



Dar es Salaam Urban Transport Improvement Project  
(DUTP)

Terms of Reference (ToR)

For

**Engagement of Project Management Consultancy (PMC) Services  
to Plan and Design the Intelligent Transportation Systems (ITS)  
for BRT Phases 3 and 4 Corridors, in Dar es Salaam, Tanzania**

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## I. Background

The Dar es Salaam Rapid Transit (DART) project was first conceptualized in 2002 by the Dar es Salaam City Council as part of a broader initiative to improve urban mobility. It was subsequently incorporated into the city's transport program, with the goal of addressing long-standing transit challenges. These challenges include escalation of traffic congestion, the deteriorating condition of private commuter buses and inadequate transport infrastructure—all of which have significantly impeded the efficiency, reliability, and convenience of daily travel. These limitations have not only affected the quality of life for city residents and commuters but have also slowed socio-economic growth. The DART project was therefore designed as a strategic intervention to transform public transportation and support sustainable urban development.

To facilitate improvement and enhance the urban transport system, the Government established the Dar es Salaam Rapid Transit Agency (DART Agency) as an Executive Agency under the Prime Minister's Office - Regional Administration and Local Government. The Agency was formally established through Government Notice No. 120 issued on 25 May, 2007, in accordance with the Executive Agencies Act No. 30 of 1997 and was officially launched on 16 June 2008. The Government's vision in establishing the DART project is *"To have a modern public transport system at reasonable cost to the users and yet profitable to the operators; using a high-capacity quality buses, which meet international standards, are environmentally friendly and operating on exclusive lanes, at less travelling time"*.

The DART project was initially designed to be implemented in six phases, covering a total of 141.1 kilometres. Following a comprehensive review and update of the project's conceptual plan in 2019, the planned coverage was revised and expanded to 154.4 kilometres to better meet the city's growing transportation needs.

The implementation of the DART project is structured into two primary categories: **infrastructure development** and **bus operations**. Infrastructure development encompasses the construction of dedicated bus lanes, terminals, depots, and feeder roads, while bus operations involve the procurement, deployment, and management of high-capacity buses to ensure efficient and reliable service delivery.

The proposed six phases for DART project implementation are as shown below:

Phase	Roads	Length (Km)
Phase I	Morogoro Rd, Kawawa Rd North, Msimbazi Street,	20.9
Phase II	Kilwa Rd, Kawawa Rd South, Changómbe Rd	20.3
Phase III	Nyerere Road, Uhuru Street, Bibi Titi Road, Azikiwe Street	23.6
Phase IV	Bagamoyo Rd, Sam Nujoma Rd, Ali Hassan Mwinyi Rd	30.3
Phase V	Mandela Rd, Tabata Rd, Kigogo Rd	27.6
Phase VI	Mwai Kibaki Rd, Extension of BRT along Morogoro Rd (Kimara to Kibaha), Extension of BRT 2 along Kilwa Rd	33.5
	<b>Total</b>	<b>154.4</b>



Figure 1: DART System Network Phase 1 to 6 (Source: DART conceptual design 2019)

Implementation of Phase I of the DART project commenced in August 2010, focusing on infrastructure development. Construction activities were successfully completed in 2015, laying the foundation for the operationalization of the Bus Rapid Transit (BRT) System.

Phase 1 covers a corridor stretching from Kimara Terminal to Kivukoni, Morocco and Kariakoo Terminals, incorporating dedicated bus lanes along three (3) trunk routes. The corridor includes

- 20.9 kilometers of trunk road

- 57.9 kilometers of feeder roads
- 5 large terminals
- 27 stations spaced approximately 500m apart and
- one depot.

Additionally, a park-and-ride facility is planned to enhance accessibility and promote the use of public transportation for daily commuters.

Construction of the infrastructure for BRT Phase 2 of the DART project has completed, with operations expected to commence by May 2025. This phase covers 20.3 kilometres, connecting key urban areas from Sokoine Drive in the city centre to Mbagala Rangitatu section. The route passes through major areas including Kilwa Road, Morogoro Road in the Magomeni area, Kawawa Road and Chang'ombe Street.

Phase 2 infrastructure has

- 27 trunk stations
- 4 feeder stations
- Two terminals and
- One depot

Additionally, a park-and-ride facility is collocated at the depot to facilitate commuter access and promote public transport usage.

The design for Phase 3 of the DART project has been completed. Procurement for the road works under Lot 1 has been finalized and construction activities are currently underway. This phase is anticipated to become operational in 2026, marking another significant advancement in the city's public transportation infrastructure.

Phase 3 will extend the DART network by 23.6 kilometre, connecting the city centre to the Gongo la Mbotto area. The corridor passes through Maktaba/Azikiwe St, Bibi-Titi Mohammed Rd, Nyerere Rd, and continues from the TAZARA intersection (intersection of Nyerere- Mandela Road) to the Kariakoo area, via Mandela Rd and Uhuru Street.

Phase 3 infrastructure has

- 28 stations
- 3 feeder stations
- 4 terminals and

- One depot together with a park and ride facility will be collocated at the depot to enhance last-mile connectivity and commuter experience.

Phase 3 is expected to significantly improve transit access across high-demand areas, reduce travel time, and support the city's broader vision for sustainable and efficient urban mobility.

The design of DART system Phase 4 infrastructure has been completed, and construction is currently in progress. The system is expected to become operational in 2026 further expanding the city's high-capacity public transport network.

Phase 4 covers a corridor of 30.3 kilometres, linking the city centre to the Tegeta area. The route runs along key arterial roads including Bibi Titi Mohammed Street, Ali Hassan Mwinyi Road, Bagamoyo Road, and a segment of Sam Nujoma Road between Mwenge to Ubungo Junction. This phase will integrate with Phase 1 and Phase 5 at the Ubungo Transfer Hub via Mawasiliano Road, enhancing interconnectivity within the overall DART system.

Phase 4 infrastructure has

- 36 stations
- 8 feeder stations
- 4 terminals and
- 2 depots, and
- Park and ride facility collocated at some feeder stations and depots.

Once operational, Phase 4 will play a vital role in alleviating congestion along one of Dar es Salaam's busiest corridors and provide a seamless transit experience by connecting multiple BRT phases. It supports the city's strategic objective of developing a fully integrated and efficient mass transit system.

