TERMS OF REFERENCE

FOR

CONSULTANCY SERVICES FOR FEASIBILITY STUDY, ECONOMIC EVALUATION, PRELIMINARY DESIGN, PRELIMINARY ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT, DETAILED ENGINEERING DESIGN, PREPARATION OF BIDDING DOCUMENTS AND SUPERVISION OF WORKS FOR UPGRADING OF MKATA – KWAMSISI ROAD SECTION (38KM) TO BITUMEN STANDARD.

1.0 INTRODUCTION

1.1 The Government of the United Republic of Tanzania has received funds from the International Development Association (IDA) towards the cost of the Tanzania Roads to Inclusion and Socioeconomic Opportunities (RISE) Project and intends to apply part of the proceeds of this Credit to cover eligible payments under the contract for the Consultancy Services for Feasibility study, Economic Evaluation, Preliminary Design, Preliminary Environmental and Social Impact assessment, Detailed Engineering Design, Preparation of Bidding Documents and Supervision of Works for Upgrading of Mkata – Kwamsisi road section (38 km) to Bitumen Standard.

1.2 The Project Development Objective (PDO) is to improve rural road access and provide employment opportunities for population in selected rural areas and build capacity in the sustainable management of rural roads incorporating community engagement approaches.

1.3 **The RISE Project will address some of the urgent challenges in the rural road subsector in Tanzania.** During its six years of implementation, it is expected that the RISE Project will set the foundation for the management of rural roads in Tanzania in the medium term from the policy, planning and implementation capacity perspectives and create a model for a national program. The RISE Project will assist in creating a philosophy of road asset management that will focus on the safe, inclusive and all-season access for rural communities to reach their social, education, health and financial services, and help link rural communities to markets and economic opportunities. Furthermore, the RISE Project will incorporate community engagement and gender-responsive approaches that will leverage social inclusion while reducing road safety risks, social risks such as SEA and SH in the workplace, and incorporate mechanisms to address contagious diseases, such as the COVID-19 outbreak, within its scope.

1.4 The upgrading will incorporate the outcomes of an assessment of current and future climate impacts and the inclusion of adaptation measures to be adopted to increase resilience to these impacts.

1.5 The services described under these TOR are for Feasibility Study, Economic Evaluation, Preliminary Design, Preliminary Environmental and Social Impact assessment, Detailed Engineering Design, Preparation of Bidding Documents and Supervision of Works for Upgrading of Mkata – Kwamsisi road section (38km) to Bitumen Standard, which is among the priority links for improvement on the corridor Networks.

1.6 The project is part of the Government strategy to develop its regional roads network to improve Transportation to Pangani, Saadan National Park, and form a link to Mkange – Mkwaja – Tungamaa with Mkata the node for Chalinze – Segera Trunk road and improve socio-economic development of the country at large.

1.7 The Consulting firm (the Consultant) is therefore required to undertake Feasibility Study, Economic Evaluation, Preliminary Design, Preliminary Environmental and Social Impact assessment Detailed Engineering Design, and Preparation of Bidding Documents and Supervision of Works for Upgrading of Mkata - Kwamsisi Section (38km) to Bitumen standard.

2.0 PROJECT DESCRIPTION

2.1 The Mkata - Kwamsisi road section (38km) is part of Mkata – Mkalamo Regional Road located in the Tanga region. The Mkata – Kwamsisi road section (38km) is an engineered earth/gravel road. It is currently undergoing various maintenance interventions ranging from routine maintenance, periodic maintenance, spot improvement and rehabilitation of some sections. Although the road is passable during dry seasons, some of its sections become impassable during rainy seasons which hinders transportation of goods and passengers.

2.2 The project road starts at the junction with Chalinze – Segera trunk road at Mkata town centre and ends at Kwamsisi town, joining to Mkange – Mkwaja – Tungamaa trunk road. The route follows the existing earth/gravel road traversing through a number of centres including Kibaoni, Kwapala, Kwamkata/Mawe Matatu, Kwedichenje, Pozo and Kwamsisi Township.

2.3 The road traverses mostly rolling terrain with a combination of curves in some sections. The low area is characterised by swampy and water logging on both sides. These locations and any other areas of concern require special attention and thorough investigations.

2.4 The road crosses several seasonal and perennial rivers such as Mkula. These rivers have various types of drainage structures including pipe culverts, box culverts, and bridges. Some of these structures experience overtopping during rainy seasons. Thus, together with the proposed road upgrading study, investigations and detailed design of all drainage structures are part of the assignment.

2.5 The road passes through areas with potential economic activities such as agriculture, livestock keeping, forestry, tourism, fishing, business centers, etc. However, these economic potentials are not fully exploited due to a lack of reliable road transport infrastructure.

2.6 The proposed project road traverses through the existing road which is managed by TANROADS Tanga Region. Currently, the traffic on the proposed road recorded 688 ADT in 2019, but, it is expected that more traffic will be generated after upgrading it to bitumen standard. Therefore, it is expected that more vehicles will use the improved road in order to reduce transport costs. Among other benefits, improvement of the road will provide a catalytic impact in reducing poverty through socio-economic growth and exogenous benefits to Tanzania as a whole.

2.7 With typical levels of motorization to be lower and a significant share of the population living in poverty or extreme poverty, the Mkata - Kwamsisi corridor is “de facto” being used as a street where the majority of the road users are pedestrians and bikers. This particularity makes the traditional “vehicle-centred” approach to road design in urban and peri-urban areas (already populated) insufficient to address the actual functional needs of the population. Since urbanization is also rapidly increasing, this also entails that it should be expected that the villages and urban areas that are served by the project will increasingly be populated.

2.8 The Mkata – Kwamsisi road (38km) is starting to populate due to the establishment of Handeni District Council Office. It is expected that with the urbanization trends and the increase in connectivity and accessibility provided by the project, the road will become a corridor with settlements in its entirety and potentially an urban expansion corridor that will eventually conurbation Mkata, Pozo and Kwamsisi in the next two decades. As a result, the Client believes that the project needs to be visionary and innovative in the way it takes the urbanization trends into consideration. The project will be cognizant of the expected land use and settlement changes along the corridor and that the project solution will incorporate treatments sensitive to the mobility needs and potential use of non-motorized transport options (biking and walking) and public transport not only in the currently populated areas but also in the entirety of its length. The Consultant is expected to design context-sensitive

treatments to address all these mobility needs for populated areas with the implementation of bikeways and sidewalks, traffic-calmed areas and public transport stands and bays as needed (catering to all public transport modes including municipal buses, inter-municipal buses, bajajis and moto-taxis, etc), space for freight needs for loading and off-loading and other needs.

2.9 TANROADS has considered the need for upgrading to Bitumen Standard of Mkata - Kwamsisi Regional Road Section (38km) under the Roads to Inclusion and Socioeconomic opportunities (RISE) Program. Since the said section is not designed, the Client is desirous to engage a Consultant to design with the current design standard and other guidelines and supervise the construction Works.

MKATA - KWAMSISI ROAD SECTION

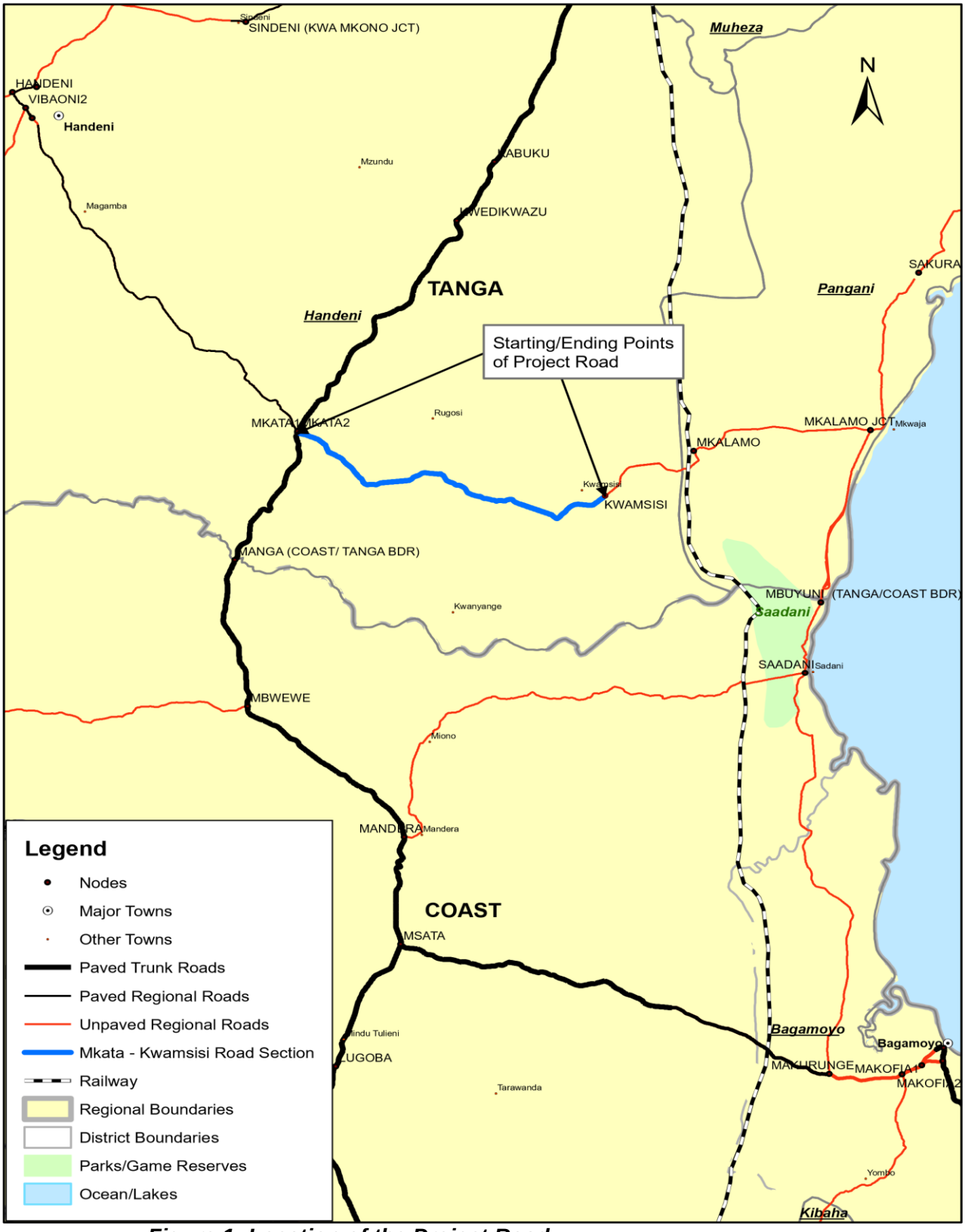

Figure 1: Location of the Project Road

3.0 OBJECTIVES

3.1 The objective of the assignment is to carry out Feasibility Study, Economic Evaluation, Preliminary Design, Preliminary Environmental and Social Impact assessment, Detailed Engineering Design, Preparation of Bidding Documents and Supervision of Works for Upgrading of Mkata – Kwamsisi road section (38 km) to Bitumen Standard.

3.2 The Consultant shall undertake Feasibility Study, Economic Evaluation, Preliminary Design, Preliminary Environmental and Social Impact Assessment, Detailed Engineering Design, Preparation of Bidding Documents for International Competitive Bidding (ICB) or National Competitive Bidding (NCB) in according with the World Bank Procurement Regulations.

3.3 The Consultant shall collect and use most current design information, including the potential impacts of current and future climate, to perform all necessary tasks that will lead to delivery of a sound engineering design as per the current standards and specifications.

3.4 The Supervision of the Works Contract would be to ensure that the Works comply with the approved design, drawings, specifications, provisions of contract and sound engineering practice during construction stage; and project environmental, social, and health and safety (ESHS) requirements.

4.0 SCOPE OF CONSULTANCY SERVICES

4.1 The Consultant shall carry out all the tasks necessary to achieve the defined objectives. The services shall involve Feasibility study including, Economic Evaluation, the preliminary design, project cost estimates, preliminary environmental & social impacts assessment including identification of properties to be affected and preliminary costs for resettling those properties.

4.2 The Consultant shall review all available reports and relevant documents, maps, previous studies if any and perform all engineering work, economic evaluation, field investigations and the related works herein described as well as any other related work required to attain the objectives of the Asignment. The services shall be carried out in three phases namely:

Phase I: Feasibility Study, Economic Evaluation, Preliminary Design, Preliminary Environmental and Social Impact Assessment. The duration of this activity is five (5) months;

Phase II: Detailed Engineering Design, and preparation of Bidding Documents. The duration of this activity is Five (5) months; and

Phase III: Supervision of Construction Works and Defects Notification Period. The duration of this activity is 36 months; 24 months for supervision of works and 12 months for Defects Notification Period.

4.3 The Consultant is required to clearly indicate costs for the three phases separately in the Financial Proposal as the conditions of payment and timing for three Phases are different. Whereas the services described under Phase I and II will be executed using Lump-sum form of Contract whereby payments are linked with deliverable/outputs while those under Phase III will be executed using Time Based Contract whereby the payments are linked with time inputs of the Key Experts in the assignment. The Client and consultant will sign contract for both Phase I&II and Phase III. However, the Consultant will be notified by the Client on the start of Phase III after successful completion of Phase I & II as per the terms and conditions of the signed contract.

4.4 The Preliminary Environmental and Social Impact Assessments shall be undertaken in accordance with the requirements of the legislations and policies of the United Republic of Tanzania and the World Bank Environmental and Social Framework (ESF). The detailed scope for undertaking the Preliminary Environmental and Social Impact Assessment is herewith attached as **Annex I**

5.0 PHASE I: FEASIBILITY STUDY, ECONOMIC EVALUATION, PRELIMINARY DESIGN, AND PRELIMINARY ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

The scope of services for Feasibility Study, Economic Evaluation, Preliminary Design and Preliminary Environmental and Social Impact Assessment shall include the following:

a) Preliminary survey and investigations,
b) Economic analysis and evaluation,
c) Traffic surveys and analysis,
d) Preliminary Environmental & Social Impact Assessment,
e) Preliminary design,

It should be noted that the road once upgraded will serve various communities, villages and townships along the identified corridor and therefore evaluation and subsequent design of short access roads should be included in the scope of the Consultant's services.

5.1 ROAD ALIGNMENT AND CONDITION SURVEY

5.1.1 The Consultant shall carry out desk studies of the existing road alignment and condition survey data from available information. This shall be followed with field surveys for the establishment of the road centreline with particular attention given to characteristics of the alignment such as low and high points of vertical alignment, sub standard curves, deep cuts, high fills, overtopping sections, etc. Where potential improvement in alignment is envisaged the coordinates of the locations will be captured. The Consultant shall capture the coordinates of locations of, drainage structures, overtopping sections, large river crossings, railway crossings, villages, towns, markets, public services facilities, etc. However, it is desired that the alignment should follow as closely as possible the existing road to avoid compensations.

5.1.2 The Consultant shall investigate the alternative routes, if any, along the project area and recommend the best route based on technical, economic, social and environmental assessment.

5.2 ROUTE SELECTION

5.2.1 The existing road alignment will be adopted for this design save for necessary re-alignments. For stretches without any defined alignment, the Consultant shall select the best route to be followed from both technical and economic points of view. The project starts at the junction with Chalinze – Segera – Tanga road at Mkata township and traverses along the rolloing terrain and ends at Kwamsisi village.

5.2.2 Any proposed realignment/bypasses or spur roads will be guided by the existing Land use plan of the respective District/Town Master Plan and shall be agreed upon between the Consultant and TANROADS during the Inception Report stage.

5.3 PRELIMINARY TOPOGRAPHIC SURVEY

5.3.1 The Consultant shall carry out topographical surveys to facilitate the location of permanent control points, centreline, drainage structures, and computation of quantities of earthworks.

5.3.2 All topographic surveys undertaken by the Consultant shall be according to the Land Surveying and Mapping Standards of Tanzania, and shall be recorded in standard survey field books/electronic data book, which shall be submitted and become the property of the Client at the completion of the assignment**.**

5.3.3 The primary network of permanent control points shall be established at a maximum interval of 3000 m along the road thereafter to be distributed to a maximum of 300m as secondary points, which should be intervisible.

5.3.4 The Consultant shall liaise with the Ministry responsible for lands for the existing National Grid/Datum reference beacons and benchmarks in order to establish the permanent control points. The co-ordinates of all intersection points shall be in the Universal Transverse Mercator (UTM) system and shall be tied to the National Survey Grid, and levels related to the National Benchmarks.

5.3.5 Monumentation of all primary control points shall be made using 12 mm steel pins embedded in concrete cast in-situ. The description cards for the control points shall be prepared and submitted to the Client and detailed in the report to be submitted to the Client for future reference.

5.3.6 The survey of the centreline shall comprise all activities required to locate the road alignment on the ground and to plot it on the plan and shall include:

a) Levelling along centreline at 50 m intervals for the longitudinal profile, and

b) Cross-section levelling at 500 m intervals and at any local irregularity. Cross sections are to cover at least 25m each side of the centreline.

5.3.7 Further, the survey shall cover the location from the centre line of physical features like buildings, monuments, posts, pipe lines, existing roads and railways lines, stream/river crossings, cross drainage structures etc that are likely to affect the road construction works.

