and materials shall occur within two weeks following completion of services or within two weeks following termination of the Contract if termination occurs prior to completion. The Consultant shall coordinate with the Client regarding logistics for physical transfer of materials and shall obtain written acknowledgment from the Client confirming receipt of all returned materials.

5.6 Native File Formats and Digital Deliverables

The Consultant shall ensure that all native file submissions preserve complete functionality including formulas, cell references, drawing layers, embedded graphics, and all other elements necessary for effective use and modification of the files by the Client.

Written reports including all technical reports, feasibility studies, and narrative documentation shall be provided in Microsoft Word format or equivalent word processing format that fully preserves all formatting, styles, tables, embedded graphics, headers, footers, and table of contents with active hyperlinks. Report files shall be organized with appropriate use of styles and heading levels to facilitate navigation and subsequent editing. Large reports may be organized into multiple files by chapter or section to improve file manageability, with a master document provided that links all component files.

Spreadsheets including cost estimates, Bills of Quantities, traffic analysis worksheets, economic evaluation calculations, and HDM-4 input data shall be provided in Microsoft Excel format with all formulas and cell references intact to enable the Client to update input parameters or modify calculations. Spreadsheet files shall include clear labelling of all worksheets, appropriate use of cell formatting to distinguish input cells from calculated cells, and documentation either in separate worksheets or in cell comments explaining the purpose and methodology of complex calculations.

Engineering drawings shall be provided in AutoCAD DWG format compatible with AutoCAD 2018 or later versions, or equivalent CAD format that preserves all layers, dimensions, annotations, hatching, line types, blocks, external references, and drawing properties. Drawing files shall be organized using a consistent layer naming convention with separate layers used for different element types such as centreline alignment, contours, structures, utilities, text annotations, and dimensions. All text within drawings shall use standard AutoCAD fonts or commonly available TrueType fonts to ensure proper display on systems that may not have specialized font libraries. Drawing templates, title blocks, and standard details shall be provided as separate reference files to enable the Client to use these standards for future drawing production.

Economic analysis files shall include the complete HDM-4 files with all input files, calibration parameters, traffic data, road network data, vehicle fleet data, economic parameters, and analysis scenarios preserved to enable the Client to run the model independently and conduct additional sensitivity analyses or scenario testing. All HDM-4 files shall be organized in a logical folder structure with clear naming conventions. A readme file shall be provided documenting the HDM-4 model structure and explaining how to execute the model runs.

Presentation materials including those prepared for stakeholder consultation workshops, concept design approval meetings, and final preliminary engineering design approval meetings shall be provided in Microsoft PowerPoint format or equivalent presentation software format that preserves all slide layouts, animations, embedded graphics, and multimedia elements. Presentation files shall be provided along with all linked or embedded media files to ensure presentations can be displayed correctly on systems other than the Consultant's computers. Photographic records shall be provided as high resolution digital image files in JPEG format organized in folders by location, date, or subject matter as appropriate. Each photograph shall be accompanied by metadata either embedded in the image file or provided in a separate index file documenting the date, location, description of subject matter, and photographer.

All digital deliverables shall be organized using a logical folder structure with clear folder names and consistent file naming conventions that enable the Client to locate specific files efficiently. A master index or readme file shall be provided at the root level of each USB drive or storage medium documenting the folder structure and describing the contents of major folders. File names shall be descriptive and shall avoid use of special characters that may cause compatibility issues across different operating systems. Version control shall be maintained for documents that undergo multiple revisions, with file names or folder organization clearly indicating draft versus final versions and the date or version number of each iteration.

The Consultant shall test all digital deliverables prior to submission to verify that files open correctly, that all links and references function properly, that formulas calculate correctly, and that no data corruption has occurred during file preparation or copying to storage media. The Client reserves the right to reject digital submissions that contain corrupted files, broken links, missing components, or files that cannot be opened using standard software packages, and to require resubmission of corrected digital deliverables at no additional cost.

5.7 Lateness in Reporting

Where a report required under any section of these Terms of Reference is delayed beyond the stipulated time for submission, the consultant shall provide to the Client an explanation satisfactory to the Client for the delay in submission and the remedial measures to be undertaken.

6 DATA SERVICES, PERSONNEL, AND FACILITIES TO BE PROVIDED BY THE CLIENT

6.1 Documents and Data

The Client shall make available all relevant documents and data in possession of the Client or other government agencies including the existing feasibility reports, Detailed Engineering Reports for the main alignment (already designed) including road condition surveys and pavement assessments; historical traffic count data; geotechnical investigation reports and materials testing results; previous environmental and social assessment documentation; land records and cadastral information; and utility infrastructure records.

The Consultant shall review all Client-provided information and shall be responsible for verification, analysis, and professional interpretation. The Client makes no representation regarding completeness or accuracy of provided information. Where existing data are inadequate, the Consultant shall conduct additional surveys and investigations as specified in Section 4.

6.2 Services and Assistance

The Client shall provide liaison and coordination support with government ministries, departments, agencies, and county governments. The Client shall facilitate permits, approvals, and clearances from regulatory authorities including National Environment Management Authority, National Land Commission, utility companies, and county governments.

The Client shall assist obtaining customs and tax exemptions for Consultant's imported equipment and materials in accordance with Government of Kenya policy for donor-financed projects. The Client shall support obtaining work permits and entry visas for expatriate staff.

The Client shall facilitate security arrangements and coordination with relevant authorities where security considerations apply. The Client shall organize coordination meetings and provide meeting facilities as necessary. The Client shall facilitate arrangements for Consultant office space or provide compensation as specified in Contract.

6.3 Correspondence and Communication

All formal correspondence regarding the consulting assignment shall be addressed to the Director, Highway Design and Survey, KeNHA, who serves as Client's Representative for contract administration and has authority to issue instructions, approve deliverables, and make decisions within Contract scope.