The Detailed Engineering Design for Phase 5 of the DART system has completed. Procurement of the Consultancy Firm responsible for designing, review and supervision of the construction work has also been finalized. The construction is scheduled to commence in 2025, with operations expected to begin by 2028.

Phase 5 of the DART System will extend the DART network by 27.6 kilometres, providing vital connectivity across high demand urban corridors.

The phase will cover Mandela Road from Ubungo Junction to Mwalimu Nyerere Bridge, Tabata Road from Dampo to Segerea and the Kingo road from Dampo to Kigogo round about to connect with Phase 2 of the DART system.

Phase 5 will have

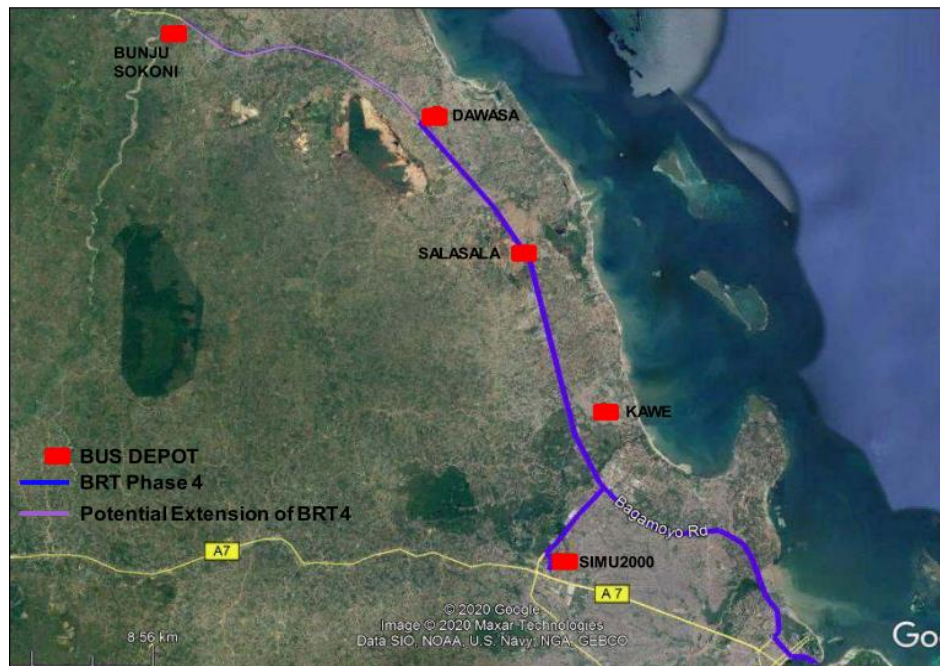
- 33 stations
- 7 feeder stations
- 3 terminals and
- 3 depots with a park and ride facility collocated at some feeder station.

Once completed, Phase 5 will significantly improve accessibility in densely populated areas, enhance integration with existing DART corridors, and support Dar es Salaam's long-term vision for a modern, efficient, and interconnected public transport network.

Phase 6 of the DART system is planned to cover a total corridor length of 26.5 kilometres. This phase will extend the network along Mwai Kibaki Road from Morocco through Mikocheni and Kawe and joins the Phase 4 at Lugalo. In addition to this corridor, Phase 6 will also include two significant infrastructure extensions:

- The extension of Phase 1, from Kimara to Kibaha
- The extension of Phase 2, from Mbagala Rangitatu to Vikindu

These expansions are aimed at improving regional connectivity by linking central Dar es Salaam with rapidly growing suburban and peri-urban areas. Phase 6 will further strengthen the integration of the DART system, support future population growth, and promote inclusive, sustainable urban mobility.