5.3.8 Geometrical characteristics of the centreline shall be computed and survey data shall be given at regular intervals along the curves and the longer tangent alignments. Vertical alignment shall be defined and computed.

5.3.9 The topographic data shall be available and presented on maps with a scale of 1:4000.

5.3.10 In addition, electronic copies of the topographic data saved in MS Excel and topographic drawings in DXF or DWG format shall be submitted in USB to the Client and become his property.

5.4 PRELIMINARY SOILS AND MATERIALS INVESTIGATIONS

5.4.1 The Consultant shall investigate the soils along the project road with a view to determining the characteristics of existing soil layers. The soil types shall be described and assessed in terms of their suitability for road construction, resistance to erosion and other relevant factors. Sub-grade soils shall be analysed by excavating pits or auger and collecting soil samples for laboratory tests. Generally test pits shall be excavated every 1000m. Additional test pits shall be carried out where there is a remarkable change in soil characteristics and the tests to be carried out shall include:

a) Particles size distribution
b) Atterberg Limits
c) Moisture/density relationship, and
d) CBR (3 points) and swell after 4-days soaking for each typical soil type identified.

5.4.2 The Consultant shall carry out studies of the sources of construction materials available for upgrading of the project road. The studies shall include identification of

materials in the field as well as testing in the laboratory. Details of tests are similar to those given in section 5.4.1 above. For borrow areas for fill materials and where the road is to be re-aligned, investigations shall be conducted to locate areas with materials of the desired quality within economic haul distances. The fill materials shall meet minimum soaked CBR requirements. The location of trial pits and the quantity of materials available as a result of such testing shall be estimated for all potential borrow areas. Representative material samples shall be collected in order to conduct detailed testing on the materials.

5.4.3 The Consultant shall carry out investigations for potential sources and conduct necessary tests for sub base and base materials. Tests for stabilization and blending of materials for sub-base and base courses will also be carried out.

5.5 DRAINAGE STUDIES AND SURVEYS

5.5.1 The Consultant shall undertake desk studies from available information on the drainage condition along the project road and information on future climate changes which can be obtained from available sources such as the World Bank Climate Portal or the Southern Africa Development Community (SADC) Regional Climate Services Center. The Consultant shall also carry out a visual survey to assess the functionality and deficiencies of existing drainage structures such as side drains, mitre drains, pipe and box culverts, bridges, etc. Where ponding, drainage bottlenecks, or overtopping are observed the Consultant will assess the requirement for additional cross drainage structures.

5.5.2 The Consultant shall carry out a detailed condition survey for culverts and bridges in order to assess the adequacy of the structure for the waterways, load carrying capacity, anticipated serviceability and the requirement for repair, rehabilitation, widening and reconstruction of structures showing distress. The survey report shall include but not limited to:

a) Dimensions (width, length, number of spans, height and associated vertical clearance, channel water depth);
b) Types of structures (concrete, steel, timber);
c) Conditions of superstructures
d) Conditions of substructures and bridge bearings;
e) Erosion around piers, abutments, and banks;
f) Guard rails, approach slabs and traffic safety conditions;
g) Hydraulic capacity and highest water levels; and
h) Conditions of river channel (shape, vegetation growth, barriers, navigation considerations etc).

5.5.3 Existing culverts may require increased capacity, extension, new headwall/wingwalls structures and erosion protection measures particularly where the outlets and outfall drains are scoured. The Consultant shall carefully inspect all culverts and determine the expected residual life. TANROADS shall be advised of the Consultant's findings, recommendations and related costs.

5.5.4 All existing data and the results of the field investigations for drainage structures, soils, etc. shall be reassessed and used as a basis for the design of drainage structures. Detailed hydraulic computation and structural designs shall be carried out and fully documented in the Reports. Detailed designs shall be prepared for all new and replacement of drainage structures to a width in accordance with Clause 5.12 of the Ministry of Works Road Geometric Design Manual (2011) and loading capacity in accordance with BS 5400.

5.5.5 Special road safety measures shall be proposed at hazardous drainage structure locations and other areas e.g. centres.

5.6 HYDROLOGICAL SURVEY AND ANALYSIS

5.6.1 The Consultant shall define the catchment areas for all the major drainage structures on topographical maps or aerial photographs. The sites of the meteorological and hydrological existing stations in the area shall also be shown. Rainfall intensity, run-off duration/intensity relationship, catchments run-off characteristics and the channel slopes/discharge characteristics for each catchment area will be determined based on the available aerial photographs, topographic maps and field investigations as necessary.

5.6.2 The Consultant shall investigate channel stability; scour depth and bank stability, maximum flood level and hydraulic opening of the structures to accommodate maximum flow anticipated with a provision for adequate free board. The peak flow through the river/stream will be estimated for a return period of 100 years for bridges, 50 years for box culverts and 10-25 years for other structures using generally acceptable standard procedures such as the Rational Method for catchments between 1.0 sq km or where drainage flow distance is less than 1 km and the "Transport Road Research Laboratory (TRRL) East African Flood Model" for catchments larger than 1.0 sq km but less than 200 sq km and for catchment areas that are greater than 200 sq km, the Consultant is advised to use at least three International recognized large catchment models which compute reliable results of water discharges.

5.6.3 The Consultant shall investigate channel stability; scour depth and bank stability, maximum flood level and hydraulic opening of the structures to accommodate maximum flow anticipated with a provision for adequate free board. The Consultant shall estimate/compute peak flow through the river/stream for a return period of 100 years for bridges, 50 years for Box culverts and 10-25 years for pipe culvert using generally acceptable standard procedures such as the Rational Method for catchments between 1.0 sq km or where drainage flow distance is less than 1 km and the "Transport Road Research Laboratory (TRRL) East African Flood Model" for catchments larger than 1.0 sq km but less than 200 sq km. For catchment areas that are greater than 200 sq km, the Consultant is advised to use at least three International recognized large catchment models which compute reliable results of water discharges.

5.6.4 Channel Stability

The Consultant shall investigate channel stability, channel-bank stability and maximum flood level.

5.6.5 Climate Change Resilience and Adaptation

In order to minimize the impact of climatic change, the Consultant shall incorporate in the design the philosophy of all climatic change stressors with emphasis placed on the proper design of drainage structures. Therefore, the design will adopt engineering measures to reduce the impact of climate change during design and construction of the project road so as to ensure that roads become climatic resilient such that it can retain its passability after both periodic and extreme climatic events such floods etc.

The Consultant shall describe the current and future climatic conditions of the project area by providing at least the following details: -

a) Historic climate data should be obtained from both Tanzania Metrological Authority (TMA) and Specific Basin Water Office around the study area. Future climate data may be obtained from either the World Bank Climate Change Knowledge Portal, https://climateknowledgeportal.worldbank.org/ or the SADC, Regional Climate

Services Centre, which includes data from some 20 – 30 weather stations in Tanzania. See: http://csc.sadc.int/en/climate/historical-reference/climdex-indices.

b) The Consultant shall endeavor to collect and use reliable climate data and information available around the project area. In case the data and information is not available for the area of the project, information from nearby and similar basins should be considered and carefully analyzed in consultation with the Client. The Consultant is advised to contact relevant authorities and discuss on the data and information to be used in the project. All risk should be identified for the project area and the indirect project area.

c) During design, the Consultant shall take into consideration the current climatic changes including global warming and recommend appropriate measures to cater for such situation particularly in terms of flooding, landslides, and on bitumen binder selection. The Consultant shall design the road taking into account concepts of resiliency to climate change and consideration for cost-efficiency of the infrastructure solution throughout the life-cycle of the project. The Consultant should consider different levels of intervention to climate proof road project which include but not limited to engineering or structural adjustments (such as adjusting drainage and drainage structures), planning and ecosystem-based approaches (such as improved natural flood management or re-alignment) or a combination of different types of activities as ideal measure for a comprehensive climate-proofing adaptation strategy. If applicable, the Consultant shall advise on the scoping and prioritization of the interventions in case the level of interventions may be considered to extend beyond the project period.

d) There is now general agreement that climate change will continue to occur over the coming decades. For the specific roads in this assignment climate change will involve issues such as variations in seasonal rainfall; increased temperature and increased major climatic events. Consequent climate-related hazards may, among other, result in:
    - Drainage and structures being exposed to more frequent and higher levels of flooding;
    - Roads in hill areas being exposed to more frequent landslides:
    - Unsealed road surfaces being exposed to increased erosion;
    - Changes in soil moisture and groundwater level affecting pavement structures;
    - Extreme heat causing defects in bituminous surfacing, concrete and steel structures.

The Consultant should ensure that pavement, drainage, structure and earthwork designs take account of potential impacts due to current and future climate within the design life of the road assets.

5.7 TRAFFIC SAFETY STUDY, SURVEYS AND ANALYSIS

5.7.1 Traffic Safety Study

The Consultant shall identify all possible accident black spots (existing and potential in the future) and incorporate them within their design measures to improve any dangerous locations identified. The Consultant shall provide improved layout and visibility at junctions, proper separation of pedestrians and cyclists from the vehicular traffic and provide safe pedestrian crossings, bus bays, parking areas and lay bays at appropriate intervals as well as the major centres shall be included in the design improvement where possible. Other measures to be considered include the provision of sidewalks in highly populated areas and climbing lanes on steep grades. Assessment of safety around schools should be made by providing relevant walkways, speed control measures and crossings facilities. The Consultant shall provide options to ensure road safety to non-mechanized

uses of the road to ensure that the walking and cycling modes are feasible mobility alternatives for the functions for which the road is being used (e.g. pedestrian and cycling).

The consultant will also gather any existing information on road safety/crashes in the Mkata - Kwamsisi road.

The roads designs should suitably address Cattle and animal migration crossing and the design shall evaluate options to address the issue and improve the associated road safety. Based on the lessons learned from other completed road projects by TANROADS, provision of *at grade* cattle crossings could result in an ineffective measure to ensure road safety if, eventually after construction, the heads of cattle may shift away from the crossing provided to alternative crossing either beside new one or to completely new point. The Consultant shall therefore carry out a review and updates the cattle crossings location by providing options to the Client shall include alternative underpasses using box culverts or any other cattle crossing model from international design standard that may be proposed by the Consultant.

5.7.2 Traffic Surveys and Analysis

The Consultant shall carry out a traffic study and it shall include motorised and non – motorised traffic to enable the Consultant to design pedestrians and cyclist facilities wherever necessary. The design solution proposed should be cognizant that the majority of the current users of the road are are pedestrians and bicyclists and thus the solution should take into account the functional uses of the road beyond mechanized transport.

The counts will include solid data collection of pedestrians and bikers and estimates of the usage of the roads within the project horizon for non-motorized transport (taking into account forecasted land-use changes along the corridor). The counts will be done by functional segment (all urban and semi-urban and rural) with counts at peak hours (and in every km in urban areas). By having accurate data on pedestrians and non-motorized users, the Consultant will have information that will support the design of more effective road safety and street function design interventions (including non-motorized transport facilities). The Consultant shall also estimate the growth in non-motorized mobility along the corridor and consider solutions that adequately address the functional needs for this type of mobility for the next 20 years.

The Consultant shall carry out classified traffic counts for 7 consecutive days out of which 4 days will be for 12 hours and 3 days for 24 hours. The counting should be carried out at the permanent locations that were established by TANROADS. The ADT shall be converted to Annual Average Daily Traffic (AADT) by applying seasonal adjustment factors established by TANROADS.

Historical traffic data shall be collected depending on its availability (preferably about 5 -10 years) so as to establish meaningful past growth trends for each vehicle class.

The consultant will also count the public transport units in the corridor and estimate the increase in public transport units that should reasonably be expected taking into account factors such as land use, population growth, etc. Counts will be conducted for at least a 24hrs period during a representative day in agreement with the Client.

Origin and destination (O-D) surveys shall be carried out at appropriate locations for 3 consecutive days which must encompass the weekly market day and one working day. The O-D information shall include vehicle particulars, commodity O-D particulars, vehicle utilization and route particulars. The points at which the data is collected should be carefully chosen on the road network such that it should be possible to derive the volume of traffic likely to use the facility under consideration. The ADT data obtained from O/D surveys should be presented in trip matrix format.

Traffic counts and O-D surveys would provide information about present traffic on the road (in the case of existing roads), or the possible diverted traffic (in the case of new construction, such as bypass). For design purpose, however, classified traffic must be predicted for the design period i.e. 20 years excluding the period of construction.

Axle load surveys should be carried out at each counting station at appropriately selected locations for seven consecutive days at 24 hours on the project road to capture information on directional traffic loading in order to determine the Vehicle Equivalent Factors (VEF) for various categories of vehicles for the estimation of E80s for traffic loading on the project road.

All available statistics on accidents that can form some inputs in the HDM-4 model and also form the basis for designing the improvements at accident-prone locations on existing roads shall be collected and analyzed.

5.7.3 Design Traffic Projections

The Consultant shall determine appropriate growth rates per category of vehicles (i.e. light, medium and heavy, and including buses, three-wheelers and motorcycles) using appropriate methods acceptable by the Client and provide for each identified category future traffic forecast for the next 20 years after project completion. The consultant will discuss assumptions on changes to vehicular composition once the project is implemented and there are new conditions. For vehicular traffic, the consultant will propose “homogeneous segments” for demand estimates in agreement with the Client.

The Consultant shall come up with future traffic forecast for each vehicle category for the next 20 years after project completion. All traffic (light, medium and heavy vehicles) forecasts shall be given at three growth rates, namely; low, medium and high.

The Consultant shall identify, describe and quantify existing and potential traffic generating factors in the immediate areas served by the project and areas likely to be influenced by future economic development. Such factors include but not limited to:

(i) Population growth and changes in rural and urban population distribution;

(ii) District and Regional economic growth;

(iii) Development in agriculture, livestock, irrigation, minerals, industry, commerce and tourism within the influence area,

(iv) Influence of project road for both transport and cargo freight and within Iringa and neighbouring Regions.

(v) Private and public investments along the project area;

(vi) Development of social services, medical facilities, educational centres;

(vii) Administrative structures available in managing conflicts which are formal and informal

(viii) Other factors identified by the Consultant.

Based on the above, generated traffic, non-motorized traffic as well as suppressed and diverted traffic shall be determined and shared with the Client for future use..

5.8 ECONOMIC EVALUATION AND ANALYSIS

Economic evaluation will be undertaken based on the TANROADS Investment Appraisal Manual of 2015. The activities to be undertaken include but not limited to the following.

5.8.1 Survey of National Social-Economic Profile

The economy of a region and its transport infrastructure are closely interrelated. The economic justification for a road project often depends upon the economic activities in the region and the potential for their further growth. The growth of traffic on the roads is likely to be closely governed by the inter-relationship between transport demand and certain selected economic indicators. Based on this the consultant shall carry out the following activities;-

- Give a general overview of the Tanzania economic profile and provide the most current statistics on macroeconomics such as Gross Domestic Product (GDP), inflation, exchange rates, economic sectors such as agriculture, manufacturing, mining, tourism, transport and communication, construction, etc for the past 5 -10 years.

- Describe the country's population, growth rates and population projections.

5.8.2 Transport System of the Country

The consultant shall provide information on the main transport modes and their context; the road network in km by classification and surface type; vehicle fleet and its growth rate in order to determine transport demand in the country. The new development in the transport sector such as the construction of the Standard Gauge Railway (SGR) should be acknowledged.

5.8.3 Socio-Economic Profile of the Region and Project Area of Influence

The Consultant shall collect and analyse the socio-economic data for the past 5-10 years from the project regions as well as project influence area so as to get an idea of how the economic growth has taken place in relation to traffic growth, thus giving a basis for estimation of future traffic growth generated by various sectors of the economy. Such data shall include but not limited to;

i. Population growth and changes in rural and urban population by distribution;
ii. Regional and national economic growth;
iii. Development in agriculture including area under crops, potential area for crops, livestock, irrigation, minerals such as gemstones, gold, coal, iron ore, uranium, natural gas etc, manufacturing industries such cashew nuts and tuna processing, commerce, tourism, forestry, fisheries within the influence area;
iv. Influence of new road for both transport and cargo freight within Tanzania and neighbouring countries;
v. Private and public investments along the project area;
vi. Development of social services, medical facilities, educational centres; refugees' camps;
vii. Administrative structures available in managing conflicts which are formal and informal; and
viii. Other factors as might be identified by the Consultant.

The Consultant shall carryout the economic evaluation of alternative technical solutions for upgrading of the project road using HDM-4 latest version or other more appropriate models such as Road Economic Decision (RED) model for economic analysis of Low Volume roads and agreed by the TANROADS and World Bank.

5.8.4 Economic Analysis

The basic purpose of economic analysis of a road project is to measure its economic costs and benefits in order to determine whether the net benefits accruing from the proposed project justify

investment in such a project. Based on the above, the economic analysis for this project will be undertaken based on the following assumptions:

(i) The economic analysis period is considered to be 20 years design life and 4 years planning, procurement and construction starting from the Base Year.
(ii) A discount rate of 12% shall be applied;
(iii) Vehicle Operating Costs (VOC) prepared by TANROADS in 2015 should be applied. However, the Consultant is required to update the items whose prices change with time. Such items include fuel prices, crew wages, and prices of new vehicles.
(iv) The Standard Conversion Factor (SCF) of 0.83 should apply as guided in the TANROADS Investment Appraisal Manual 2015. This factor is used to convert financial or market prices to economic costs. However, the consultant will be required to explain the concept of the SCF.