The Consultant shall maintain professional communication protocols and respond to Client correspondence within reasonable timeframes appropriate to matter urgency. For urgent technical matters requiring immediate attention, the Consultant shall establish direct communication with Client's Project Technical Team as specified in Section 9.

All correspondence shall be documented and filed systematically by both parties. Electronic communication may be used for routine coordination subject to written confirmation for matters requiring formal record.

7 TRAINING AND CAPACITY BUILDING

7.1 Training Objectives

Capacity building through structured training aims to enhance technical capabilities of Kenya National Highways Authority and Kenya Urban Roads Authority staff in highway design, project development, and Design-Build procurement. Training enables Client staff to better manage future design assignments, review consultant deliverables with enhanced technical understanding, and contribute more effectively to project development activities. Trainees shall work alongside Consultant's key staff observing professional practices, participating in technical tasks under supervision, and gradually assuming greater responsibility as competence develops. This on-the-job training approach ensures knowledge transfer is grounded in real project experience rather than abstract theory.

7.2 Training Participants

The Client shall nominate up to three trainee engineers and up to three trainee technicians or inspectors to participate in assignment as counterpart staff receiving structured training. Nominees should be permanent KeNHA staff with relevant educational background and potential for career development in highway design and project management. Trainee engineers should have university degree in civil engineering and up to five years professional experience. Trainee technicians should have diploma in civil engineering technology and relevant field experience.

The Trainees shall be assigned to work with Consultant team during Assignment participating in design activities and gaining exposure to professional practices. The trainee deployment schedule shall be coordinated with Consultant work program ensuring trainees participate when meaningful learning opportunities are available. Training participation should not interfere with trainees' primary responsibilities to Client and deployment schedule accommodates Client operational requirements.

The Consultant, as part of its support to the Client's trainees under the stipend arrangement, shall provide adequate safety equipment and protective gear for all trainees engaged in field activities, including survey operations and site investigations. The Consultant shall ensure that trainees receive proper safety briefings prior to field deployment and are supervised by qualified and experienced personnel throughout field assignments. Additionally, the Consultant shall maintain appropriate insurance coverage for trainees participating in assignment-related activities..

7.3 Training Program Content

The Consultant shall tailor specific training content to individual trainee background and learning objectives but typically includes; survey operations and data processing for highway projects, traffic surveys and forecasting methodologies, geotechnical investigation and materials testing, highway geometric design using modern design software, pavement structural design and materials selection, bridge and drainage structure design, economic evaluation using HDM-4 methodology, environmental and social considerations in highway design, Design-Build procurement and Employer's Requirements development, project management and quality assurance practices, and technical report preparation and presentation. The tasks might include survey data processing and quality checking, materials testing in laboratory and reporting of results, traffic count data analysis and preparation of traffic summary tables, geometric design of road sections using design software, preparation of drawing sections under supervision, quantity calculations from drawings, preparation of sections of technical reports, and review and checking of technical work. All trainee work products shall be reviewed by Consultant key staff with feedback provided on quality and areas for improvement.

In addition to hands-on technical work, the trainees shall observe and participate in professional activities including coordination meetings with Client and other consultants, stakeholder consultation forums, technical presentations and workshops, and review and quality control processes.

7.4 Training Supervision and Evaluation

The Team Leader shall designate senior key staff member as Training Coordinator responsible for training program implementation and trainee supervision. The Training Coordinator shall develop individual training plans for each trainee based on background and learning objectives, assign trainees to appropriate key staff for technical supervision, monitor training progress and trainee performance, provide feedback and coaching to trainees, and prepare training progress reports for Client.

Individual training plans shall document training objectives, technical areas to be covered, specific tasks and activities assigned, schedule and duration of training assignments, and evaluation criteria for assessing learning outcomes. Training plans shall be developed in consultation with trainees and Client's Representative ensuring alignment with Client capacity building priorities and trainee career development goals. Training plans shall be reviewed and updated quarterly based on progress and evolving learning needs. Training progress shall be documented in monthly progress reports submitted to Client including summary of training activities during reporting period, description of tasks and responsibilities assigned to each trainee, assessment of trainee performance and learning progress, any issues or constraints affecting training effectiveness, and planned training activities for following month. At assignment completion, the Consultant shall prepare comprehensive training completion report for each trainee documenting training duration and level of effort, technical areas covered with specific skills and knowledge gained, tasks and responsibilities successfully completed, assessment of competencies achieved, and recommendations for continued professional development.

7.5 Training Facilities and Resources

The Consultant shall provide trainees with access to necessary facilities and resources for effective learning. Trainees are accommodated in Consultant project office with desk space and computer access. Trainees have access to Consultant technical library including design standards, reference manuals, and technical publications. Trainees are provided with copies of relevant training materials including design guidelines, calculation examples, and procedure documents.

The Trainees shall use Consultant software under supervision for design tasks and analysis including highway design software such as Civil 3D, economic analysis software including HDM-4, geotechnical analysis software, structural design software, and standard office software including Microsoft Office suite. Software use is supervised ensuring trainees learn proper application while protecting data security and quality control.

The Consultant shall provide reasonable safety equipment and protective gear for trainees participating in field activities including survey operations and site investigations. The Consultant shall ensure trainees receive appropriate safety briefing before field deployment and are supervised by experienced staff during field activities. The Consultant shall maintain appropriate insurance coverage for trainees participating in assignment activities.

8 DURATION OF THE ASSIGNMENT

The Contract period for the Assignments shall be six (6) months from the effective date of commencement of services.

Shortlisted Consultants shall be required to prepare Financial Proposals costing the assignment activities under remuneration and reimbursable costs as guided within the Request for Proposal Document.