**Figure 2: BRT 4 Corridor Trunk Routes**

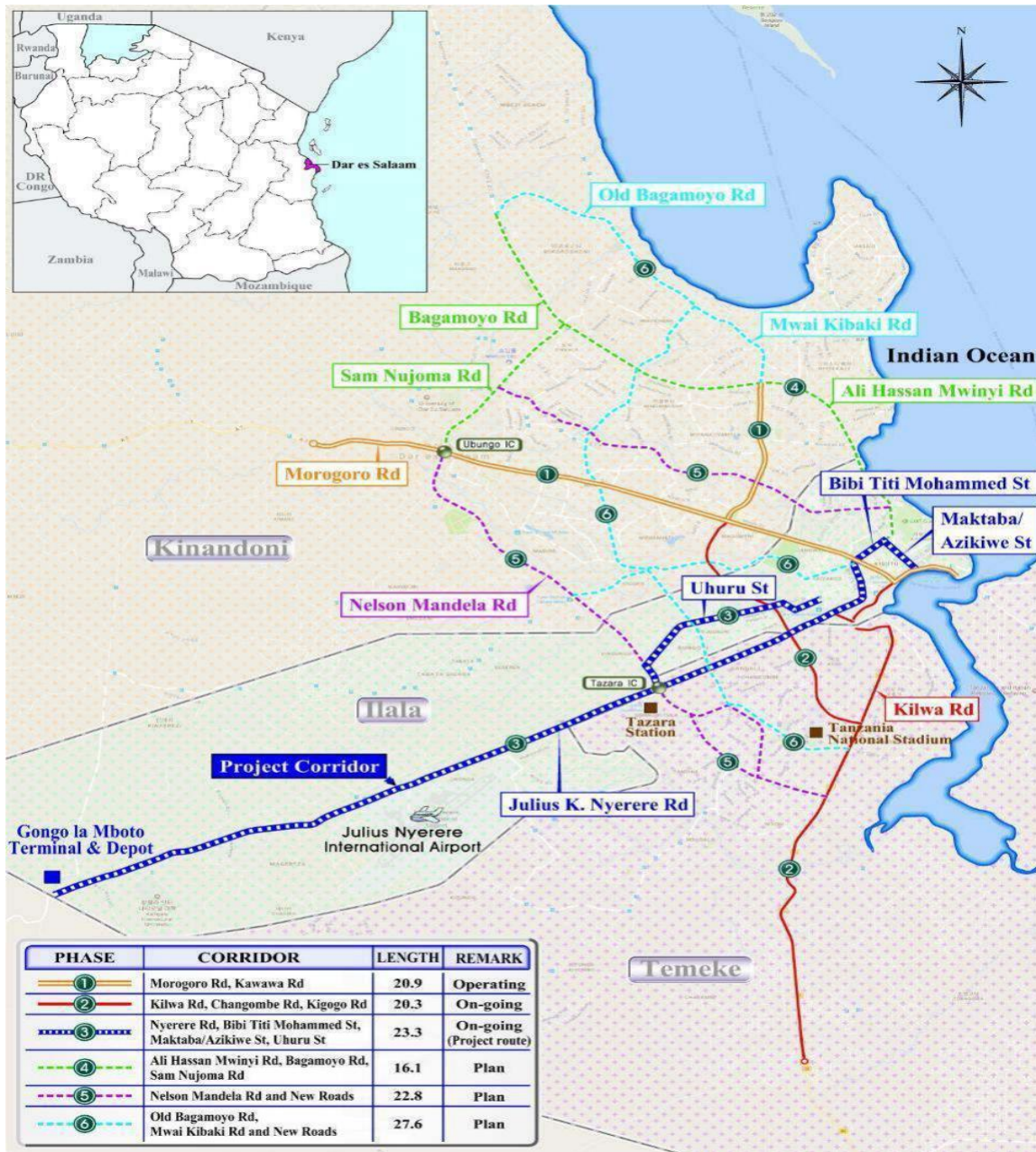


Figure 3: BRT Phase 3 Corridor Trunk Routes

In addition to the ongoing construction of the BRT network, DART Agency also intends to develop a comprehensive strategy for Traffic Management in the City to ensure smooth circulation of traffic in the road networks, reliable accessibility to transport services, detecting traffic violations, overloading violations, incident management, safety and environmental sound traffic management. To achieve these, there is need for investing in the Integrated Traffic Management System (ITMS) in the City of Dar es Salaam, and this is best situated within DART's mandate.

## **II. Goals of the TOR:**

The objective of this Terms of Reference (TOR) is to engage a Project Management Consultant (PMC) to support the successful completion of the Planning and Design Phases of the Intelligent Transportation System (ITS) component for BRT Phases 3 and 4. The PMC will be responsible for providing comprehensive Procurement Support Services including preparation of two Bidding Documents: one for hiring Contractor(s)/System Integrator(s) and another for the engagement of the Supervision Consultant for the Implementation of the ITS infrastructure in Phases 3 and 4.

The broader aim of this assignment is to facilitate the development of an Integrated Traffic Management System (ITMS), designed to monitor, control and manage traffic flows across Dar es Salaam urban roads. By integrating advancing technologies with urban infrastructure, the ITMS will enhance the efficiency and coordination of road transport operations. Ultimately, the implementation of this project is expected to significantly reduce traffic congestion and improve mobility across the city.

### **II.1 - Objectives:**

Objectives (Tasks) of the project that the PMC will complete are the following:

- a) To finalize the planning phase of the project and develop a High-Level Design of Intelligent Transportation Systems (ITS) that meets defined system requirements and establishes key system architectures and interfaces.
- b) To develop a high-level design of the power infrastructure and communications network covering both wide and local areas networks (DARTnet) to support the operations of the DART BRT system and ITS functionalities for the DART Agency, the City of Dar es Salaam and its broader metropolitan region. The detailed (“Design-to-Build”) phase will be subsequently executed by the selected Contractor (Systems Integrator)
- c) To develop a high-level design of the Intelligent Transportation System (ITS), including all key systems and subsystems to be integrated as part of the DART ITS Deployment and Integration Project.
- d) To design a traffic management system for the City of Dar es Salaam that maximizes traffic flow and road capacity while enhancing the streetscape through the application of modern traffic control systems and technologies within BRT Phases 3 and 4.

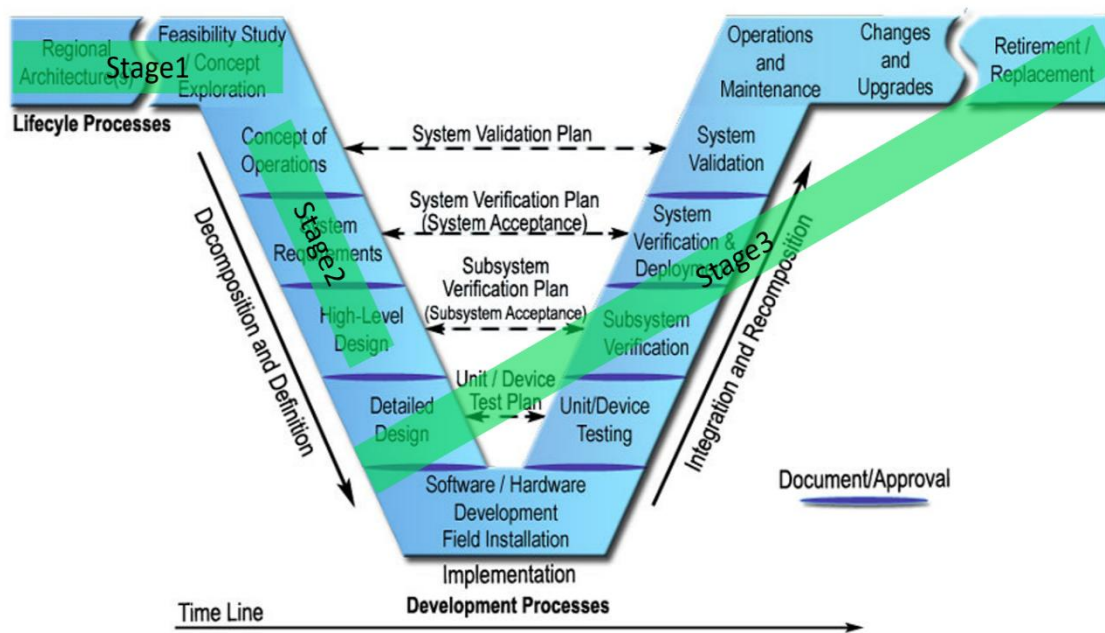
- e) To provide procurement support services and develop two tender documents for the selection of i. Contractors (Systems Integrators) and ii. Supervision Consultant for the implementation of the Intelligent Transportation System (ITS) in DART Phases 3 and 4.
- f) To provide Capacity Building Services on Intelligent Transportation System and facilitate Knowledge and Technology Transfer to the DART Agency and its key partners involved in the BRT operations.