The consultant shall carry out the economic evaluation of the proposed improvement options using the HDM-4 version 2.11 model or other latest version available to determine economic viability of the proposed road project. Calibration of some data collected from the project area should be made in order for the HDM-4 model to give better results. Improvement options should be clearly stated.

The following economic indicators shall be calculated by the above models;

- Economic Internal Rate of Return (EIRR)
- Net Present Value of Investment (NPV) at 12% discount rate
- Benefit/Cost Ratio (B/C)
- First-Year Rate of Return (FYRR)

Interpretation of the economic analysis results, as well as recommendation on the best option, should be made clearly to enable the client to make the decision.

5.8.5 Economic Costs

The Consultant shall study all available information on the vehicle operating and road maintenance costs and estimates of such costs for both “Without” and “with” the project options. The Consultant shall use the Vehicle Operating Cost (VOCs) established by TANROADS.

For construction costs of different options, which also include environmental management, and social costs, the Consultant shall give estimates separated into foreign and local currency components.

For road maintenance costs for different identified options, the Consultant shall ensure that such costs are strictly related to current and forecast traffic volumes. The Consultant shall detail in the reports all data assumptions and parameters used to develop estimates of current and future road maintenance costs, separated into foreign and local costs.

In determining the economic costs for all inputs in the study, the Consultant shall ensure that costs are net of all taxes and duties or any other transfer payment to the Government, and shadow priced where appropriate to reflect the true scarcity value of the resources being used.

5.8.6 Economic Benefits

Economic benefits for each identified option shall be expressed primarily in terms of:

(i) Savings in vehicle operating costs;

(ii) Savings in road maintenance expenditure;

(iii) Savings in travel time costs;

(iv) Saving in accident costs due to improvement of non-motorized infrastructure;;

(v) Enviromental benefits (i.e., cost/savings in emissions, modal shift, other emissions, dust, etc.)

(vi) The residual value of the road structure at the end of the evaluation period; and

(vii) Any other factor(s) the Consultant shall consider relevant for the analysis, e.g. employment generation, etc.

Savings will be calculated as the difference of the costs under "With" and "without" project cases. In this respect, it is noted that the HDM-4model will calculate these costs savings from input data to be provided by the Consultant.

Due to the fact that some indirect economic and social benefits arising from the improvement in road conditions are not quantifiable, the Consultant shall undertake a detailed qualitative analysis of these benefits. Only when such benefits can be firmly demonstrated in quantitative terms shall they be included in the economic evaluation of the project but may be used as secondary justification for project implementation.

5.8.7 Sensitivity Tests

The Consultant shall carry out sensitivity analysis for the recommended alternative showing variations of NPV and IRR assuming construction costs variation of $\pm$10% and $\pm$20%; and variation of traffic levels over the life of the project of $\pm$10% and $\pm$20%. The sensitivity analysis shall also include a switching value analysis for construction costs and traffic levels.

The Consultant shall also develop a Risk Assessment in order to highlight the likelihood of an unsatisfactory outcome. The Risk Analysis methodology shall provide a framework within which it is possible to identify the most likely outcome of a series of relationships based upon the possible values of the input variables to those relationships.

The Consultant will rank the results of different options and make recommendations to the Client.

5.9 PRELIMINARY ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA

The Consultant shall Conduct Preliminary Environmental and Social Impact Assessment and shall recommend appropriate mitigation measures/plans to minimize any negative impacts. The assessment should be conducted as per the requirements of the Environment Impact Assessment and Audit Regulations (2005) and World Bank's Regulations. In undertaking Social Impact Assessment the consultant shall establish the number and the cost of compensation for properties to be affected as per requirements of the Road Sector Compensation and Resettlement Guidelines issued by the Ministry of Infrastructure Development (MoID), Feb.2009. The detailed scope of undertaking Environmental and Social Impact Assessment is attached to these TOR as **Annex I**

The Consultant shall recommend appropriate mitigation measures/plans to minimize any negative impacts of the project.

The Consultant shall assess the likely impact of HIV/AIDS, STI,TB and COVID -19 on the project road and propose measures to mitigate the same in accordance with National HIV/AIDS policy and strategies. The Consultant shall also prepare an awareness programs which aims at educating the community.

5.10 PRELIMINARY ENGINEERING DESIGN

5.10.1 Pavement Design

The Consultant shall carry out a preliminary pavement design on the basis of sub grade characteristics and design traffic loading for the design period, which is the same as that for economic analysis. The Consultant shall use the design methods for pavement design as specified in the Pavement and Materials Design Manual (PMDM) published by the Ministry of Works in 1999. The recommended pavement structure with respect to the type and thickness of structural layers as well as the type and thickness of surfacing will be derived from specifications shown in relevant tables of the PMDM. However, the final decision on the type of pavement designs will depend on the results of the economic analysis.

5.10.2 Geometric Design and Volume computations

Based on the topographic surveying and the designed pavements, the Consultant shall improve the horizontal and vertical alignments as necessary to comply with the approved design standards appropriate to the traffic and engineering characteristics of the road. The Consultant shall use the designed alignments to perform volume computations for earthworks and pavement layers.

5.10.3 Drainage structures

The Consultant shall provide new drainage structures on the basis of hydrological study, load carrying capacity and structural stability. The Consultant shall recommend appropriate remedial measures to the existing structures to improve structural stability and load carrying capacity.

5.10.4 Design Standards

The following approved standards by the Ministry of Infrastructure Development shall be adopted and adhered to:-

- Geometric design:- - MOW Draft Road Manual of 1989
  - Code of Practice for Geometric Design (Draft) published by SATTC -TU, 1998
- Pavement and Materials: - MOW Pavement and Materials Design Manual, 1999
- Specifications: - MOW Standard Specifications for Road Works, 2000
- Testing Procedure: - MOW Central Materials Laboratory Testing Manual, 2000
- Structures: - British Standards BS 5400
- Hydrology and hydraulics - TRRL East African Flood Model
- Surveying - Land Surveying and Mapping Standards of Tanzania (Land Surveying Regulations CAP 390)

The Consultant shall be responsible for the design details within these Terms of Reference (TOR). The methodologies used in the design of pavement, earthworks, drainage structures, shall give preference to the use of available local construction materials. At all times a balance must be maintained between capital and maintenance costs.

The Consultant's Feasibility Study Report including Economic Evaluation, Preliminary design and Preliminary Environmental and Social Impact Assessment for the road shall include soils and materials report, Topographical Survey, traffic data plans, preliminary cost estimates and reliminary

bidding documents, typical cross-sections, as well as key drawings for the proposed construction at the following scales:

1: 5,000/500 horizontal/vertical alignments
1: 250 cross-sections
1: 250 bridge/culverts

In addition to the drawings the consultant shall prepare and submit to the client a Digital Terrain design model based on the commonly used CAD computer models.

6.0 PHASE II: DETAILED ENGINEERING DESIGN, PREPARATION OF BIDDING DOCUMENTS AND COST ESTIMATES

Depending on the results of the feasibility study and authorization by the Client, the Consultant shall undertake the detailed engineering design of the selected options.

The scope of services for Detailed Engineering Design and Preparation of Bidding Documents shall include the following:

a) Survey and investigations;
b) Detailed Engineering Design,
c) Preparation of Tender Documents,
d) Confidential Cost Estimates.

The Consultant shall carry out the necessary designs to improve the road safety of all road users along the route. These include but not limited to the design of service roads, walkways and bikeways in populated areas and settlement areas for safe segregation of traffic, pedestrians and cyclists. The Consultant shall determine feasible locations for truck lay bay, bus bays, and other facilities for non-motorized traffic along the route,

The Consultant shall also design the full junction between the Mkata - Kwamsisi regional road and Chalinze – Segera Trunk road to ensure adequate road safety for vehicles and non-motorized transport. For this, it is expected that the Consultant will provide concept options for the Client to consider (and select) before proceeding with the design,

For facilities for non-motorized traffic along the route, the consultant shall propose sidewalks (on both sides of the road) along the populated segments of the project road and a bikeway for the entirety of the project length. The locations already identified by the Client for the facilities include the populated segments in Mkata, Pozo and Kwamsisi. The specific location of the facilities in the cross-section should be agreed upon with the Client during the inception stage. The consultant shall assess the urban and semi-urban cross-section design guidelines and propose options for cross-sections for each of these segments to the Client for approval,

With consultation with TANROADS Regional Manager's office, Tanga, the Consultant shall explore the location and design of the bus stand near Mkata and Kwamsisi,

The Consultant shall perform any other necessary task to achieve the objectives of the assignment,

The Design outputs will be subjected to road safety design audits at the discretion of TANROADS. It is expected that these will be discussed at inception stage and draft Final Design Stage,

The Consultant shall design the road to a design life of 20 years including studying the pedestrians and traffic movement at the populated centres, cattle crossing infrastructures, drainage patterns and design of relevant service roads and street lights to safeguard segregation of traffic, pedestrians and cyclists and introduction of truck lay-by areas along the route. The street lights should preferably be the solar-powered type with the TANESCO Power as an alternative option in case of malfunctioning of the solar power, and

The Consultants shall undertake the detailed engineering design and preparation of Tender Documents as follows.

6.1 Design Standards

The following approved standards by the Ministry of Works and Transport shall be adopted and adhered to:

- Geometric design:
  - MOW Road Geometry Design Manual of 2011
  - Code of Practice for Geometric Design (Draft) published

by SATTC -TU, 1998

- Pavement and Materials:
  - MOW Pavement and Materials Design Manual, 1999
  - Interim Guideline for the Design of Hot-MIX Asphalt: - MOWTC 2018
- Specifications:
  - MOW Standard Specifications for Road Works, 2000
- Testing Procedure:
  - MOW Central Materials Laboratory Testing Manual, 2000
- Structures:
  - British Standards BS 5400
- Hydrology and hydraulics:
  - TRRL East African Flood Model / any other internationally recognised model depending on the catchment area
- Traffic Signing and Marking:
  - A Guide to Traffic Signing (MoID, 2009)
- Traffic Management During Construction :
  - Traffic Management at Roadworks, TANROADS 2012
- Safety Auditing Manual:
  - A Guide to Road Safety Audit (MoID, 2009)
  - Road Safety Manuals for Africa: New Roads and Schemes – Road Safety Audit (African Development Bank, 2014)
  - Road Safety Screening and Appraisal Tool (RSSAT)
- Surveying:
  - Land Surveying and Mapping Standards of Tanzania (Land Surveying Regulations CAP 390)
- Economic Evaluation
  - TANROADS Investment Appraisal Manual 2015
  - Baseline Traffic Counts in Tanzania Mainland & Establishment of a Comprehensive Traffic Census Methodology for TANROADS (ICT, 2009)
- NMT road safety:
  - Pedestrian Safety. A Road Safety Manual for Decision-Makers and Practitioners (World Health Organization, 2013)

6.2 Topographic Survey

Topographical survey report shall be stand alone. The topographic surveys undertaken by the Consultant shall be according to the Land Surveying and Mapping Standards of Tanzania, and shall be recorded in standard survey field books/electronic data book, which shall be submitted and become the property of the Client after the assignment**.**

The Consultant shall liaise with the Ministry responsible for lands for the existing National Grid/Datum reference beacons and benchmarks in order to establish the permanent control points. The coordinates of all intersection points shall be in Universal Transverse Mercator (UTM) system and shall be tied to the National Survey Grid, and levels related to the National Benchmarks. The following activities shall be carried out:

- Monumentations of all control points using 12mm steel pins embedded in concrete cast in-situ. The description cards for the control points shall be prepared and

submitted to the Client and detailed in the report to be submitted to the Client for future reference;

- Computation and definition of the geometric characteristics of the centerline of the road;
- Preparation of the setting out data; and
- Computation and definition of the Vertical and Horizontal alignment.

The topographic surveys shall be carried out for the whole project road and shall include: -

c) Control points establishment comprising the primary network of permanent control points at a maximum interval of 2000 m (2km) along the road thereafter to be distributed to a maximum of 300m as secondary points, which should be inter-visible. Additional, control points should be established as necessary,
d) Height of the primary and secondary controls has to be done by Spirit Levelling, and presentation of Final Reduced Levels has to include Computation data Sheets in excel format,
e) Survey of the existing road, junctions, kerbs, drains, culverts, road furniture, utilities, buildings etc within the road reserve or beyond when need arises for preparation of mapping to a scale of 1:2000 and completion of the engineering design as necessary,
f) Detailed surveys at all proposed locations for new drainage structures including at least a length of 50 m downstream and upstream of the structures,
g) Levelling along centreline at 25m intervals for the longitudinal profile,
h) Cross-section levelling at approximately 2m intervals and any local irregularity. Cross-sections are to cover at least 25m on each side of the future centreline, and
i) Marking all properties to be relocated within the Road Reserve.

Computation and definition of the geometric characteristics of the centreline of the road must be carried out, setting out data prepared and the definition of the vertical and horizontal alignment computed and presented in any other format but not excluding X, Y, Z format at every 25m intervals of the road centreline.

The topographic data shall be available and presented on maps with a scale of 1:2000 for the following:

a) Existing road, other roads, footpaths, rivers, creeks, bike path, watercourses, drains;
b) Buildings: - houses of stone, mud, public buildings; including planned relocation
c) Details of utility services such as electricity poles and water mains should also be included;
d) Land use: sports fields, cemeteries, cultivation, forests, etc.;
e) Trees with a diameter exceeding 0.5m and height exceeding 1.50m.
f) Main fences/bench marks and grid lines; and
g) Existing national trigonometric points, and national bench marks, Consultant's primary and secondary trigonometric points and benchmarks with co-ordinates and elevations.

In addition, electronic copies of the topographic data saved in M/S Excel and topographic drawings in DXF or DWG format shall be submitted in CD ROMs and USB flash memory stick compatible with Windows 8/10 and Vista, for future reference and actions.

6.3 Soils and Materials Investigations

The Consultant shall review all existing relevant data and perform investigations to verify suitability and sufficiency of materials for construction of wearing course, base course, sub-base improved sub grade and fill within economic haulage distance. The following shall be undertaken:

6.3.1 Investigation of the soils along the project road to determine the characteristics of existing soil layers. The soil types shall be described and assessed in terms of their suitability for road construction, resistance to erosion and other relevant factors. As a minimum, the Consultant's testing shall include three (3) trial pits per kilometer to verify alignment soil types and collect samples of the sub-grade for laboratory testing. This will be supplemented by DCP sounding to establish the insitu strength profile down to a depth of 800 mm. Special attentions shall be given to identification of sections with problem soils.

6.3.2 Proof drilling and pitting to verify quantity and quality of materials from existing borrow pits and identification of potential supplementary suitable sources as necessary to obtain sufficient quantities within economic haulage distance.

6.3.3 Analysis and testing of alignment soils and potential construction materials shall be carried out to determine their suitability for the works. The Consultant shall perform all necessary tests as stipulated in the PMDM to verify the type and strength of the sub-grade soils. Special attention shall be given to the identification of sections with problem soils.

6.3.4 Potential Gravel sources shall be tested for at least:

e) Grading (Particles size distribution)
f) Atterberg Limits
g) Moisture/density relationship, and
h) CBR (3 points) and swell after 4-days soaking for each typical soil type identified
i) Any other necessary tests as per PMDM.

6.3.5 Potential sources of suitable aggregates shall be tested for at least:

a) Los Angeles Abrasion,
b) Aggregate Crushing Value (ACV),
c) Ten Percent Fine Value (TFV) in dry and soaked condition,
d) Sodium Sulphate Soundness,
e) Bitumen Affinity,
f) Specific Gravity and Water Absorption,
g) Soluble salts Content,
h) AIV (Aggregate Impact Value), and
i) Any other necessary tests as per PMDM and the Interim Guideline for the Design of Hot-MIX Asphalt – MoWTC, 2018.

6.3.6 On weak soils and high embankment areas, the Consultant should do necessary geotechnical design and checking bearing capacity, slope stability (local & global, short & long term), amount and rate of settlement (primary & secondary consolidation, elastic deformation) and embankment stability and the tests to be carried out shall include, but not limited to the following:

i) Particles size distribution,
j) Atterberg Limits,
k) Moisture/density relationship,
l) CBR (3 points) and swell after 4-days soaking for each typical soil type identified,
m) Test pits plus bulk samples for the existing pavement and alignment survey.
n) DCP (Dynamic Cone Penetration) & CBR tests and Falling weight Deflectorneter or Benkiman Beam for the existing pavement, and
o) CHEMICAL PROPERTIES (total dissolved salts, sulphate ex chloride contents; pH value etc) for corrosion & durability assessment of bridge foundations.

6.3.7 The Consultant shall carry out studies of the available potential sources of construction materials for upgrading the project road. The studies shall include the identification of materials in the field as well as testing in the laboratory. Details of tests are similar to those given in the preceding section. For borrow areas for fill materials and where the road is to be re-aligned, investigations shall be conducted to locate areas with materials of the desired quality within economic haulage distances. The fill materials shall meet minimum soaked CBR requirements. The location of trial pits and available quantity of materials as a result of such testing shall be estimated for all potential borrow areas. Representative material samples shall be collected in order to conduct detailed testing on the material using procedures similar to those given in the preceding section.

6.3.8 The Consultant shall carry out investigations for potential sources and conduct necessary tests for sub-base and base materials. Tests for stabilization and blending of materials for sub-base and base courses will also be carried out as deemed necessary.

6.3.9 The Consultant shall identify existing water sources for supplying water for construction works, and assess its quantities and quality. It should be noted that water to be used for the implementation of the project should not be on the expense of local community. Where construction water is not available from existing sources, the Consultant shall explore alternative sources such as Bore holes or shallow ponds and identify associated costs.

6.4 Geotechnical Investigation

The Consultant shall carry out sufficient geo-technical investigations necessary at sites for designing new bridges and major culverts and where major embankments shall be constructed, including sampling, field and laboratory testing to achieve the necessary basis for foundation design, stability analysis, assessment of settlements of embankments etc. Sub-surface ground and water conditions shall be investigated by auguring and/or drilling as necessary on each bridge support (abutment and piers) expected for each proposed bridge, this shall include taking disturbed and un-disturbed samples, including water and rock samples, if encountered.

The geotechnical investigations shall include, as necessary, pitting, hand auguring and/or drilling down to sufficient depth as per the standard practice for geotechnical investigations, including logging, SPT and taking of disturbed and undisturbed samples. The seismic investigation shall also be carried out if considered necessary by the Consultant. Allowable bearing pressures of subsurface stratum shall be determined at proposed foundation levels of structures.

Review of Geo-technical investigations data at the site of bridges, major culverts and the grade-separated intersection at major centres and where high embankments shall be carried out, that include sampling, field and laboratory testing to achieve a necessary basis for foundation design, stability analysis, assessment of settlements of embankments, etc.

Levelling shall be carried out on each exploratory borehole to determine existing ground levels. The permitted bearing values and settlement characteristics of the sub-surface stratum shall be determined.

6.5 People-Centered Design Approach

a) The people-centered design approach places special emphasis on ensuring that district and regional roads are designed, built, and operated with all road users in mind. With this

approach, vulnerable users will not be considered as an afterthought but as a key element of the process. This will be done through a combination of people-centered technical designs, consultations, and road safety audits.

Figure 1. Comparison of People-centered Design Approach versus Conventional Approach in Tanzania

b) The design process for the roads to be improved through the RISE Project will engage, include, and protect the communities that will benefit from the road improvement and maintenance. Therefore, the Consultant shall;
   i) Ensure the design approach will consider the mobility needs of all road users and place special emphasis on avoiding the social and road safety risks that are inherent to roads and that may increase during road construction and operation.
   ii) Be aware that people centered road design will be substantially enriched with complementary, carefully designed citizen engagement activities and people-centered road safety audits. This will be accomplished through two people-centered rounds of consultations targeted at addressing the needs and concerns of all road users and two people centered road safety audits. The approach will result in sensitive treatments of all segments of the roads including special interventions in populated areas with bikeways and sidewalks/walkways, traffic-calmed areas with speed management actions (especially near schools and clinics), street lighting as needed, signaling, cattle crossing management, public transport stands and bays (catering to all public transport modes such as buses, three-wheelers, and moto-taxis), community road and path access, and space for freight needs for loading and off-loading, and other needs.
   iii) The Consultant will participate in first and second round of community consultation which will be led and executed by ESIA & RAP Consultant. First round of community consultation will introduce the proposed project to the public and gather their opinions and concerns and inform the consultant. The Consultant will provide technical support to ESIA & RAP Consultant who shall prepare a report on design issues and concerns regarding sub-project and submit to the Client for approval. More details on community consultation can be referred in People Centered Design (PCD) Manual. After submission of Preliminary design report to the Client, the Client in cooperation with the ESIA and Design Consultants shall conduct a second round of community consultation that will provide feedback to the community on how their concerns and opinions have been addressed into the design
   iv) Refer to People Centered Design Manual (PCDM) and People Centred Road Safety Audit Manual (PCRSM) for more details and Consultant's role in conducting First and Second round of community consultations.

6.6 Horizontal and Vertical Alignment

The horizontal alignment for the project road shall be determined by points at intervals of 25m along the centreline; tangent points and such other critical points as may be required.

All primary and secondary points shall be in the UTM system and shall be coordinated to the National Grid System. Wherever possible, the primary and secondary points shall be tied to at least three permanent features using distances or a combination of distances and angles. The Consultant shall submit a summary of description cards for the primary and secondary control points, consisting of photographs, their respective coordinates, and sketches of the control points indicating their location in relation to the closest permanent features.

The vertical alignment shall be designed to take into account the hydraulic and soil conditions and the needs to raise the embankment to avoid flooding. A minimum ditch depth as per the design standard should therefore be observed at all time.

6.7 Geometric Design and Volume Computations

Based on the topographic surveying and the designed pavements, the Consultant shall design the horizontal and vertical alignments as necessary to comply with the approved design standards appropriate to the traffic and engineering characteristics of the road. The design must comply with all minimum requirements for various facilities such as minimum ditch depth etc. to cater for road safety issues and project climate change resilience. The design engineer shall assess the recommendations regarding the climate change adaptation and incorporate the proposed interventions in the design as necessary. The Consultant shall use the designed alignments to perform volume computations for earthworks and pavement layers.

The Consultant shall identify an appropriate place for at least one police check point with separate parking lanes including a toilet facility and police hut.

The Consultant shall identify all possible accident black spots and include in the design, measures to improve them. Improved layout and visibility at junctions, proper separation of pedestrians and cyclists from the vehicular traffic and the provision of pedestrian crossings, bus bays and parking areas shall be included in the design. Other measures to be considered include provision of wide shoulders in towns/villages and climbing lanes on steep grades.

The Consultant shall identify the appropriate places to install fixed weighbridge in order to control vehicle overloading. Also, the Consultant shall look for the possible places for Heavy Trucks/Buses parking along the route.

For facilities for non-motorized traffic along the route, the consultant will propose sidewalks along with the populated segments of the project road and a bikeway for the entirety of the project length. The specific location of the facilities and the corresponding options for cross-sections should be discussed and agreed upon with the Client during the inception stage. The consultant shall assess the urban and semi-urban cross-section design guidelines and propose options for cross-sections for each of these segments to the Client for approval.

6.8 Earthworks and Pavement Design

The Consultant shall carry out pavement design based on sub-grade soils characteristic and materials tests and other engineering treatments dictated by available natural materials, climate and design traffic loading for the design period, which is the same as that for economic analysis. The pavement shall be designed to carry traffic over a 20-year design period of the proposed project road and in accordance with the Pavement and Materials Design Manual, 1999 and provisions for further future expansions. The recommended pavement structure with respect to the type and thickness of structural layers as well as the type and thickness of surfacing will be derived from specifications shown in relevant tables of the PMDM and Interim Guideline for the Design of Hot-MIX Asphalt: - (MOWTC, 2018). At the discretion of the Client, the Consultant may be required to use the *"South African Pavement Engineering Manual (SAPEM)"*(2014) or other manuals to

compliment Ministry of Works' Pavement and Materials Design Manual, (1999) to enhance the technical solution and its sustainability.

The Consultant shall take into consideration the current climatic changes including global warming and recommend appropriate measures to cater for such situation, particularly on binder selection. The Consultant shall design the road taking into account concepts of resiliency to climate change and consideration for cost-efficiency of the infrastructure solution throughout the life-cycle of the project. The Consultant should consider different levels of intervention to climate-proof road project which include but not limited to engineering or structural adjustments (such as adjusting drainage and drainage structures), planning and ecosystem-based approaches (such as improved natural flood management or re-alignment) or a combination of different types of activities as an ideal measure for a comprehensive climate-proofing adaptation strategy. If applicable, the Consultant shall advise on the scoping and prioritization of the interventions in case the level of interventions may be considered to extend beyond the project period.

Access roads joining the project road shall be designed in according with the requirements specified in the MOW Road Geometry Design Manual of 2011.

The design should also consider proper locations of animal (cattle) crossings and provide appropriate facilities. Shoulders should be provided on both sides according to the requirements of the Road Geometric Design Manual – 2011.

6.9 Design of Drainage Structures

The Consultant shall provide new drainage structures based on the hydrological study, load-carrying capacity, climate change resilience and structural stability. The Consultant shall recommend appropriate remedial measures to the existing structures to improve structural stability, load-carrying capacity, reduce the effects of climate change. and meet the design standards.

The Consultant shall check the structural condition of the existing drainage structures including the inlet and outlet of the structures and carry out the design of their remedial/repair works. The Consultant shall also carry out hydrological analysis for all new drainage structures and existing ones that are hydraulically and structurally unsound and in need of replacement. All existing drainage structures which don't meet the design standards shall be replaced.

The Consultant shall review the climate change assumptions made with regard to hydrology parameters climate and adjust as necessary in the light of any additional information.

The catchment areas, rainfall, run-off duration/intensity relationships, catchments run-off characteristics and channel slopes/discharge characteristics for each catchment shall be determined based on available topographic maps and field investigations as necessary. The appropriate return flood period and corresponding water levels will be established and the adequacy of existing waterways should be checked. An appropriate flood design model like the East African flood design model should be used. All hydraulic designs shall be based on parameters suitably modified for climate change.

All existing data and the results of the field investigations for soils, foundations, hydrology, etc shall be assessed and used as a basis for the design of drainage structures. Detailed hydraulic computation and structural designs shall be carried out and fully documented in the reports. All drainage structures shall be designed according to BS 5400 using HA Loading and 37.5 units of HB Loading.

All pipe culverts should preferably be of reinforced concrete. The minimum size of cross pipe culverts shall be 900 mm diameter, while those for access roads shall be a minimum of 600 mm diameter. The Consultant shall make sure sufficient drainage structure lengths are provided and invert levels are properly designed and determined based on the vertical profile along the drainage channel line up to the right of way as a minimum.

The Consultant shall investigate scour depth around the abutment, pier and other drainage structures. The Consultant shall also design the hydraulic opening of drainage structures to accommodate maximum flow anticipated with a provision for adequate free board.

6.10 Design Traffic and Safety

Road improvement is expected to lead to an increase in vehicular speed and, if not addressed properly, may negatively impact by increasing road traffic-related fatalities. Roads can become safer for all users if these are designed to effectively serve pedestrians, public transport users, bicyclists and other road users[1]. Thus, It is expected that the Consultant will proactively propose options that will improve road safety beyond the standards mentioned above. The Consultant is therefore expected to also consider other more current alternative internationally recognized standards (e.g. *"Road Safety Manuals for Africa: New Roads and Schemes – Road Safety Audit (African Development Bank, 2014) to compliment Safety Audit Manual (MOID, 2009) on road safety assessments"*) to compliment the above-mentioned standards should there be any inadequacy that may benefit from a more recent perspective on how to handle road safety (e.g. safe systems approaches, etc). Thus, when relevant, the Consultant shall prepare a design exception report and seek in writing the Client's approval of the same applications of standards should be agreed upon with the Client.

For the populated areas and the design of the bikeway, the Consultant will discuss the options for the most suitable guideline/manual with the Client during the inception stage. The guideline and approach to be used will be at the Client's discretion. For pedestrian safety, the consultant will follow the recommendations of the "Pedestrian *Safety: A Road Safety Manual for Decision-Makers and Practitioners (World Health Organization, 2013)",* and, within it, paying special attention to the guidance on i) recommendations to reduce pedestrian exposure to vehicular traffic (section 4.2.1) including sidewalks/footpaths, marked crossings; ii) recommendations for reducing vehicular speeds (section 4.2.2) (especially applicable to the populated segments), and iii) recommendations on improving the visibility of pedestrians (section 4.2.3).

A detailed traffic engineering design shall be carried out to specify the necessary traffic control features. This design shall include detailed traffic analysis including where appropriate, design traffic forecasts for major intersections. Based on the traffic analysis, the Consultant shall conduct intersection capacity and related traffic studies to determine the location of signs, guardrails, rumble strips, pavement markings, and facilities for pedestrians and non-motorized traffic throughout the populated areas, central barriers, headlight deflectors, street lighting and other control features, all to fully comply with the current design standards and guidelines (but not limited to the standards if it is justifiable from the road safety perspective).

Special treatment on road safety, health and safety for road crossing at pedestrians, school children and any other public place existing nearby the road will be considered.

A detailed scheme for the management of the traffic flow shall be developed to ensure that vehicle and pedestrian movement is properly handled during the construction period. This plan shall include details of the location and design of by-pass lanes; temporary structures, barriers, signs, signals and other physical features necessary to accommodate traffic flow during construction. In addition to the design plan, the Consultant shall prepare a traffic operations plan detailing the construction sequencing, public information announcements, use of traffic control devices and other activities designed to minimize traffic disruption. The Consultant shall adhere to the provisions in the Guideline for Traffic Management during Construction Project assumptions for traffic, geometric design and economic evaluation should be done in the context of the additional expected increase

[1]*The fatality risk for pedestrians with vehicles traveling at 50km/hr is more than twice as high as the risk at40 km/hr and more than five times higher than the risk at 30 km/hr. At the current condition of the roads, it was observed that vehicles were travelling at speeds of 50km/hr or higher, which means once the roads are improved/upgraded the vehicles will operate at even higher speeds and this will make the roads unsafe to the community. Therefore, the projects will include traffic calming measures at all populated areas with a special emphasis in areas adjacent to educational and health facilities.*

in mechanized and non-motorized transport derived from RISE and other programs supporting infrastructure development.

The Consultant should be aware that an independent road safety audit will be conducted on the preliminary and final designs for the roads and the recommendations on roads safety interventions will be incorporated in the detailed designs.

6.11 Environmental and Social Impact Assessment

The Detailed Environmental and Social Impact Assessment (ESIA) is not part of the scope of this assignment. However, the road works are likely to affect the life of the community staying along the project road, the Consultant shall include in the Bill of Quantities pay items for Environmental and Social mitigation measures, HIV/AIDS awareness and prevention based on the outcome of the ESIA report being undertaken by another consultant.

6.12 Presentation of Detailed Engineering Design

The Consultant shall make a presentation about draft designs in the commencement meeting of People-centered Road Safety Audit (PCRSA) and at the second round of community consultations, where the community will provide feedback on the draft designs at the draft design-stage. Later the Consultant shall refer to the PCRSA recommendations, incorporate them into the draft detailed design and provide a response matrix (whether recommendations have been considered, what actions have been taken, how they are reflected in the draft detailed design drawings). The consultant shall refer to the PCD Manual for further information and guidance.

6.12.1 Engineering Drawings

The Consultant shall prepare the following engineering drawings for the project using the format and title sheets as required by TANROADS, with the originals becoming the property of the Client.

(i) Topographic Plans, scale 1:2000

(ii) Plans and Profile, scale 1:1000/1:100

Showing natural ground levels, horizontal and vertical curve details, running chainage, cross-section chainages, side drains location, description and references to all drainage works, location of bench marks, location of road furniture, any other relevant information in the format approved by the Client.

(iii) Typical Cross-Sections, scale 1:50

Showing all details of road cross-section in cuts and fills, side drains, pavement thickness, camber and super-elevation and pavement widening. The cross-sections shall also show natural ground level and super-imposed road prism and structural drawings details as required.

(iv) Typical Cross-sections of Junction layouts, scale 1:50;

The drawings shall include details of junction layouts along the project road where appropriate. Based on the nature of the road and traffic analysis, the Consultant shall determine the appropriate location of junctions including the signs, signals, pavement markings and other control features. The access roads shall be designed to the end of the road reserve.

(v) Cross Sections, scale 1:100

Showing natural ground level and superimposed road prism at 25m intervals.

(vi) Bridges, scale 1:100 and 1:50/20 for more detailed elements

Showing all the details for the construction of a bridge superstructure and sub structure as well as any protection works

(vii) Culvert details, scale 1:50

Showing details of all types of culverts, their inlets and outlets and any necessary protection works.

(viii) Soil plans

Showing the location of borrow and quarry sites and characteristics of soils for various sections of the route using the appropriate scale.

(ix) Traffic Management Plans

Showing details of the location of by-pass lanes, temporary structures, barriers, signs, signals and other physical features necessary to accommodate traffic flow during construction.

(x) Auxiliary Works

Showing all auxiliary works using the appropriate scales.

6.13 Construction Quantities

The calculated quantities for the items of construction shall be based on the final design drawings. The earthwork quantities shall be derived from calculations based on the field cross-sections along the road centreline and in accordance with acceptable methods of measurements that shall be agreed with the Client. A detailed bill of quantities shall be prepared under the following sections: preliminary and general; clearing and earthworks; drainage; culverts and protection works; sub-grade; sub-base; and base; surfacing; bridges including major structures; road furniture; ancillary works (including road reserve markers); schedule of day works, etc. as described in the MoW Standard Specifications for Road works, 2000.

6.14 Cost Estimates

The Consultant shall estimate likely ruling bill rates applicable to the proposed time of construction, showing how these are derived. To make a fair and reasonable estimate of the cost of the project, the Consultant shall prepare a unit price analysis of each item using basic cost elements (labour, materials, equipment, tools, overheads, on-site costs, profit, etc.) and showing separately the cost of all taxes (direct or indirect, duties, levies and fees). The estimated financial cost resulting from this analysis shall be accurate to within $\pm$10%.

The cost estimates shall also include the costs for implementation of ESMP and HIV/AIDS alleviation program as determined and recommended from ESIA and RAP Consultants. The Consultant shall give cost estimates entirely in Tanzania currency.