## II.2 - PMC - Scope of Work (SOW)

The Project Management Consultant (PMC), to be engaged by DART, will be responsible for providing expert services throughout key phases of the project life cycle -namely **Planning, Design, and Procurement Support Services**- for the implementation of the Intelligent Transportation System (ITS) under DART Phases 3 and 4. This includes supporting the procurement of the **System Integrator (SI)** and **the Supervision Consultant**.

In addition to these core responsibilities, the PMC will also deliver **Capacity Building Support Services** to DART and its key partner agencies, as required while ensuring effective knowledge transfer and institutional strengthening.

The specific tasks to be undertaken across the four project phases are detailed in the subsequent sections of this Terms of Reference (ToR). All activities shall be carried out in accordance with the Systems Engineering “**V Model**” approach for ITS, as illustrated in the Figure below.



**Figure: The Systems Engineering for ITS “V” Model for use in the DART ITS Project**

## II.2-A: Project Planning Phase

During initiation period of the Planning Phase of the Project, the PMC will be required to conduct a comprehensive review of all relevant reports and deliverables previously prepared for DART, whether developed by external consultants or in-house staff. This review will serve as a foundation step to ensure continuity, alignment and informed decision-making throughout the project.

In addition to the desk review, the PMC must carry out field investigations as necessary to validate existing data, assess current site conditions and identify any gaps or constraints that may affect project implementation.

Upon completion of these activities, the PMC will be responsible for submitting key planning documents, which will serve as the basis for the subsequent phases, as highlighted below.

- a) Prepare and submit a **Project Management Planning (PMP)** Document. This document must outline the overall project approach and include an organizational chart with clearly defined roles and responsibilities of all key personnel assigned to the project. Additionally, the PMP should detail required for successful execution, and provide a well-structured project schedule, including key milestones and deliverables.
- b) Prepare and submit a **Systems Engineering Management Planning (SEMP)** Document. This document must clearly outline how the PMC will apply the Systems Engineering "V" Model methodology to carry out the tasks specified in this ToR. The SEMP should also describe the approach for managing and supervising the project during the implementation phase, ensuring alignment with best practices in systems engineering and integrated project delivery.
- c) Review, update and finalize the existing "**Needs Assessment**" and the **Concept of Operations (CONOPS) documents** for the Intelligent Transportation Systems and Advanced Public Transport Management System (APTMS). The finalized CONOPS will serve as a foundational document to guide the planning, deployment, integration,

operation and maintenance of DART ITS system, ensuring that it aligns with stakeholder expectations, system requirements and long-term operational goals.

- d) Review, update, finalize and submit the **Systems Requirements Documents** for both the intelligent Transportation System (ITS) and Advanced Public Transport Management System (APTMS). These documents will define the functional, technical and performance requirements and will serve as the foundation for preparing the Design Document for the project.
  
- e) Review and update the existing ITS **Strategic Plan** Document, which will serve as a “Road Map” for implementation of the ITS projects under DART’s ITS Program. Additionally, the PMC shall refine the ITS Architecture Concept which will serve as a framework for coordination and implementation of the ITS Systems by DART and its partner agencies in the Dar es Salaam Metropolitan Region. This architecture will support the development of the future National ITS Architecture for Tanzania, ensuring scalability, interoperability and institutional alignment at the national level.

The tasks outlined above, to be undertaken by the Project Management Consultant (PMC) are further detailed in the following sections.

#### **II.2-A - Task-1: Prepare and Submit a Project Management Planning (PMP) Document:**

Significant groundwork has already been completed to support the planning phase of the DART Phase I corridor -ITS Deployment and Integration Project. Several key reports and technical documents were submitted to DART by external consultants, including World Bank Support Team, during the project initiation stage. The PMC will be required to thoroughly review these existing materials and build upon them to develop a Project Planning Document. This approach will ensure continuity, leverage prior investments and align the project with previously established goals and recommendations.

The PMP Document must present a high-level overview of the project life cycle, including all major tasks and their corresponding deliverables to be submitted by the Project Management Consultant. The PMC is expected to develop an initial project schedule that outlines key milestones and timelines. While this schedule may be high-level and subject to refinement as the

project progresses, it must provide a clear framework for monitoring progress and managing deliverables.

The organizational chart, including defined roles, responsibilities and assigned personnel must remain consistent throughout the project life cycle. Any proposed changes to personnel, resources, task assignments, or responsibilities must be submitted for prior review and receive formal approval from the **DART Project Management Team**.

The PMP must also include a Risk Management Plan, that identifies potential risks and challenges that could arise throughout the project life cycle. This plan should outline preventive measures and mitigation strategies to effectively manage and minimize the impact of such risks, ensuring the project remains on track and meets its objectives.

**A. II.2-A - Task-2: Prepare and Submit a Systems Engineering Management Plan (SEMP):**

The Systems Engineering Management Planning (SEMP) will detail the methodologies, processes and steps the PMC will employ to execute each task throughout the various project phases. This approach will be fully aligned with the Systems Engineering “V” model for ITS, as previously outlined. The PMC is expected to rigorously follow this system engineering process, delivering the required documentations, products and services at each stage of the project life cycle in accordance with the established standards and project requirements.

The SEMP document will serve as a “Road Map” to guide both the PMC and the DART Project Management Team in the effective implementation of the project. It will provide a structured framework that facilitates efficient project management, control, and progress monitoring, ensuring all activities align with the project’s objectives and timelines. As such, the SEMP will be an essential tool for maintaining oversight and driving successful project delivery.

**B. II.2-A - Task-3: Review, Update and Finalize the Existing Concept of Operations (CONOPS):**

As indicated in the Systems Engineering for ITS “V” model, the Concept of Operations serves as the foundational document for developing both the Needs Assessment and System Requirements for the DART - ITS Deployment and Integration project. Significant work has already been done during the project’s initiation phase, with several key reports already prepared.