The Consultant shall give cost estimates broken down by main works' items into foreign and local currency components as follows: -

(i) For foreign currency:

a) Imported equipment, materials and supplies;
b) Identifiable foreign components of domestic manufactured equipment, materials and supplies;
c) Salaries of expatriate personnel, and
d) Profit and overheads of foreign firms where appropriate.

(ii) For local currency:

a) Right of way acquisition;
b) Local materials, supplies, and services;

c) Salaries and wages of local employees both skilled and unskilled.

In addition, the Consultant shall present separately the taxes and duties element of the cost estimates.

6.15 Construction Schedule

In order to assist in evaluating the required construction period and forward budget needs, the Consultant shall carry out a network analysis of the project using suitable deterministic or probabilistic theory or a combination of both shows, inter alia: -

a) Major activities and their duration
b) A “network” showing the proposed ordering or sequencing of the major activities.
c) Duration of the entire project in the form of a bar chart
d) The monthly cost of each activity
e) Anticipated monthly expenditure presented in form of an S-curve.

In carrying out the analysis of the construction schedule, due account shall be taken of the climatic conditions of the areas concerned.

6.16 Preparation of Bidding Documents

The Consultant shall prepare complete Tender documents using the most recent Standard Procurement Documents in accordance with the World Bank “Procurement Regulations for IPF Borrowers”, Procurement in Investment Project Financing Goods, Works, Non-Consulting and Consulting Services, July 2016 and revised in November 2017, or whichever World standard procurement approach is applicable at the time the tender documents are prepared. The tender documents need to fully reflect the Environmental, Social, Health and Safety requirements, which include but are not limited to Occupational Health and Safety, Road Safety, Labour Influx, HIV/AIDS, Gender-based Violence and Violence against Children.

Based on the approved detailed design the Consultant shall prepare complete Bidding Documents comprising of Parts 1, 2, and 3, which includes all the sections specified below, and which should be read in conjunction with any Addenda issued in accordance with ITB 8.

PART 1 Bidding Procedures

Section I - Instructions to Bidders (ITB)

Section II - Bid Data Sheet (BDS)

Section III - Evaluation and Qualification Criteria

Section IV - Bidding Forms

Section V - Eligible Countries

Section VI - Fraud and Corruption

PART 2 Works’ Requirements

Section VII - Works’ Requirements

PART 3 Conditions of Contract and Contract Forms

Section VIII - General Conditions (GC)

Section IX - Particular Conditions (PC)

Section X - Contract Forms

N.B: The notice of Request for Bids (RfB) issued by the Employer to the pre-qualified

Bidders is not part of the Bidding Document.

The Consultant shall be responsible for the design details within these Terms of Reference (ToR). The methodologies used in the design of pavement, earthworks, drainage structures, shall give preference to the use of available local construction materials. At all times a balance must be maintained between capital and maintenance costs.

7.0 PHASE III: SUPERVISION OF CONSTRUCTION WORKS

The Consultant shall be fully responsible for the supervision of the construction with respect to contract administration and management duties throughout the duration of the assignment to secure smooth and timely implementation, proper supervision and control of the Project. For this purpose, the Consultant shall establish clear lines of responsibility and procedures for each activity in the construction process The Consultants shall, in general, exercise the powers of the Engineer in all matters concerning the contract and the execution of the works in accordance with the FIDIC Conditions of Contract '**Red Book**". He shall supervise the construction works with due diligence and efficiency and in accordance with sound technical, administrative, financial and economic practices.

He shall perform all duties associated with such tasks to ensure that only the best construction practices are followed and that the final product is in all respects equal to, or better than that specified, at the most economic costs and is carried out in full compliance with the governing specifications.

In particular, the Consultant's duties and responsibilities shall include but not be limited to:

(a) Inspect and approve Contractor's camp sites location in areas which minimize disruption to local population, fauna and flora, water courses, provide adequate drainage facilities, treatment of sewage and waste disposals. Furthermore inspect contractor's camp site from time-to-time to verify whether occupational health and safety standards are being followed. Information relating to this shall be furnished in every monthly progress report. The camp areas should be dismantled and rehabilitated once the construction project is completed;

(b) Check and establish that the contractor adequately mobilises key staff, on-site construction personnel teams and supplies to the contract all plant, equipment and machinery that have been committed in the tender and ensure that all such items of the plant, equipment and machinery are calibrated, as required and remain on the construction site until their release has been authorized;

(c) Receive, analyze and approve the Contractor's Work program prior to the commencement of construction activities. The Consultant shall provide appropriate and timely inputs to the program where required to ensure that construction works are implemented using effective, and realistic plans and schedules.

(d) Conduct regular management site meetings, deal with matters raised in accordance with the early warning procedures indicated in the Works contract and review plans for the remaining work. Minutes of these meetings will be included in the monthly progress reports,

(e) Receive and review the contents and amounts of all relevant Insurance Certificates submitted by Contractor as required by the Works Contract and advise the Client accordingly,

(f) Receive and verify the Registration Cards of key equipment and plants mobilized on site by Contractor for execution of Works before submitting the same to the Client,

(g) Review contract documents for the works including designs, drawings, bills of quantities (BoQ), technical specifications, etc. so that deficiencies (if any) are identified in time and adjustments are made before construction work starts. At all times take necessary measures and provide appropriate advice to TANROADS to enable the construction contract to be completed in a timely and cost-effective manner, in conformity with the contract conditions and specifications.

(h) Satisfy himself thoroughly as to the nature and scope of the works, of all information available and of documents and materials to be used by the contractor in executing the works as to enable him to perform his duties satisfactorily, study and check all documents associated with the project, foresee possible problems and advise TANROADS appropriately during the construction and maintenance period.

(i) Review and approve the Contractor's drawings and methodology for identifying and marking of all utilities falling within the right of way. In addition and in liaison with competent authorities and TANROADS, review and approve the Contractor's methodology and cost for removal of utilities affected by the works and ensure that the relocation works is done in accordance with contract requirements.

(j) Liaise with the respective Regional Authority to ensure that the assessment and compensation of crops and buildings including temporary structures and fences, if any, within the right of way is done before the Contractor is given possession of site;

(k) Identify and locate all beacons and benchmarks, confirm their compatibility with the designs, cause Contractor to re-establish the missing ones where needed in accordance with the works requirements and agreed specifications and hand over to the Contractor before commencement of the works to enable the Contractor set out and construct the works;

(l) Inspect, test and approve all materials and completed works to ensure compliance with technical specification requirements.

(m) Assign the necessary field staff to perform such field operations as required and be responsible for all administrative work related to project supervision requirements, including proper conduct, attendance and performance of duties of its staff, and ensure that they properly record all equipment, materials, etc. supplied under the contracts;

(n) Establish supervision survey teams, review design levels, profiles etc. and carry out initial markings to be able to assess correctly the extent of construction works to be undertaken by the Contractors, supervise and modify as necessary and ensure they are progressively attained to completion as required;

(o) Establish works inspection teams to undertake on-site supervision of construction works that will be able to check/assess correctly the quality, quantities and extent of construction works to be undertaken by the Contractors and ensure that they are progressively achieved up to the completion of the works as per the requirements of the contract.

(p) Review and approve all road safety measures, including road detours/deviations, safety controls and signs, training, and monitoring; and should undertake inspections on adequacy of road safety measures and make recommendations for changes or improvements as needed,

(q) Undertake Construction-stage (during roadworks) Road Safety Audits (RSAs) at least four (4) times during the construction period. These RSAs shall be conducted randomly, however, mainly during major roadworks. The RSAs must place special emphasis on safety of vulnerable road-users (e.g., pedestrians, cyclists, etc.) through roadwork sites. The consultant shall notify the Client in advance of conducting the RSAs so that the Client can nominate staff to attend the same. The RSA report shall be prepared by the Consultant and shared with the Client within 10 working days of the completion of the RSA. The consultant shall organize a meeting with the Client and the Contractor to discuss the findings and recommendations of the RSA.

(r) Keep updated all records including reports, works diaries, correspondence, instructions given to contractor(s), test records, measurement and quantity calculations, payment records and all other relevant documents about the works operations and supervision contracts.

(s) Prepare consolidated monthly reports on physical and financial status, site meetings, contractual matters, ESHS Compliance, etc., with recommendations for action by TANROADS. The reports shall be submitted in hard and soft copies;

(i) Review and approve Management Strategies and Implementation Plans (MSIP) to manage the (ESHS) risks and monitor their implementation. The MSIP shall include but not limited to:

a) Traffic Management Plan to ensure safety of local communities from construction traffic;
b) Water Resource Protection Plan to prevent contamination of drinking water and manage the extent of usage by the Contractor for construction purposes. The plan should also outline the process for effluent and water discharge quality monitoring;
c) Chance find procedure that outlines the actions to be taken if previously unknown cultural heritage is encountered;
d) Waste Management Plan to provide guides for reducing, handling, and disposing of waste during construction or land-clearing;
e) Material source, borrow pit and quarry management plan;
f) Boundary Marking and Protection Strategy for mobilization and construction to prevent offsite adverse impacts;
g) Strategy for obtaining Consents/Permits prior to the start of relevant works such as opening a quarry or borrow pit;
h) Gender based violence, sexual exploitation and abuse, and sexual harassment (GBV/SEA/SH) prevention and response action plan;
i) Grievance Redress Mechanism;
j) Health and Safety Management Plan, to ensure health and safety of workers; including use of protective clothing; HIV/AIDS and COVID-19 awareness and prevention, including sensitization and counselling; drug and substance abuse, and avoidance of child labour and child abuse.

(t) Management of Labour Influx and use of local labour, including employer compliance with national laws in relation to terms and conditions of employment, occupational health and safety, and prohibition of forced labor/ labor trafficking and avoidance of child labor, in particular worst forms of child labor. In the context of management of labor influx, establish and operate a worker grievance redress mechanism for project workers in line with the project LMP and ESS2.

(u) Direct and monitor the implementation of traffic safety and HIV/AIDS, STI and TB awareness Sensitization campaigns & programs campaigns by providing health education to the work force and the local population and provide preventive condoms. For this aspect of the supervision services, the Consultant should include a qualified Public Health Expert/Sociologist as part of the supervision team;

(v) Perform routine and periodic comparison between the works' schedules and the actual progress of works, and cause the Contractor to review the program whenever the previous program is inconsistent with the actual works on site or with the Contractor's obligations,

(w) Prepare control charts of the main activities and a project master schedule, indicating both past performance and forecasts for completion including time involved in each case.

(x) Measure quantities of works satisfactorily carried out and certify monthly interim payment certificates, final accounts and final payment certificates for consideration by TANROADS and assist the Client in the taking over of the completed works at the final inspection and prepare a completion report on the works contracts. Monthly certificates to be submitted to the Employer for payment shall include the total cost of the works executed in foreign and local currency (net of taxes and duties).

(y) Record, examine and evaluate all claims submitted by the Contractor and submit timely recommendations thereof for consideration by TANROADS. The Consultant's claims report to the Client is expected to include at least the following information:

(a) Description of the claim,

(b) Source and reason of the claim,

(c) Consultant's opinion on the legitimacy and the scope of the claim,

(d) Consultant's conclusions and recommendations on the claim.

(z) Review requests from Contractors or any situations that may lead into variations in BoQ work items or issuance of instructions to omit, add or increase in quantities of work items in the contract BoQ, adding/omitting a sub-project originally in the contract, a section of road, a facility, etc. and their implication(s) in terms of time for execution, resources, environmental and social impacts, occupational health and safety, quality of work, usability/effectiveness of the completed facility/ sub-project, related costs and the overall contract price; advise the Client accordingly and seek approvals of Client prior to any issuance of the variation orders;

(aa) Determine the unit rates for new items of Works in the contract and submit to TANROADS for approval;

(bb) Once the roadworks for the entire road corridor is on the verge of completion or completed, the consultant, in close collaboration with the Client, shall undertake a pre-opening stage Road Safety Audit (RSA) to identify any road features or deficiencies which may lead to hazardous situation. An RSA report shall be prepared by the consultant and shared with the Client within 5 working days of the completion of the RSA. The consultant shall organize a meeting with the Client and the Contractor to discuss the findings and recommendations of the RSA.

(cc) When the implementation of the civil works contract reaches a value of 80% of the initial construction contract, the consultant shall prepare and submit a detailed progress report with the updated cost of the civil works contract, implementation schedules and substantiate any request related to additional funding, if such is needed to full completion of the project. At this stage, the Consultant shall also prepare the draft Project Completion Report (PCR) in the format to be agreed by the Employer.

(dd) Undertake 7 days classified traffic count once every year during the Construction period

(ee) Prepare and submit to TANROADS the final cost of executed works.

(ff) Prepare a final construction report and as-built drawings.

(gg) The Consultant may, with prior consultation with TANROADS, effect changes that will improve design or specification for the works. Such changes shall not increase

the contract time nor shall the increase in contract sum resulting from such changes exceed a percentage to be agreed with TANROADS.

(hh) The Consultant shall prepare a Supervision Manual which will lay out procedures to be followed during the execution of the works. The Manual will also serve as a basis for on-the-job training of TANROADS staff and any visiting students during the implementation of the works contract.

(ii) Maintain a site diary daily with the contents and format to be agreed with TANROADS.

(jj) The Consultant shall organize and undertake on-the-job training for qualified counterpart engineers. The Engineers will be seconded to the Consultant by TANROADS during the execution of the works contract. The training will include apart from others, all aspects of supervision of road work contracts, contract works scheduling, quality control of completed works, setting out and measurement, including preparation of as-built drawings and final report.

(kk) Ensure that the contractor organizes HIV/AIDS awareness campaigns by providing health education to the workforce and the local population and provides condoms. For this aspect of the supervision services, the Consultant should include a qualified Environmentalist/Social Expert as part of the supervision team.

(ll) Supervise the Contractor's contractual obligation on HIV/AIDS prevention;

(mm) In the event of adjudication or arbitration, provide the necessary personnel and expertise to advise and assist the Employer in any such process and prepare any further analysis of the contractor's claims submissions as may be necessary to assist the Employer in the presentation of his case.

(nn) Carry out inspections, prepare a Defects list and draft the "Taking over Certificate" before the commencement of "Defects Nofication Period" and supervise the Works as per **Item 6** below.

(oo) At the latest within one month following final inspection of the completed works, agree with the contractor the final measurements of the works, and prepare the final payment certificate for submission to the Employer.

(pp) The Consultant shall provide any other additional services if so requested by the Client, at rates and under conditions to be mutually agreed which fall within general ambit of these terms of reference.

(qq) The Consultant shall ensure that the Contractor's ((Environmental, Social, and Health and Safety - ESHS) ESHS performance is in accordance with TANROADS Environmental, Social, and Health and Safety (ESHS) Code of Conduct (accessible through **https://www.tanroads.go.tz/policies**), Contractor's ESHS obligations and good international industry practice. The ESHS related services include but are not limited to: -

a) Review and approve the Contractor's Environment and Social Management Plan (C-ESMP) prior to any construction works, including all updates and revisions (within a reasonable time and prior to any significant works that would be covered by the proposed material changes) in consultation with the Environmental, HS or Social specialists of TANROADS;

b) Monitor the implementation of the Contractor's ESHS requirements, including impact mitigation and monitoring measures, during the construction of the works,

c) Review and approve ESHS provisions of method statements, implementation plans, GBV/SEA prevention and response action plan, drawings, proposals, schedules and all relevant Contractor's documents;

d) Review and consider the potential ESHS risks and impacts of any proposed design change proposals and advise if there are implications for compliance with ESIA, C-ESMP, consent/permits and other relevant project requirements;

e) Undertake audits, supervisions and/or inspections of any sites where the Contractor is undertaking activities related to the Works, to verify the Contractor's compliance with ESHS requirements including its Gender Based Violence (GBV)/ Sexual Exploitation and Abuse (SEA) obligations, with and without contractor and/or client relevant representatives, as necessary, but for GBV related issues not less than once per month,

f) review the Contractor's EHS workers training and related materials and activities related to workers whom predominate language is Swahili,

g) Develop and maintain ESHS checklists and supervision reports related to audits and inspections related to Contractor's ESHS compliance and performance,

h) Routinely review and undertake audits and inspections of Contractor's worker EHS training records, accident logs, community liaison records, EHS inspection and monitoring findings and other ESHS related documentation, as necessary, to confirm the Contractor's compliance with ESHS requirements;

i) Promptly report any identified non-compliance issues to Construction Contractor and TANROADS and work with these entities to define acceptable remedial action/s and their timeframe for implementation in the event of a noncompliance with the Contractor's ESHS obligations remedial action/s and their timeframe for implementation in the event of a noncompliance with the Contractor's ESHS obligations;

j) In the case of any significant or material ESHS incident (such as death or seriously accident, significant spill, pandemics like COVID 19 etc.), report within one day of knowledge of such event to TANROADS and work to define acceptable remedial actions to investigate, remediate and prevent such events in the future (see Section 10 for related reporting),

k) In relation to all significant material and service providers to the Contractor (such as sites/provides of road base and fill materials, construction waste disposal services and sites), undertake site visit and assessment of such material and service providers in terms of potential significant ESHS issues

l) Ensure appropriate representation at relevant meetings including site meetings, and progress meetings to discuss and agree appropriate actions to ensure compliance with ESHS obligations;

m) Review and critique, in a timely manner, the Contractor's ESHS documentation (including regular reports and incident reports) regarding the accuracy and efficacy of the documentation;

n) Undertake liaison, from time to time and as necessary, with project stakeholders to identify and discuss any actual or potential ESHS issues

o) On behalf of TANROADS, establish and maintain a grievance redress mechanism with support of the Contractor, including types of grievances to be

recorded and how to protect confidentiality e.g. of those reporting allegations of GBV/SEA. Also, on behalf of TANROADS, ensure and maintain a worker grievance redressal mechanism in line with the project Labor Management Procedures (LMP) and ESS2.

p) Ensure any GBV/SEA instances and complaints that come to the attention of the Consultant are registered in the grievance redress mechanism,

q) Prepare and submit to TANROADS, as part of monthly progress report, issues on ESHS project construction compliance and performance (see Section 10 for details),

r) Upon completion of project construction or closure of any specific work area or camp site, perform an inspection of such site/area to ensure Contractor's compliance with ESHS requirements and whether there are any existing unmitigated ESHS impacts, and if issues are identified then promptly notify the Contractor and TANROADS and work with such entities to define acceptable remedial actions to resolve all issues.

s) ES reporting; the Consultant shall:
   (a) Immediately notify the Client of any failure by the Contractor to comply with its SEA and SH obligations;
   (b) Immediately notify the Client of any allegation, incident or accident, which has or is likely to have a significant adverse effect on the environment, the affected communities, the public, Client's Personnel, Contractor's Personnel or Experts. In case of SEA and/or SH, while maintaining confidentiality as appropriate, the type of allegation (sexual exploitation, sexual abuse or sexual harassment), gender and age of the person who experienced the alleged incident should be included in the information. The Consultant shall provide full details of such incidents or accidents to the Client within the timeframe agreed with the Client.
   (c) Immediately inform and share with the Client notifications on ES incidents or accidents provided to the Consultant by the Contractor, and as required of the Contractor as part of the Progress Reporting;
   (d) Share with the Client in a timely manner the Contractor's ES metrics, as required of the Contractor as part of the Progress Reports.

8.0 DEFECTS NOTIFICATION PERIOD

The Consultant shall supervise maintenance of the works (including the administrative aspects of the works) during the Defects Notification period. For the purposes of fulfilling Consultant's obligations during the Defects Notification Period, the Road Safety Engineer is expected to undertake post construction Road safety Audit while the Resident Engineer is expected to carry out inspection of the works and subsequently prepare and issue the final certificate. During this period the Consultant shall be expected to draw the attention of the Contractor to any defects as soon as such defects are noticed and shall supervise the subsequent remedial works. As the Defects Notification Period for the Contract is 12 months, a total of three (3) inspections will be carried out at 4 months time interval during the 12-month period (each inspection visit shall be extended for a maximum period of seven (7) calendar-days consecutively) after substantial completion of the works and any deficiencies noted along the road and its remedial measures be proposed to the Contractor. Depending on the nature of deficiency, repair work will be carried out under the Consultant's supervision. The Consultant will be required to submit the inspection report to the Client every four months interval. At the end of the 12 month notification period, the Consultant will do inspection and confirm that the Contractor has completed Works ready for joint inspection and handover. A final inspection will be carried out under the supervision of the Resident Engineer who will prepare and sign the Inspection Report and distribute to the Contractor, TANROADS HQ and Regional Manager Tanga Region for joint verification.

9.0 TRAINING OF COUNTERPART STAFF

The Client may assign two (2) counterpart staff relevant to the assignment (One Engineer and One Economist) during the execution of the services (Phase I & II) to work with the Consultant in all aspects of the study as a way of knowledge transfer. The counterpart staff shall be involved in the field as well as at the Consultant's home office. The Client will bear the cost of living and accommodation for the two (2) counterpart staff.

During construction, two engineers will be seconded to the Consultant by the Client for knowledge transfer . The Consultant shall provide training to the seconded staff. The training will include, among others, all aspects of supervision of road works contracts; construction works scheduling, quality control of works, setting out and measurement, including preparation of as-built drawings and final report.

10.0 CONSULTANT'S PERSONNEL

The Consultant shall provide the following key professional staff to fulfil the objectives of the services and for which he will receive remuneration as specified in the contract document.

10.1 Key Staff

The Professional staff to be provided by the Consultant is estimated at **235 person- months** covered by the services of: Project Manager/Team Leader, Transport Economist, Geotechnical Engineer, Hydrologist, Resident Engineer, Pavement/Materials Engineer, Highway Engineer, Topographical Surveyor, Bridge/Structural Engineer, Environmentalist, Sociologist, Health and Safety Officer and Road Safety Engineer. The Consultant shall provide the above-mentioned key professional staff with academic and professional qualifications and experience to recognize and to deliver good international industry practice with respect to study, design and supervision of Civil Works, Environment, Social Sexual Exploitation and Abuse (SEA) and Gender-Based Violence (GBV) requirements in order to fulfill the objectives of the Services and for which he/she will receive remuneration as specified in the Contract Document.

The Consultant shall employ only such key staff whose CVs have been approved by the Client. In addition to the key staff, the Consultant shall determine the support staff to assist with the execution of the assignment.-

The Consultant must provide in the proposal, CVs and copies of the highest education certificates for all professional and technical staff including the duration in person-months during which the staff will be deployed under the Contract.

The Key Professional Staff input and Support staff input to be provided by the Consultant is estimated at 235 and 150 person-months respectively. The desirable inputs are provided as follows: -

Stage	**Estimated Staff months for Feasibility study, Detailed Engineering Design and Supervision of Works for Upgrading of Mkata – Kwamsisi Road (38 km) to Bitumen Standard**		
1	**During feasibility Study (Phase I)**	**Staff Month**	
	Position	**Key Staff Months**	**Non-key Staff Months**
1	Project Manager/Team Leader	5	
2	Highway Engineer	3.5	
3	Transport Economist	2.5	
4	Soils/Materials Engineer	4	

5	Bridge/ Structural Engineer	3	
6	Geotechnical Engineer	2	
7	Topographical Surveyor	4	
8	Hydrologist	2.5	
9	Road Safety Engineer	1.0	
10	Environmentalist	1.0	
11	Sociologist	1.0	
12	Health and Safety Officer	1.0	
13	Projector Cordinator		2
14	CAD Expert		2
15	Assistant Land Surveyor		3.5
16	Quantity Surveyor		2
17	Traffic Expert		2
18	Materials Technicians		3
19	Valuer		1.5
	Sub-Total 1	**30.50**	**16.00**
2	**During Detalied Engineering Design (Phase II)**		
	Position	**Key Staff Months**	**Non-key Staff Months**
1	Project Manager/Team Leader	5.0	
2	Highway Engineer	3.5	
3	Transport Economist	0.5	
4	Soils/Materials Engineer	4.0	
5	Bridge/ Structural Engineer	1.0	
6	Geotechnical Engineer	2.0	
7	Topographical Surveyor	4.0	
8	Hydrologist	1.5	
9	Road Safety Engineer	1.0	
10	Environmentalist	1.0	
11	Sociologist	1.0	
12	Health and Safety Officer	1.0	
13	Projector Cordinator		1.0
14	CAD Expert		2.0
15	Assistant Land Surveyor		3.0
16	Quantity Surveyor		2.0
17	Traffic Expert		2.0
18	Materials Technicians		4.0
19	Valuer		2.0
	Sub-Total 2	**25.50**	**16.00**
3	**During the Construction Supervision (Phase III)**		
	Position	**Key Staff**	**Non-key Staff**

		Months	Months
1	Resident Engineer	24	
2	Highway Engineer	22	
3	Soils/Materials Engineer	22	
4	Bridge/Structural Engineer	13	
5	Topographical Surveyor	24	
6	Environmentalist	12	
7	Sociologist	12	
8	Health and Safety Officer	24	
9	Road Safety Engineer	24	
10	Road Inspector Road Works		24
11	Road Inspector Drainage and Structures		20
12	Assistant Land Surveyor		24
13	Materials Technician		24
14	Secretary		24
	Sub-Total 3	**177**	**116**
3	**During Defects Notification Period**		
	Position		
1	Resident Engineer	1	
2	Road Safety Engineer	1	
3	Road Inspector		1
4	Materials Technician		1
	Sub-Total 3	**2**	**2**
	TOTAL	**235**	**150**

10.2 Back up Staff

Project Director – The Project Director shall provide overall direction of the project, coordinate Economic Evaluation, Detailed Engineering Design, guide and support the site staff and liaise with the Client for the duration of the project. He shall be based at the Consultant's head office and shall co-ordinate any specialist services that may be required for the assignment.

10.3 Staff Qualifications and Requirements:-

In order to execute his obligations, the Consultant shall provide qualified key staff for the assignment, and shall prepare a work programme, and a corresponding manning schedule, showing the timing of activities and the corresponding staff input required for the execution of the services. In addition to the expert personnel, the Consultant shall determine the support staff to assist with the execution of the services.

The Consultant must provide in the proposal CVs and copies of highest education certificates for all professional and technical staff including the duration in man-months during which the staff will be deployed under the Contract. All CVs should be signed and currently dated by the nominees and Authorized Representative as per the forms provided in the RFP.

a) Key Staff during Feasibility and Detailed Engineering Design and Preparation of Tender Documents

The professional staff to be provided by the Consultant is estimated at **56** staff months covered by the services of Project Manager/Team Leader, Highway Engineer, Transport Economist; Soils/Materials Engineer, Bridge/Structural Engineer, Geotechnical Engineer, Topographical Surveyor, Hydrologist, Environmentalist, Sociologist, Road Safety Engineer and Health & Safety Officer..

The services are anticipated to be completed within 6 months for Phase 1 and 2 from the Contract Commencement Date. The duties/responsibilities and qualifications of the key staff are as indicated below: -

(i) Project Manager/Team Leader (K-1)

The Project Manager/Team Leader shall be responsible for the proper conduct of the entire study and shall be the principal contact person between the Consultant's team and the Client.

The Project Manager/Team Leader must be a registered Civil Engineer with a degree in Civil Engineering. Postgraduate qualification in Highway Engineering is an added advantage.

He/She must have at least fifteen (15) years of cumulative experience related to road studies and designs. He/She must have served in a similar capacity on at least three (3) projects of similar magnitude and complexity in the past 10 years, She/he must have at least 3 years working experience in developing countries and must be proficient in written and spoken English.

(ii) Highway Engineer (K-2)

During Phase I & II of the Assignment, the Highway Engineer shall be responsible for the design of the geometrical aspects of the road and shall assist the Team Leader in the design of road pavement.

She/he must be a registered Civil Engineer with a degree in Civil Engineering or Highway Engineering. A postgraduate qualification in Highway Engineering is an added advantage.

She/he must have a minimum of ten (10) years of specific experience related to road/bridge design and construction. She/he must have served in a similar capacity on at least two (2) Road Design Projects involving construction of bituminous roads of similar magnitude and complexity in the last 10 years, In addition, he/she must have a working experience of at least 3 years in developing countries and shall be proficient in written and spoken English.

(iii) Transport Economist (K-3)

The Transport Economist shall conduct the economic analysis for the entire project. He/She shall be responsible for the conduct of the economic evaluation of the project when final construction costs are known from the detailed engineering design to re-confirm the economic justification of the project.

He/she shall have a minimum of first degree in economics or equivalent. A postgraduate qualification in transport economics is an added advantage. He/She must have at least 12 years of working experience in carrying out socio-economic analysis of public investment projects. He/She must have served on similar position in at least 2 projects of road investment studies of similar nature and magnitude within the last 10 years. He/She must have at least 3 years working experience in Developing Countries. He/She must have proven knowledge and experience in use of HDM-4 model. Fluency in both written and spoken English is essential.

(iv) Soils/Materials Engineer (K-4)

During Phase I & II of the Assignment, the Soils/Materials Engineer shall be responsible for conducting and supervising the investigation of the material to achieve optimal design and construction strategy. The Soils/Materials Engineer shall carry out the pavement design and should be conversant with current practice in testing and pavement construction techniques.

He/She must be a registered Civil Engineer with a degree in Civil Engineering or Pavement or Materials Engineering. A postgraduate qualification in geotechnical or Pavement or Materials Engineering is an added advantage.

He/She must have a minimum of twenty (20) years of specific experience in Pavement/Materials matters related to road works. He/She must have served in similar capacity on at least three (3) road projects of similar magnitude and complexity in the past 10 years. In addition, he/she must have a working experience of at least 3 years in in developing countries and must be proficient in written and spoken English.

(v) Bridge/ Structural Engineer (K-5)

During Phase I & II of the Assignment, the Bridge/Structural Engineer shall be responsible for the assessment of existing bridges and the design of new bridges and other structures along the project road.

He/She must be a registered Civil Engineer with a degree in Civil, Bridge or Structural Engineering. Postgraduate qualification in Bridge or Structural Engineering is an added advantage.

She/he must have a minimum of ten (10) years of specific experience in bridge/structural design and construction. He/She must have served as a Bridge/Structural Engineer on at least two (2) bridge projects of similar magnitude and complexity involving designs and construction of road bridges within the last 10 years. In addition, he/she must have a working experience of at least 3 years in years in developing countries and shall be proficient in written and spoken English.

(vi) Geotechnical Engineer (K-6)

The Geotechnical Engineer shall be responsible for conducting and overseeing the geotechnical investigation to achieve optimal design and construction strategy. The Geotechnical Engineer shall carry out foundation design and should be conversant with current practices in geotechnical investigations and modern pilling construction techniques.

He/she must be a registered Engineer with a degree in Geotechnical or Civil Engineering. A postgraduate qualification in Geotechnical Engineering is an added advantage.

He/she must have a minimum of twenty (20) years of cumulative experience in geotechnical investigations and foundation designs. He/she must have served as a Geotechnical Engineer on at least two (2) Bridge projects with deep pile foundations of similar magnitude and complexity in the last ten (10) years. In addition, he/she must have a working experience of at least 3 years in in developing countries and shall be proficient in written and spoken English.

(vii) Topographical Surveyor (K-7)

The Topographical Surveyor shall be responsible for conducting and supervising the survey team. He/she will be responsible for the planning of the fieldwork, select known survey reference points, and determine the precise location of important features in the survey area. He/she shall be responsible for searching legal records, look for evidence of previous

references survey points (geodetic reference points and national benchmarks) and analyze the data to determine the location of boundary lines and record the results of the survey, verify the accuracy of data, and prepare plans, maps, and reports. The surveyor shall mark all properties to be affected by the proposed road to facilitate valuation for compensation.

The Topographical Surveyor shall be a registered Land Surveyor with a respective Professional Body, holding a minimum of Advanced Diploma in Land Surveying. Postgraduate qualification in surveying is an added advantage.

He/She must have at least ten (10) years of cumulative experience related to Land surveying activities in road design and construction. He/She must have served as a Topographical Surveyor on at least two (2) road projects of similar magnitude and complexity within the last 10 years. In addition, he/she must have a working experience of at least 3 years in in developing countries and shall be proficient in written and spoken English.

(viii) Hydrologist (K-8)

The Hydrologist shall be responsible for estimating and assessing the relationship between rainfall, runoff and soils and rock features of the catchments along the project area with a focus on surface water, including rivers and dams. He /she shall study and update the available hydrological data by computer models or any other means in order to maintain and develop successful floodwater management strategies. He /she shall provide advice and information to the Bridge/ Structural Engineer on hydraulic characteristics of the catchments along the project area.

He/She must have a degree in Applied Science or Civil Engineering. Post-graduate qualification in Hydrology/Hydraulics Engineering is an added advantage.

He/She must have at least ten (10) years of working experience related to water/flood management schemes. The ability to use appropriate flood design models is essential. He/She should have served as a Hydrologist on at least two (2) roads projects of similar magnitude and complexity within the last 10 years. In addition, he/she must have a working experience of at least 3 years in in developing countries and shall be proficient in written and spoken English.

(ix) Environmentalist (K-9)

During Phase I & II of the Assignment, the Environmentalist shall be responsible for carrying out an environmental impact assessment of the project and prepare Environmental Management Plan in order to minimize any negative impacts that the road rehabilitation will have on the environment.

She/he must be a registered Environmental Expert with a degree in Environmental Management Studies. A Post graduate qualification in Environmental and Social Management is an added advantage.

She/he must have sound knowledge of environmental issues, initiatives and implementation of mitigation measures related to civil engineering infrastructure projects. She/he must have served as an Environmental Specialist/Expert on at least two (2) projects of similar magnitude and complexity within the last ten (10) years.

She/he must have a working experience of at least three (3) years in developing countries and shall be proficient in written and spoken English.

(x) Sociologist (K-10)

During Phase I & II of the Assignment, the Sociologist shall be responsible for conducting the social impact assessment in the corridor of impact and prepare mitigating plans in order

to minimize any negative impacts that the road construction will have on the people along project area. Furthermore the sociologist will be responsible for identification of potential locations along the project area and propose measures to prevent vendors from the common practice of encroaching the roads reserves.

The Sociologist shall be a holder of a degree in social science or related disciplines. Post graduate qualifications in Social science are an added advantage. He/She must have done a SIA on at least two (2) road development projects within the last 10 years. In addition, He/She must have at least 3 years working experience in Developing Countries. Fluency in both written and spoken English and Swahili are mandatory.