The PMC will be responsible for reviewing these existing materials and deliver a finalized Concept of Operations document. The deliverables included in the final CONOPS report should include, but not be limited to, the following elements:

- a) Identify all relevant stakeholders for the project-existing and new-based on their roles, influence and impact to support effective engagement throughout the project.
- b) Identify user needs and system capabilities in terms that all project stakeholders can understand. Actively involve stakeholders throughout the project life cycle, including workshops, draft report reviews and policy formulations.
- c) Address project coordination issues and recommend organizational mechanisms, including advisory committees and technical working groups, to support the DART Project Management Team and facilitate smooth project progression toward successful completion.
- d) Facilitate the establishment of ITS stakeholder agreements and relationships by clearly defining roles, responsibilities and interfaces- such as system control, data collection, information exchange as well as operation and maintenance of the new ITS systems and subsystems and the TOC once operational.
- e) Facilitate the development of shared responsibility and understanding among system owners, operators, maintainers and developers regarding who, what, why, where, and how to seamlessly operate the ITS systems with proper coordination within the city of Dar as Salaam and its metropolitan region.
- f) Identify the basic ITS elements (service packages) for BRT-ITS Services
- g) Develop communication links, data and information-sharing platforms and mechanisms- such as GIS maps, extranet and Intranet- that can serve as a foundation and input for building Regional and National ITS Architectures.
- h) Establish layout foundations for developing systems requirements for the design, installation and Integration of the BRT-ITS System.

- i) Provide technical and advisory services during the planning, development and documentation of the Concept of Operations, including support services to enhance the performance of the Agency's functional units- thereby creating an enabling environment for developing high-capacity BRT operations and management,
- j) Facilitate consensus on developing key performance measures and a basic plan for how the system will be validated at the end of the project deployment.
- k) Submit the final Concept of Operations Document after incorporating comments from stakeholders and the DART Project Management Team on the draft reports.

**Expected Deliverables:**

The deliverables this task shall include, but not be limited to, the following:

1. **The Final Concept of Operations Document** will include reports on the tasks outlined above, along with detailed description of who is involved, what will be done, why the project is needed, where it will take place, and how the ITS stakeholder needs will be addressed through successful completion of the project.
2. System Validation Plan outlining how the final system will be evaluated to determine whether it meets the original scope and stakeholders needs, as defined in the Concept of Operations

**II.2-A - Task 4: Review, Update, Finalize and Submit the ITS Systems Requirements document**

After completing the Concept of Operations document, the PMC must review, update and develop system requirements that align with stakeholder needs, and serve as a foundation for designing the DART Intelligent Transportation System (ITS).

The Systems Requirements document must clearly define the systems and subsystems to be designed for the DART ITS. The document must include, but not be limited to, the following:

- a) Review and update key BRT-ITS Systems, incorporating high-level architecture diagrams or conceptual framework based on the existing ITS documentation,
- b) Review and update the existing BRT-ITS Operation Systems, including Traffic Operation Centre (TOC), Fleet Management System, Automatic Vehicle Location (AVL), Transit Signal Priority, Computer Aided Dispatch (CAD), Automatic Passenger Counting (APC) and Lane Control Technologies.
- c) Reviews and update the Safety and Security Systems, including surveillance CCTV cameras, panic buttons, collision avoidance systems, and precision docking technologies for drivers,
- d) The final Systems Requirements Document must be submitted by the PMC after the review and incorporation of comments on the draft reports provided by the DART Project Management Team and its stakeholders.

**The key tasks/ subtasks to be performed by the PMC, for the preparation of final Systems Requirements document must include, but not be limited to, the following:**

- i. Review and prepare System Requirements, based on the user needs identified in the Concept of Operations.
- ii. Review, update and finalize the high-level requirements previously submitted to DART by external consultants.
- iii. Analyse and update requirements through stakeholder engagements including workshops.
- iv. Review and update the requirements documentation for power and communications network supporting the ITS deployment.
- v. Devise mechanisms for validating the system requirements.
- vi. Manage and maintain traceability of requirements.
- vii. Develop the System Verification Plan based on the finalized requirements
- viii. Develop a System Acceptance Plan.
- ix. Facilitate a final review process and incorporate feedback and comments, as necessary.

### **Expected Deliverables**

The expected Document Deliverables are: -

- i. ITS System Requirements Document
- ii. Requirements Traceability Matrix
- iii. Test Plans, including
  - (a) Site Acceptance Test (SAT)
  - (b) Verification Plan
  - (c) Validation Plan

### **II.2-A - Task-5: Conduct Gap Analysis & Provide Recommendations on Regional and National ITS Programs and Architectures and DART ITS Strategic Plan:**

The DART ITS Strategic Plan will serve as a roadmap for planning, designing, installing and integrating the ITS and AFCS systems of the Agency in both current and future projects. It will act as a guiding and a “Living Document” to support the development and implementation of the Agency’s ITS Program in the coming years. It is essential to recognize that the Agency’s ITS Program must be fully aligned with the broader ITS initiatives of the City of Dar es Salaam and its metropolitan region, as well as the National ITS Program of Tanzania. As a “living document,” the Strategic Plan must be periodically reviewed and updated to reflect new developments and changes in the transportation landscape—such as road network expansions, shifts in transportation modes and travel patterns, and the emergence of new technologies.

Furthermore, the DART ITS Strategic Plan will support the development of the Agency’s ITS Program and provide a conceptual foundation for the formulation of both Regional (Dar es Salaam Metropolitan Region) and National (Tanzanian) ITS Programs and Architectures.

Accordingly, the PMC is required to undertake key assignments (sub-tasks), under the ITS Strategic Plan Task (Planning-Task-5) of its scope of work. These assignments (Sub-Tasks) include, but are not limited, to the following:

#### **II-A-Task-5-1: Conduct Gap Analysis & provide Recommendations to rectify and close the Gap in the Regional and National Architecture.**

- a) Conduct a comprehensive gap analysis and address the shortcomings and challenges encountered during the planning, design, and implementation of the Intelligent Transport System (ITS) project for the BRT Phase I Corridor, with a view

to adapting and improving the system for the BRT Phases, Dar es salaam and national level.

- b) Demonstrate how the DART ITS Program aligns with the overall development and implementation of BRT Phases 3 and 4 as well as future plans and operations of the Agency.
- c) Illustrate how the ITS components for BRT Phases 3 and 4 will integrate into the broader Regional and National ITS Programs.
- d) Identify and address technical, institutional, resource-related and capacity challenges that may impact on the implementation of the DART ITS Program for BRT Phases 3 and 4. At the same time, highlight potential opportunities that can be leveraged.

**Expected Deliverable:**

- i) Revised Regional and National ITS Architecture Conceptual Framework

**II.2-A - Task-5-2: Preparation of Dar es Salaam Traffic Management Plan document**

To enhance road management, an Integrated Traffic Management System (ITMS) should be implemented. This system will be capable of generating and delivering comprehensive highway data by introducing and operating a unified location reference framework. The ITMS will integrate with existing highway-related systems and establish seamless linkages between digital highway maps and a wide range of associated data.

The system design will incorporate a combination of technologies, including Geographic Information System (GIS), Global Positioning System (GPS), General Packet Radio Service (GPRS), Closed-Circuit Television (CCTV) cameras, Servers, Information screens/Variable Message Signs (VMS) and other ICT components to support efficient traffic management.

The system's capabilities should include, but are not limited to, the following functions: -

- i. Speed control
- ii. Enforcement of road traffic violations
- iii. Roads network management
- iv. Tracing vehicles without valid licenses
- v. Searching for stolen vehicles
- vi. Disseminating real-time traffic information

- vii. Security monitoring of designated areas
- viii. Recording and reporting of traffic accidents

**Scope of work:**

**5.2.1: Preliminary Review and Data Collection**

- i. Collect and review existing reports, studies, and data related to the current traffic conditions and management systems.
- ii. Gather traffic flow data, intersection layouts, signal timings, road network maps, and accident statistics.
- iii. Identify existing Intelligent Transport System (ITS) infrastructure and its operational status.
- iv. Assess institutional frameworks and existing roles of stakeholders (e.g., DART, TANROADS, Traffic Police, City Council, TEMESA etc)

**5.2.2: Situation Assessment and Diagnostic Analysis**

- i. Conduct field surveys to assess the performance of current traffic control measures, signage, signals, and road markings.
- ii. Evaluate the integration and effectiveness of ITS components in managing city traffic and BRT operations.
- iii. Identify bottlenecks, congestion hotspots, and safety-critical areas.
- iv. Review current traffic management policies, laws, and operational procedures.

**5.2.3: Gap Analysis**

- i. Analyze weaknesses, inefficiencies, and challenges in the current traffic management system.
- ii. Identify gaps in infrastructure, technology, capacity, and institutional coordination.
- iii. Compare current practices with international best practices in traffic management and ITS deployment.

**5.2.4: System Design and Development Planning**

- i. Define system objectives, functional requirements, and performance indicators for the proposed Traffic Management System.
- ii. Develop a conceptual design and architecture for the TMS, including control centers, communication networks, and sensor systems.
- iii. Identify required ITS components (e.g., adaptive traffic signals, CCTV surveillance, vehicle detection, data analytics etc).
- iv. Propose system integration with the BRT control center and other city transport systems.

#### **5.2.5: Stakeholder Consultation and Coordination**

- i. Organize workshops and meetings with key stakeholders to validate findings and gather inputs.
- ii. Ensure coordination among agencies responsible for road management, public transport, and traffic enforcement.
- iii. Incorporate stakeholder feedback into system design and implementation planning.

#### **5.2.6: Implementation Strategy and Action Plan**

- i. Develop a phased implementation roadmap outlining short-, medium, and long-term actions.
- ii. Develop cost estimates, timelines, and resource requirements for each phase.
- iii. Define institutional arrangements and capacity-building needs.
- iv. Propose monitoring and evaluation mechanisms for system performance.

#### **5.2.7: Risk Assessment and Mitigation Planning**

- i. Identify potential risks related to technology, infrastructure, and institutional coordination.
- ii. Develop mitigation strategies to ensure successful implementation and sustainability of the TMS.

#### **Expected Deliverables**

- i) Inception Report outlining approach, methodology, and work plan.

- ii) Progress Reports summarizing findings and analysis results.
- iii) Final Report presenting the complete Traffic Management System design, recommendations, and implementation plan.
- iv) Dar es Salaam Traffic Management Strategic Plan for BRT phase II, III, IV, V and VI
- v) Dar es Salaam Traffic Management Design Document for BRT phase II, III, IV, V and VI

### **II-2-B Project Design Phase:**

The PMC is required to develop a **High-Level Design** for the DART ITS Systems, including the Power and Communications Infrastructure necessary to support systems operations and integration with the DART Traffic Operations Centre (TOC). This **High-Level Design** must include Plans (High level engineering and construction drawings), specifications and cost estimates.

The **High-Level Design** of the DART ITS system, including the PSEs (Plans, Specifications and Estimates) will form the foundation of the “**Design-to-Build**” package. This package will subsequently be developed by the Contractor (Systems Integrator) based on the PMC-prepared **High-Level Design**. The **Detailed Design** will then be finalized and prepared for deployment, after receiving an approval from the DART Project Management Team, in consultation and reviewed by the PMC.

Below are the key tasks the PMC must perform to complete the **High-Level Design** for the DART ITS Deployment:

- a) Apply the Systems Requirements developed during the Planning Phase to prepare the High-Level Design.
- b) Develop and evaluate alternative design concepts for the ITS Deployment.
- c) Develop and evaluate design alternatives for the power and communications infrastructure supporting the DART ITS and AFCS deployment.
- d) Determine the Fiber/Wi-Fi/cellular data bandwidth requirements for all terminals, stations, stops, depots, park-and-ride facilities and buses, ensuring integration with back-office(s)
- e) Develop high-level cost estimates for the power and communications infrastructure necessary to support the ITS and AFCS deployment.

- f) Evaluate the procured off-the-shelf DART Agency software for integration with BRT Phases 3 and 4 components.
- g) Document the required interfaces between systems and subsystems and identify applicable standards.
- h) Review and finalize the Systems and Subsystems Integration, Acceptance and Verification Plans.
- i) Integrate ITS systems and devices into the Power and Communications infrastructure; the BMS, TMC and OCC that are already designed under BRT-Phase-1.
- j) Document the Bus Priority system and its integration/interface with existing infrastructure provided by other agencies and partners.
- k) Prepare plans and drawings for the depots, terminals, stations, stops, park-and-ride facilities, and bus ITS architecture and interfaces including:
  - i. Equipment locations for the installation of ITS devices, computers and hardware components at the stations, depots, buses, Server Rooms etc.
  - ii. Power and Communications links, including substations and fiber termination points for the ITS and AFCS networks, field devices and sub systems.
- l) Review and compile a typical list of Standard Operating Procedures (SOPs) to be prepared by the Contractor.
- m) Document training requirements and services to be provided by the Contractor.