(xi) Road Safety Engineer (K-11)

The Road Safety Engineer shall be responsible for the proper adherence of road safety aspects in the entire road design assignment. He shall be responsible for oversight of road safety data collection, analysis, road safety audit and recommendation and implementation of road safety improvement measures.

Should have experience in both mechanized and non-motorized transport that should be involved in the geometric design and should participate in the consultations undertaken by the ESIA to gather input on this particular topic.

The Road Safety Engineer must be a registered Civil Engineer with a degree in Civil Engineering. Postgraduate qualifications in Transport Engineering will be an added advantage.

He/She must have at least 15 years of cumulative experience in the road transportation sector. He/She must have served in a similar capacity on at least five (5) road safety improvements assignments in the past 10 years and at least (3) assignments for road safety in urban areas addressing pedestrian and biking mobility. Experience with road safety audits would be desirable. In addition, he/she must have a working experience of at least 3 years in sub-Sahara Africa. Fluency in written and spoken English is mandatory.

(xii) Health and Safety Officer (K-12)

She/he shall be responsible for ensuring compliance of all EHS plans in order to help avoid, minimize, mitigate and remediate if necessary any negative related to EHS impacts and risks in design.

She/he must be a registered with recognized OSHA for practicing the Health and Safety Mitigation measures in work place and must be a holder of Degree or Advanced Diploma in Health Science, Social work or Community Development. A Post graduate qualification in Health and Safety related disciplines is an added advantage.

She/he must possess at least ten (10) years of cumulative experiences in monitoring of Health and Safety issues in work place, initiatives and implementation of mitigation measures related to roads/airports infrastructure projects.

She/he must have served as Health and Safety Officer on at least two (2) projects of similar magnitude and complexity within the last ten (10) years. She/he must have at least 3 years working experience in developing countries and must be proficient in written and spoken English.

b) Staff Requirement during Construction Supervision

The professional staff to be provided by the Consultant is estimated at **177** person-months covered by the services of Resident Engineer, Soils /Materials Engineer, Highway Engineer,

Topographical Surveyor, Bridge/Structural Engineer, Environmentalist, Sociologist, Health & Safety Officer and Road Safety Engineer.

The Construction Supervision shall be carried out by the following key professional staff:

(i) Resident Engineer (K-13)

The Resident Engineer shall head the site staff and shall be responsible for all technical and administrative aspects on site.

She/he must be a registered Civil Engineer or Chartered Engineer with a degree in Civil or Highway Engineering. Postgraduate qualification in Civil or Highway Engineering is an added advantage.

She/he must have a minimum of fifteen (15) years of specific experience related to road/bridge design and construction supervision. An Experience in contract administration under FIDIC Conditions of Contract "Red Book"is mandatory. She/he must have served as a Resident Engineer or in an equivalent capacity on at least three (3) bituminous road construction projects of similar magnitude and complexity in the last 10 years.

In addition, he/she must have a working experience of at least 3 years in developing countries and shall be proficient in written and spoken English.

(ii) Highway Engineer (K-2)

The Highway Engineer's duties and responsibilities shall comprise road surveys, construction of pavement structures, measuring of quantities and management of site operations.

She/he must be a registered Civil Engineer with a degree in Civil Engineering or Highway Engineering. A postgraduate qualification in Highway Engineering is an added advantage.

She/he must have a minimum of ten (10) years of specific experience related to road/bridge design and construction. She/he must have served in a similar capacity on at least two (2) of similar magnitude and complexity in the last 10 years.

In addition, he/she must have a working experience of at least 3 years in developing countries and shall be proficient in written and spoken English.

(iii) Soils/Materials Engineer (K-4)

The Soils/Materials Engineer shall be responsible for ensuring the quality of all materials to be incorporated in the works, as well as the completed works, conform to the contract specifications.

She/he must be a registered Civil Engineer with a degree in Civil Engineering or Soils/Materials Engineering. Postgraduate qualification in Soils or Materials Engineering is an added advantage.

She/he must have a minimum of ten (10) years of specific experience in Soils/Materials matters related to road works. She/he must have served in similar capacity in at least two (2) road projects of similar magnitude and complexity in the last 10 years.

In addition, he/she must have a working experience of at least 3 years in in developing countries and must be proficient in written and spoken English.

(iv) Bridge/Structural Engineer (K-5)

The Bridge/Structural Engineer shall be responsible for ensuring the bridges and other drainage structures are constructed according to design and conform to the contract specifications.

She/he must be a registered Civil Engineer with a degree in Civil Engineering or Bridge Engineering or Structural Engineering. Postgraduate qualification in Bridge/Structural Engineering is an added advantage.

She/he must have a minimum of ten (10) years of specific experience in bridge/structural design and construction. He/She must have served as a Bridge/Structural Engineer on at least two (2) projects of similar magnitude and complexity involving design and construction of bridges within the last 10 years.

In addition, he/she must have a working experience of at least 3 years in years in developing countries and shall be proficient in written and spoken English.

(v) Topographical Surveyor (K-7)

The Topographical Surveyor shall be responsible for conducting and supervising the survey team. He/she shall be responsible for planning the fieldwork, selecting known survey reference points, and determining the precise location of important features in the survey area. He/she shall be responsible for searching legal records, looking for evidence of previous references' survey points (geodetic reference points and national benchmarks) and analysing the data to determine the location of boundary lines and record the results of the survey, verifying the accuracy of data, and preparing plans, maps, and reports. The surveyor shall mark all properties to be affected by the proposed road to facilitate valuation for compensation.

The Topographical Surveyor shall be a registered Land Surveyor with a respective Professional Body, holding a minimum of Advanced Diploma in Land Surveying. Postgraduate qualification in surveying is an added advantage.

She/he must have at least ten (10) years of cumulative experience related to Land surveying activities in road design and construction. She/he must have served as a Topographical Surveyor on at least two (2) projects of similar magnitude and complexity within the last 10 years.

In addition, he/she must have a working experience of at least 3 years in in developing countries and shall be proficient in written and spoken English.

(vi) Environmentalist (K-9)

The Environmentalist, Health and Safety Specialist shall be responsible for the monitoring of day to day implementation of the MSIP, Contractor ESMP, and environmental health and safety (EHS) issues under the project and ensure compliance by the Contractor with all EHS Plans in order to help avoid, minimize, mitigate and remediate if necessary any negative EHS impacts and risks from the project.

She/he must be a registered Environmental Expert with a degree in Environmental Management Studies. A Post graduate qualification in Environmental and Social Management is an added advantage.

She/he must have sound knowledge of environmental issues, initiatives and implementation of mitigation measures related to civil engineering infrastructure projects. She/he must have served as an Environmental Specialist/Expert on at least two (2) projects of similar magnitude and complexity within the last ten (10) years.

She/he must have a working experience of at least three (3) years in developing countries and shall be proficient in written and spoken English.

(vii) Sociologist (K-10)

She/he shall be responsible for supervision of implementation of the project as per environmental and social laws, regulations, policies and guidelines; monitoring of the Social issues in the project in order to minimize any negative impacts from the project on the people in the project area, in particular women, persons with disabilities and other members of vulnerable groups; and monitor implementation of the Resettlement Action Plans (RAP) to address the resettlement impacts during project implementation, as well as monitor the implementation of the Stakeholder Engagement Plan (SEP), LMP, GBV/SEA/SH Action Plan, and other ESF instruments for the project.

The Sociologist must be a holder of Degree in Sociology, Social Work, or Community Development. A Post graduate qualification in related disciplines, including law, is an added advantage.

She/he must have at least ten (10) years of cumulative experience in undertaking social impact assessment and management of Health and Safety issues in accordance with the requirements of Occupational Health and Safety Authority (OSHA) or international recognized institution.

She/he must have served as Social Specialist/Expert on at least three (3) projects of similar magnitude and complexity. She/he should have knowledge of GBV, SEA, stakeholder engagement, and labor management, including labor influx issues in relation to linear infrastructure projects.

She/he must have a working experience of at least three (3) years in developing countries and shall be proficient in written and spoken English.

(viii) Road Safety Engineer (K-11)

The Road Safety Engineer shall be responsible for monitoring of day to day implementation of Road Safety issues under the Project and ensure compliance by the Contractor with all Road Safety issues and plan. He/she shall be responsible for conducting Road Safety Audit for the Project during construction and post construction stages and prepare reports.

She/he must be a registered Civil Engineer with a degree in Civil Engineering or Road Safety Engineering. Postgraduate qualification in Road Safety Engineering is an added advantage.

She/he must have a minimum of twelve (12) years of experience in Road Safety Audits/design and construction.

She/he must have served as a Road Safety Engineer in at least two (2) road projects of similar magnitude and complexity in the last 10 years.

In addition, he/she must have a working experience of at least 3 years in years in developing countries and shall be proficient in written and spoken English.

(ix) Health and Safety Officer (K-12)

She/he shall be responsible for monitoring of day to day implementation of the environmental health and safety (EHS) issues under the project and ensure compliance by the Contractor with all EHS Plans in order to help avoid, minimize, mitigate and remediate if necessary any negative impacts related to EHS impacts and risks around the project.

She/he must be a registered with OSHA for practicing the Health and Safety Mitigation measures in work place and must be a holder of Degree or Advanced Diploma in Health Science, Social work or Community Development. A Post graduate qualification in Health and Safety related disciplines is an added advantage.

She/he must possess at least ten (10) years of cumulative experiences in monitoring of Health and Safety issues in work place, initiatives and implementation of mitigation measures related to roads/airports infrastructure projects.

She/he must have served as Health and Safety Officer on at least two (2) projects of similar magnitude and complexity within the last ten (10) years. She/he must have at least 3 years working experience in developing countries and must be proficient in written and spoken English.

10.4 Support Staff

Project Director

The Project Director shall guide and support the site supervision staff for the duration of the project. He shall be based at the Consultant's head office and shall co-ordinate any specialist services that may be required from the Consultant.

In addition to the key personnel designated above, the Consultant shall determine the support and backup staff deemed necessary to assist with on-site supervision of the upgrading works. These shall include:

a) Quantity Surveyor – (1No.),

b) Traffic Expert – (1No.),

c) Road Inspector - Road Works – (1No.),

d) Road Inspector – Drainage and Structures – (1No.),

e) Materials Technician - (1No),

f) Assistant Surveyor (1No),

g) Secretary – (1No),

h) CAD Expert (1 No.), and

i) Office attendants and housekeepers who shall be provided under the works contract.

Note:

CVs for Support Staff will not be evaluated.

10.5 Staff Requirement during the Defects Notification Period

The Consultant shall assemble a Team led by the Resident Engineer to conduct the inspection during the Defects Notification Period as described in paragraph 6 above.

10.6 The Consultant's Staff The Consultant's staff shall:

(a) Be available to move to the Works site upon the Commencement of the Contract; and

(b) Accord officials from TANROADS and the Ministry of Works and Transport the opportunity to inspect the works and the related documentation.

11.0 TIMING

The Assignment will be executed in three Phases mentioned above in Section 4.2 of TOR.

11.1 The services for **Phase I** will commence 1 week after the effective date of the contract and is estimated to be completed within five (5) months. The following time frame/schedule (in Weeks) shall be adhered to in carrying out the Feasibility Sudy. As such the various deliverables shall be submitted not later than the dates shown below:

Phase I: Feasibility Study Including Preliminary Engineering Design, Economic Evaluation, Preliminary ESIA and Preparation of Draft Tender Documents

Signing/Effective Date of Contract	-	W
Commencement of services	-	W + 1
Inception Report	-	W + 4
Comments on Inception Report by the Client	-	W + 6
Draft Feasibility Study including Preliminary Engineering Design Report, Economic Evaluation Report, Preliminary Environmental and Social Impact Assessment Report and Tender Documents, and Preliminary cost estimates	-	W + 12
Comments on Draft Feasibility Study report by Client	-	W + 16
Final Feasibility Study	-	W + 20

11.2 The services for **Phase II** will commence 1 week after the Conclusion of the Feasibility Study or after the Client has issued order to proceed with Phase II of the Assignment and is estimated to be completed within five (5) months. The following time frame/schedule (in Weeks) shall be adhered to in carrying out the Detailed engineering Design, Preparation of Tender Document and Engineer's Estimates. As such the various deliverables shall be submitted not later than the dates shown below:

Phase II: Detailed Engineering Design

Order to Proceed with Phase II	-	W
Commencement of Phase II	-	W + 1
Draft Engineering Design Report including Tender Documents, and cost estimates		W + 12
Comments on Draft Design report by Client	-	W + 16
Final Design Report, Tender Documents and cost estimates	-	W + 20

11.3 The services for **Phase III** ishall commence after signing the Works Contract and are estimated to be completed within twenty four (24) months plus 12 months of Defects Notification Period.

12.0 REPORTING

The required reports shall be submitted in the specified number of copies to TANROADS Headquarters and one (1) copy will be sent direct to the TANROADS Regional Manager's Office – Tanga Region both in hard copies (i.e. full color prints and perfect binding type) together with softcopy through Electronics Documents Management System (EDMS) and MS Word/Excel saved in USB Flash; the design drawings shall be in DXF or DWG formats. All reports and documents

relevant to the services, including maps, field survey notes, computer programs, shall become the property of Client.

The Consultant shall prepare, and submit all reports in English and present them on A4 sized paper. All reports shall be submitted initially as draft versions, which shall be finalized to accommodate Clients' comments. Survey data for both draft and final reports shall be submitted in a format compatible with the current operating window system.

The Consultant shall make all necessary coordination and arrangements to ensure that the Final Design is coordinated with the work being advanced by the Consultant for the Detailed Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) since the three documents ought to be coordinated with each other. This coordination must be reflected in the work plan and in the inception report. The Consultant shall also include in its work plan the production of the information needs that will be required for the consultations and the preparation of the ESIA and RAP and the participation in the consultations. The Client will arrange for the Draft Design Report and ESIA (and as needed the RAP inputs), to be presented concurrently to the Client and agreed recommendations to be incorporated in the final detailed design. The Consultant shall also present the documentation in PowerPoint to the Client and provide recommendations for the coordination of the three studies. World Bank may be invited to participate in the discussions.

The Consultant shall arrange to present the Reports from Phase I and II to the panel of TANROADS experts. The presentations shall be made at least 5 days after submission of the Draft final reports in hard and soft copies of the reports. The presentations shall preferably be in PowerPoint. Also, the Consultant should be available during the review assignment.

12.1 Reporting During Phase I: Feasibility Study Including Preliminary Engineering Design, Economic Evaluation, Preliminary ESIA and Preparation of Draft Tender Documents

a) Inception report (6 Copies)

This report shall briefly describe the mobilization and establishment status of the Consultant, the specific staffing plan, the updated work plan the Consultant proposes to follow in carrying out the assignment, based on the Consultants initial findings, details of any constraints or inputs required from the employer and such remarks as are deemed appropriate including the works done so far. This report shall be submitted not later than 4 Weeks from the date of commencement of the services for Phase I.

b) Draft Feasibility Study and Preliminary Design Report (6 Copies)

The Draft Feasibility Study including Preliminary Engineering Design Report, Economic Evaluation Report, Preliminary ESIA Report, Draft Tender Documents, and Preliminary cost estimates Report shall summarize all the work performed, the findings and recommendations of the Consultant. The consultant shall submit 6 copies of the report within **twelve (12)** Weeks after the commencement of the study. The report shall include maps, plans and diagrams. The consultant shall also submit separately the following reports in hard and soft copy compatible with MS Word Software:

(i) Executive Summary;

(ii) Economic Study Report;

(iii) Preliminary Environmental Impact Assessment (EIA) and Mitigation plan (EMP Report);

(iv) Preliminary Social Impact Assessment (SIA) and Mitigation Plan (SMP) including the Preliminary Resettlement Action Plan (RAP) Framework document;

(v) Preliminary design report including Topographical survey Report, Materials/Soil Investigations report, Books of Drawings, etc; and

(vi) The Object Files from HDM-4 Work Space for verification.

The Consultant's Feasibility Study Report for the road shall include plans and profiles typical cross-sections, soils and materials report and traffic data as well as drainage structure drawings for the proposed construction, at following scales:

1: 5,000/500 horizontal/vertical alignments
1: 250 cross-sections
1: 250 bridge/culverts

The intervals for levels in the profile should not be more than 100 meters. In addition to the hard copies of the drawing the Consultant shall prepare and submit to the Client soft copies of design drawings together with the Digital Terrain Model (DTM) in DXF or DWG format.

In addition to the above, the Consultant shall submit to the Client the soft copy for the following files from HDM-4 workspace for further verification:-

i) Vehicles.dbf
ii) Improves.dbf
iii) Annual works.dbf
iv) HDM-4 rundata.dbf
v) Objects.data

The Consultant shall arrange to present Draft Feasibility Study Report to a panel of TANROADS experts. The presentations shall be at least 5 days after submission of the hard and soft copies of the reports. The presentations shall preferably be in PowerPoint.

c) Final Feasibility Study and Preliminary Design Report (6 Copies)

The Final report shall be submitted in 6 copies within 4 weeks of receipt of the Clients' comments on the Draft Final Feasibility Study Report complete with plans incorporating all the revisions deemed appropriate by the Consultant after receipt of comments on the Draft Final Report of the study from the Client. The models and/or calculations used in the economic analysis shall also be made available in a compact disc compatible with MS Windows software. The consultant shall also prepare an executive summary, highlighting most important findings from the studies, conclusions and recommendations.

d) Record of Documents

After delivery of all Final documentation, the originals of the documents are to be deposited with TANROADS head quarters in Compact Disc compatible with software used and agreed with the Client at inception, such as Microsoft Word for word processing, Microsoft Excel for spreadsheet, Microsoft project for project management, AutoCAD etc.