**Expected Deliverables - Final Design Documents:**

- i) Plans and Engineering Drawings including
  - a. System Integration Plans
  - b. Systems and Subsystem Verification Plans
  - c. Systems and Subsystem Acceptance Plans
  - d. Unit and Device Test Plans
- ii) Systems and Subsystems Operation and Maintenance Plans
- iii) Front and Back-Office Operations Plans
- iv) Comprehensive List of Standard Operating and Maintenance Manuals and Procedures (SOPs)

- v) High-Level ITS architecture design (engineering drawings) for depots, terminals, stations, stops, park-and-ride facilities, the control center and Bus ITS systems.
- vi) Detailed technical specifications for DART ITS systems, subsystems and related devices,
- vii) Performance measures and monitoring regimes
- viii) Guidelines and requirements for the review of the **High-Level Design** and preparation of **the Final Detailed Design (“Design-to-Build”)** by the Contractor (Systems Integrator).
- ix) Preparation of a detailed Terms of Reference (TOR) and Scope of Work (SoW) for the preparation of the Final Detailed Design (“Design-to-Build”), to be included in the procurement package for hiring a Contractor (Systems Integrator) and a Supervision Consultant. This task will be undertaken by the PMC as part of its Procurement Support Services in accordance with its contract with DART.

### **II-2-C - Procurement Support Services Phase :**

The objective of this task is to prepare two Tender documents, which will be reviewed and approved by DART for issuance. The PMC will support DART in the preparation and implementation of the procurement and bidding process required to hire both the Contractor/Systems Integrator (SI) and Supervision Consultant.

The services to be provided by the PMC under this task must include, but not be limited to, the following:

- i. Prepare alternative analysis of procurement options, including a comparison of pros and cons, and provide recommendations to the DART Project Management Team on the most cost-effective approach.
- ii. Identify potential risks and challenges in the procurement process and recommend appropriate prevention and mitigation measures

- iii. Prepare two tender documents- **one for the System Integrator and another for the Supervision Consultant**-using the applicable and currently World Bank Standard bidding documents and templates aligned with all relevant requirements
- iv. Ensure each tender document includes, but not limited to, the following components:
  - a) Description of contract scope, schedule, budget constraints and requirements
  - b) Instructions to bidders/contractors
  - c) Applicable and Special Conditions of Contract
  - d) Contract Data
  - e) Terms of References (TOR) which incorporates
    - 1. Scope of Work
    - 2. General Requirements
    - 3. Payment Methodology
    - 4. Description of Payment Items
    - 5. Comprehensive Schedule and Bill of Quantities to be priced by the tenderers
    - 6. Site-specific information related to DART system and operations
- iv. Prepare, finalize and submit the complete bidding documents for approval and issuance
- v. Review proposals from prospective Contractors/Systems Integrators and provide recommendations for selection of the most qualified firms
- vi. Respond to the pre-bid queries in consultation with the DART Project Management Team
- vii. Assist the Agency in evaluation and ranking of the bids.
- viii. Support DART in negotiations with the selected Contractor and Supervision Consultant to finalize selection and ensure the preferred technical and financial proposals are secured

**Expected Deliverables and Services:**

- a) Evaluation Reports of bid submissions
- b) Recommendations for the appointment of selected Contractors and Consultants
- c) Updated Budget Estimate, as required
- d) Updated Project Schedule, as required
- e) Updated Scope of Work documentation, as required

- f) Facilitation of contract signing between the Client (DART) and Contractor/Systems Integrator
- g) Contract Management Plan, to be used by the DART Project Management Team in consultation with the PMC

### **II.2-E - Capacity Building and Knowledge Transfer Services:**

The Project Management Consultant (PMC) for the ITS Project shall provide advisory and consulting services aimed at strengthening the organizational, technical, managerial and human resource capacity of DART. The aim is to enhance skills, facilitate knowledge and technology transfer and ensure effective management of all stages of the ITS and AFCS project- including planning, design, deployment, systems integration, operation and maintenance. This support will apply to existing systems as well as new and upcoming initiatives, with a particular focus on advancing ITS development for DART and the broader Dar es Salaam Metropolitan Region.

The PMC services under this task shall include, but are not limited to, the following:

- a) Assist the DART Project Management Team in internal and external communications, professional networking and review of draft reports and technical manuals, as required
- b) Provide training and workshops to the DART Project Management Team and key stakeholders on topics such as ITS Planning and Architecture, Systems Engineering for ITS, hardware and software systems, communications networks and database development.
- c) Deliver specialized training and workshops to the DART AFCS technical team on AFCS planning, upgrades, system monitoring, hardware and software systems, system development, database management and operations and maintenance.
- d) Assist DART in the development and acquisition of educational and training materials including technical references and manual.
- e) In collaboration with international development agencies, such as World Bank, etc. support DART in identifying and facilitating overseas trainings opportunities for policy makers, senior management, executives and technical staff.
- f) Support skills, knowledge and technology transfer from international best practices, such as participation in annual conferences-enabling DART's policy,

technical and managerial teams to benefit from global experience in ITS and AFCS.

- g) Assist DART's technical team in building capacity in core ICT systems operations by establishing partnerships with globally recognized Urban Mass transit Systems to promote knowledge sharing and lessons learned.
- h) Foster strong professional relationships between DART's Project Management Team and the Contractor's (Systems Integrator) personnel to encourage collaboration, synergy, and effective knowledge transfer throughout project implementation.
- i) Develop guidelines and procedures to establish best practices, and support the continuous improvement of DART's BRT operations by introducing advanced technologies and effective management strategies to enhance operational efficiency and skills

### **III. Key Personnel Composition and Qualification Requirements**

All key personnel assigned to the project must possess in-depth knowledge and specific, verifiable experiences in major ITS projects **of comparable scope and complexity, particularly** in the Planning and Design of the ITS systems like the DART -ITS Project.