12.2 Reporting During Phase II: Detailed Design, Preparation of Tender Documents and Engineer's Estimates

The following reports shall be submitted by the Consultant:

a) Draft Detailed Engineering Design, Draft Tender Documents and Draft Cost Estimates Reports (4 Copies)

The Draft Detailed Engineering Design Report shall summarize the findings, analysis, results and recommendations of the detailed engineering design, and shall consist of road plans and profile drawings, typical cross-sections drawings, drainage plans, design of drainage and other structures, traffic data, topographic data, setting out data, bills of quantities, bidding documents, the estimate of construction costs (and

its price analysis including all supporting material). The draft final design report shall comprise all the assumptions and criteria used in the analysis and design of the work together with all details and standards used. All design calculations for pavements and structures shall be enclosed in form of annexes. The draft final design report shall be submitted within sixteen (12) weeks from the date of commencement of the services for Phase II together with the following reports:

i) Draft Materials Report (4 copies)

The report shall summarize all geotechnical findings and adoption of those findings to design quantities, and qualities of materials to be available with the corresponding excavation depth, test results and any other related information in respect of materials quarries.

ii) Draft Hydrological - Hydraulic Report (4 copies)

The report shall summarize hydrological and hydraulic analysis/calculations together with the assumptions and criteria used for the design of drainage structures, waterway openings, major watercourses, etc.

iii) Draft Engineering Drawings (4 copies)

The engineering drawings shall be prepared to A3 size. The drawings shall include cross-sections drawn at 25m intervals, layout plans showing contours and other details, Typical Sections, Typical Drawings Details and Specific Details of all structures, together with a Culvert Schedule, Bridge Schedule and a Schedule of Drawings. All drawings should clearly show: - Designed by, approved by, with the name and signature of the responsible engineer and the date displayed.

iv) Draft Survey Report (4 copies)

The Survey report shall be submitted together with other reports.

v) Draft Geotechnical Investigation Report (6 copies)

The Consultant shall prepare and submit Draft Geotechnical Investigation Report as required of the ToR.

vi) Draft Confidential cost estimate (4 copies)

The confidential cost estimate for works and services shall be in the form of completed Bills of quantities. The estimate shall be submitted together with other reports.

Viii) Draft Bidding Documents (4 copies)

The Consultant shall prepare and submit Draft Bidding Documents as required in the ToR.

The Consultant shall arrange to present the Draft Draft Detailed Design Report to a panel of TANROADS experts. The presentations shall be at least 5 days after submission of the hard copies of the reports. The presentations shall preferably be in PowerPoint.

b) Final Detailed Engineering Design Report, Tender Documents and Engineer's Cost Estimate (5 copies)

The reports shall be submitted not later than four (4) Weeks from the date of approval by the Client of Draft Final Design Report and Draft Final Tender/Contract Documents. This report shall incorporate all revisions deemed necessary arising from comments received from the Client. The Consultant shall submit electronic copies of all the reports, including the Bidding Documents in Microsoft Office format. The submission will include the following copies:

- Final Detailed Engineering Design Report [5 copies],
- Bidding Documents [5 copies],
- Engineering Drawings [5 copies];
- Confidential cost estimate [5 copies],
- Hydrological - Hydraulic Report [5 copies]
- Materials Report [5 copies],
- Geotechnical Investigation Report [5 copies],
- Topographical Report [5 copies],

c) Record of Documents

After delivery of all final documentation, the originals of the documents are to be deposited with TANROADS headquarters in Compact Disc compatible with the software used and agreed by the Client, such as Microsoft word for word processing, Microsoft Excel for spreadsheet, Microsoft project for project management, AutoCAD etc.

10.1 Reporting During Phase 2: Construction Supervision

10.1.1 ESHS Reports

a) The Consultant shall provide immediate notification to the Client should any incident in the following categories occur while carrying out the Services. Full details of such incidents shall be provided to the Client within three (3) calendar days.

(i) Immediately notify the Client of any failure by the Contractor to comply with its SEA and SH obligations;

(ii) Immediately notify the Client of any allegation, incident or accident, which has or is likely to have a significant adverse effect on the environment, the affected communities, the public, Client's Personnel, Contractor's Personnel or Experts. In case of SEA and/or SH, while maintaining confidentiality as appropriate, the type of allegation (sexual exploitation, sexual abuse or sexual harassment), gender and age of the person who experienced the alleged incident should be included in the information. The Consultant shall provide full details of such incidents or accidents to the Client within the timeframe agreed with the Client.

(iii) confirmed or likely violation of any law or international agreement;

(iv) any fatality or serious (lost time) injury;

(v) significant adverse effects or damage to private property (e.g., vehicle accident); or

(vi) any allegation of Gender-Based Violence (GBV), Sexual Exploitation or Abuse (SEA), sexual harassment or sexual misbehaviour, rape, sexual assault, child abuse or defilement, or other violations involving children.

b) Ensure that contractor immediate notifications on ESHS aspects are shared with the Client immediately;

c) Immediately inform and share with the Client any immediate notification related to ESHS incidents provided to the Consultant by the Contractor, and as required of the Contractor as part of the Progress Reporting; and

d) Share with the Client in a timely manner the Contractor's ESHS performance and metrics, as required of the Contractor as part of the Monthly Progress Reports.

10.1.2 Other Reports

(a) Inception Report

The Consultant shall prepare an Inception Report four (4) weeks after the commencement of the Supervision Services. This report shall include results of the review of the contractor's work program, any modifications thereto, the status of the consultant and contractor's mobilization and any other matter requiring the Employer's action. ESHS Contractor requirements or other ESHS plans or documents and any other matter requiring the Client's action. This report shall be prepared and be submitted to TANROADS HQ ten (10) copies, three (3) copies to the World Bank, and one (1) copy to the TANROADS Regional Manager - Tanga. The Client shall review and provide comments on the Inception Report within a period of ten (10) working days for the purpose of enabling the Consultant to proceed smoothly with the next step of undertaking the assignment.

(b) Progress Reports

The Consultant shall prepare progress reports every month for the duration of the contract. These are to be submitted in 12 copies and should reach TANROADS not later than 15 days after the end of the month being reported on. The distribution of the reports will be as follows: seven (7) copies to TANROADS HQ, two (2) copies to the World Bank, one (1) copy to the TANROADS Regional Manager - Tanga. The consultant shall also assist TANROADS in the preparation of quarterly reports for transmission to the Bank, following the format instructed by TANROADS.

The format and the content of the monthly progress reports shall be as agreed with TANROADS. They will include but not limited to the following:

(i) summary progress of the works, both physical and financial;
(ii) mention of any changes on the original envisaged technical solutions;
(iii) major changes of quantities compared to contractual Bill of quantities;
(iv) Record of working units (number of equipment and labour) used for the various types of works and the total number of working hours of every item of equipment, plants and labour category.
(v) Suggestions for resolving any technical and other problems which occur and those affecting the progress of the works. A separate section will be given to cover issues, problems and solutions.
(vi) the financial status of both works and consultancy contracts;
(vii) progress charts including percentages of completion of individual main work items and overall project;
(viii) weather information and charts,
(ix) Construction and supervision data.
(x) Summary progress of the works, both physical and financial status;
(xi) Record of working units (number of equipment and labour) used for the various types of works and total number of working hours of every item of equipment and labour category;
(xii) Details of claims if any, made by the respective Contractor.

(xiii) Contractor's ESHS performance, any non-compliance issues and relevant remedial actions taken or being taken.

(c) Road safety Audit Report

The Consultant shall undertake a total of four (4) Road Safety Audits spread equally over the duration of the construction phase of the Project. Another Road Safety Audit shall be undertaken 6 months after Substantial completion of the Project. The Consultant shall prepare Report each time he would undertake Road safety Audit. These are to be submitted and should reach TANROADS not later than 15 days after the end of each Road safety Audit. One copy will be sent to TANROADS Regional Managers Offices in Tanga. four copies to TANROADS HQ.

(d) Detailed Progress Report

When the implementation of the civil works contract reaches a value of 80% of the initial construction contract, the consultant shall prepare and submit a detailed progress report with the updated cost of the civil works contract, implementation schedules and substantiate any request related to additional funding, if such is needed to full completion of the project. Five (5) copies of the report shall be sent to TANROADS HQ, one (1) copy to the respective TANROADS Regional Manager and three (3) copies will be sent to the World Bank. At this stage, the Consultant shall also prepare the Project Completion Report (PCR) within three weeks after the value of 80% of the initial construction Contract completed, to be submitted in ten (10) copies to the Employer.

10.2 Reporting after Construction Period (Final Report)

(a) Project Completion Report Final Report

The Final Project completion report in five (5) copies to TANROADS Headquarters, three (3) copies to the World Bank, and one (1) copy to the TANROADS Regional Manager - Tanga not later than one month after the substantial completion of construction works. The report should enable TANROADS in the future to know the type, quality and quantity of materials used and all information which together with the as-built drawings (Original and 9 copies) and specifications will help TANROADS in the maintenance of the road.

The report shall include among other things, as built drawings, type, quality and quantity of materials used for construction of various sections and structures of the project road and other relevant information that would enable TANROADS to apply for future maintenance or new construction works.

The report shall also include a summary of the principal difficulties encountered during construction and the means employed to overcome them, changes (if any) made in the original designs, modifications to specifications and conditions of contract, all variation orders, assessment of claims by the Contractor, utilization of provisional and price variation and physical contingencies sums, cumulative monthly payments to the Contractor designated by date and number of payment certificate and break down into foreign and local currencies and including a similar payment schedule for supervision services. The details of the overall project costs (construction and supervision) with justification for any significant differences with the original shall be given in the Final Report.

(b) Final Completion Report

The Consultant shall prepare and submit Final Project Report and Final Account within three (3) months after the issuance of the Defects Notification and Final Payment Certificate in ten (10) copies to TANROADS and one (1) copy sent to the TANROADS Regional Manager Office – Tanga. The Final Project Report shall include a separate volume on maintenance proposal of the respective road section.

13.0 DURATION OF THE ASSIGNMENT

The duration for Feasibility Study is **5 months** , Detailed Engineering Design is **5 months**, Construction Supervision is **24 months and that of Defects Notification is 12 months**. The engagement shall be deemed to have started on the execution of the agreement for the services and shall terminate when when the final inspection of the works at the completion of the Defects Notification Period has been done and the Consultant has fulfilled all of his obligations

14.0 PAYMENT TERMS TO THE CONSULTANT

A. Payment during Feasibility Study (Phase I)

The consultant shall build up the costs for carrying out the assignment using the forms provided in the Request for Proposal (RFP).

Payment during **Phase I** the will be made as follows:-

a) Fifteen per cent (15%) of the amount shall be paid upon submission and acceptance by the client of Inception Report;

b) Sixty per cent (60%) of the contract amount shall be paid upon submission of acceptance of Draft Feasibility Study Report including including Preliminary Engineering Design Report, Economic Evaluation Report, Preliminary ESIA Report, Draft Tender Documents, and Preliminary cost estimates Report; and

c) Twenty per cent (25%) of the contract amount shall be paid upon submission of acceptance of Final Feasibility Study Report including including Preliminary Engineering Design Report, Economic Evaluation Report, Preliminary ESIA Report, Draft Tender Documents, and Preliminary cost estimates Report.

B. Payment during Detailed Engineering Design (Phase II)

The consultant shall build up the costs for carrying out the assignment using the forms provided in the Request for Proposal (RFP).

Payment during **Phase II** will be made as follows:-

a) Sixty per cent (60%) of the contract amount shall be paid upon submission of acceptance of Draft Final Engineering Design Report (including Tender Document and Confidential Cost Estimates); and

b) Forty per cent (40%) of the contract amount shall be paid upon submission of acceptance of Final Detailed Engineering Design Reports, Tender Documents and Confidential Cost Estimates.

C. Payment during Construction Supervision Phase III

Payments will be made monthly for undertaking the assignments described in these Terms of Reference to cover fees for approved personnel and reimbursable.

The Consultant shall quote the cost of his expatriate/local staff, technical, equipment and other costs as he deems to be required. He shall summarize his monthly and total costs and accompany the same with a schedule showing the Consultant involvement.

The Costs shall be quoted to cover the Consultant's performance of his duties described in items 7.0 and 8.0 of these TOR in accordance with the following:

(a) Monthly costs, subsistence and allowances for expatriate personnel;
(b) Monthly costs, overtime and allowances for local personnel;
(c) Transportation for key personnel;

(d) Cost of producing and printing reports as described in item 14 including secretarial expenses;
(e) Local travel costs;
(f) Shipment of personal effects, reports, documents etc; and
(g) Other costs which must be specified by the consultant.

15.0 SPECIFIC RESPONSIBILITIES OF THE CONSULTANT

10.3 In the conduct of this assignment, the Consultant shall cooperate fully with relevant Government Ministries and Departments. All information, data and reports obtained from TANROADS in the execution of Consultancy services shall be properly reviewed and analysed by the Consultant. The Consultant shall be responsible for the correctness of using such data. All such information, data and reports shall be treated as confidential.

10.4 The consultant shall comply with all applicable laws, regulations and other requirements, including requirements to protect the health, safety and well-being of other Experts and any other person.

10.5 The Consultant shall be responsible for arranging for all necessary office and living accommodation, transport, equipment, supplies, secretarial services, and such other services, necessary for the proper implementation of the services during Phase I & II of the Assignment.

10.6 The Consultant shall be responsible for making sure that all key staff proposed in the Technical proposal and approved by TANROADS are available at all time of the assignment as per the schedule provided in the contract. TANROADS will keep on investigating their presence and take contractual measures to the consultant including the deduction of the relevant fees in case of absence.

10.7 The Consultant shall be responsible for making sure that the assignment is done according to the requirements of the Terms of Reference and the standards. Any cost that will be incurred by the employer for review of any resubmitted report due to substandard work will be borne by the Consultant and will be deducted directly from any monies payable to the Consultant.

10.8 The Consultant shall ensure that all professional EHS and one Social Specialist providing services under this Supervision Contract have background training related to potential worker health and safety risks associated with this work, and provided all the necessary health and safety equipment, including applicable personnel protective equipment, to fulfill their duties. The Consultant shall also ensure that all non-ESHS personnel providing services under this Supervision contract are provided basic training relate to the Project ESHS requirements and potential significant ESHS related impacts and risks.

10.9 Under the Works Contract and during supervision of the Works Contract, the consultant shall be provided with office and laboratory accommodation and equipment, housing for staff and transportation. These facilities are included in the Works Contract and detailed in the special specifications and bills of quantities. Note that, these facilities will not be provided by the Contracting Authority during the Study and Design. The Consultant shall be deemed to have included the cost of providing these facilities in his Financial Proposal.

10.10 The Consultant shall be responsible for arranging for his support staff who will not be accommodated in the multiple accommodations provided under the works contract.

16.0 GENERAL OBLIGATION

The Consultant's remuneration shall be deemed to cover his liabilities, travel costs and support of his head office staff and all his obligations other than additional services not covered by these terms of reference.

17.0 OBLIGATIONS OF THE CLIENT

(a) Employer will make available: study reports, including appendices, etc. relevant to the assignment, that have been carried out by or for the Employer and any other relevant data available, which are necessary for the proper execution of the assignment

(b) The Employer will provide liaison with the Government Ministries and Departments in order to introduce the Consultant to them. However, the Consultant shall be fully responsible for collecting data and information from these agencies; paying for them where applicable.

18.0 ASSISTANCE TO THE CONSULTANT

The Client will assist the Consultant to:

(i) Obtain formal consent from outside authorities or persons having rights or powers in connection with the works or the site thereof;
(ii) Obtain ministerial orders, sanctions, licenses and permits in connection with the works;
(iii) Register a non-Tanzanian firm and senior staff with the Engineers Registration Board. Any associated cost will be borne by the Consultant.

19.0 LEAVE

The Consultant's key staff engaged in the supervision of the construction Works will be entitled to 30 days leave per calendar year. In connection with leave, the expatriate staffs are entitled to one round trip international travel per year, for which the Consultant will be reimbursed. Person-months during annual leave will not be paid. During the absence of leave the Staff's duties shall be handed over to an appropriate Staff approved by the Client.

20.0 PROJECT COORDINATION

The Consultant shall be responsible to the Chief Executive, TANROADS and shall report to the Director of Infrastructure Planning during feasibility study and detailed engineering design phases; while during Supervision phase he shall report to the Director of Projects. The Consultant shall be required to work closely with the respective Directorate's Project Coordinators in order to accomplish specific task components.

In the course of executing the assignment, the Consultant's Team Leader shall be required to keep close liaison with the TANROADS Regional Manager for Tanga Region and obtain support services in relation to the assignment; simultaneously the incumbent shall take charge of the operations and acceptable performance of duties and responsibilities of all Key and Support Staff as described on Section 10.1 & 10.4 above.