#### **a) Key PMC Staff Requirement During Planning, Design and Procurement Support Services Phase -Lump Sum Contract**

The Planning, Design, and Procurement Support Services - along with capacity building and knowledge transfer activities- shall be completed within a period of five (5) months by the technical staff of the Project Management Consultant. The total estimated staff input is **22.5 person-months**, as detailed in Table: 1 below. The proposed personnel must hold appropriate academic and professional qualifications, along with relevant experience, to ensure delivery in accordance with recognized international industry standards and to effectively achieve the objectives of the assignment.

The PMC is free to propose an appropriate staffing composition to carry out the assignment. Of the total **4.5 person-months allocated to the Team Leader, 0.5 person-months** shall be specifically dedicated to supporting the DART Agency during the one-month tendering

process for the selection of the Contractor/Systems Integrator.

No.	Key Professional staff	Person-months
1.	Project Manager/Team Leader	4.5
2.	ITS Systems Designer	04
3.	Communications Network Specialist	04
4.	Traffic Engineering and Safety Specialist	04
5.	Procurement Specialist	02
6	Other key staff	04
	<b>TOTAL</b>	<b>22.5</b>

Table 1: Professional key Staff-Months for Planning, Designing, procurement Support phase

The table below lists key personnel for whom CVs must be submitted. While the titles of the key personnel may differ in the Consultant's proposal, the qualifications must meet or exceed the minimum requirements specified.

No	Position	Minimum Qualifications	Specific Experience	On site Duration
1	Project Manager	<p>A holder of M.Sc. Degree in Civil, Electrical or Electronics Engineering, ICT or related fields, specializing in ITS Project Management, Planning, Design and/or Installation and Integration.</p> <p>Membership in international ITS Societies, related project management, electrical and electronic engineering professional institutions and associations, as well as Certifications from Project Management Institute (PMI) or other recognized organizations will be added an advantage.</p>	<p>Minimum of seven (7) years experiences as a Project Manager and Team Leader, in managing major and complex ITS Projects with specialties in the areas of Strategic Planning, Systems Design and/or Integration, including ITS Infrastructure (Communications and Fiber Network); ITS field devices, systems and subsystems deployment; as well as Traffic/Transit Operations Centre</p>	5 Months

		<b>(20 Marks)</b>	<p>integrations for a major Highway and/or Transit Corridor.</p> <p>Practical knowledge and expertise in the application of Systems Engineering Methodologies and practices for ITS projects -including development of Needs Assessment, Concept of Operations, Systems Requirements, Design, Installations and Site Acceptance Test (SAT)-are essential.</p>	
2	ITS Systems Designer	<p>Holder of M.Sc. Degree in Civil, Electrical, Electronics, ICT Engineering or related fields specializing in ITS Systems,</p> <p><b>(15 Marks)</b></p>	<p>A minimum of seven years' experiences as an ITS Systems Designer, Project Manager or Team Leader, in the design of major and complex ITS Projects, including ATIS, ATMS, Incident Management and Traffic Control and Detection Systems.</p> <p>Experience in designing the integration of ITS Systems (such as CCTV traffic and security cameras, VMS, Traffic Operator GUIs) into a Traffic/Transit Operations Centre as well as supervising Site Acceptance Testing (SAT) operations.</p>	5 Months
3	Communications	A holder of BSc Degree in	A minimum of five	5 Months

	Network Specialist	<p>Communications Systems, Networking, Electrical, Electronic, computer and ICT engineering or equivalent Degree.</p> <p><b>(10 Marks)</b></p>	<p>years' relevant experience as a communications specialist, ITS and communications network engineer, telecommunication or fibre optic specialist and/or electronics systems analyst with expertise in testing digital audio/video and data transmission systems.</p> <p>Experience in fibre network testing (including OTDR) as well as interpretation and analysis of capacity and signal loss measurements.</p>	
4	Traffic Engineering and Safety Specialist	<p>A holder of B.Sc. degree in Transportation Engineering, Civil Engineering specializing in ITS or traffic engineering or equivalent Degree. Knowledge in safety and related studies will be added advantage,</p> <p><b>(9 Marks)</b></p>	<p>A five years' experience in traffic engineering practice and ITS applications for safety improvement and incident management, as well as providing support services to facility and highway traffic operations in traffic control and safety management and sign design.</p> <p>Special training in road safety and ITS applications would be a plus to experiences and educational background in traffic engineering and safety.</p>	5 Months
5	Procurement Specialist	<p>Holder of Bachelor's degree in Engineering and a Master's degree in Contract Management or an</p>	<p>At least seven years of experience in preparing tender documents and managing the bid</p>	4 Months

		equivalent qualification. <b>(6 Marks)</b>	process. Must have experience in ITS related procurement and be capable of understanding and effectively communicating the technical specifications of ITS products	
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NB. The assignment of all staff, including intermittent personnel, shall be subject to the client's approval. The estimated man-months listed are for the purpose of consultant's proposal submission. The final labor requirements and associated costs will be determined through negotiations with the client (DART), in accordance with the required scope of work and project schedule.

**b) Communication and Reporting**

a) Progress reports in MS-Word shall include following content: -

- i. Schedule of all meetings held including attendance registers and minutes
- ii. Identified risks and mitigation actions
- iii. Percentage (%) progress of each task

b) Frequency: monthly, submitted no later than the 7<sup>th</sup> calendar day of each month for the previous month,

c) Number of copies: -

- i. Submission of final hardcopy versions and electronic distribution in PDF format via email to the persons designated by the DART Chief Executive or any other nominated individual.
- ii. Submission of two flash disks to DART

**d) Time Schedule for Deliverables:**

- i. Inception report that shall include: “Detailed Work Plan and Training Program”: 2 weeks after contract signing.
- ii. Completion of the “Project Management Plan (PMP) Document and Systems Engineering Management Plan (SEMP) Document”: 4 weeks after contract signing.
- iii. Completion of the “ITS Strategic Plan Document”: 6 weeks after contract signing.
- iv. Completion of the “Updated Concept of Operations and ITS System Requirements Document”: 8 weeks after contract signing.
- v. Completion of the “ITS Design Document for BRT 3 and 4”: 10 weeks after contract signing.
- vi. Dar es salaam City and National ITS Architectures Framework document
- vii. Completion of the “Tender Documents for System Integrator and Supervision Consultant”: 14 weeks after weeks after contract signing.
- viii. Completion of the “Dar es salaam Traffic Management strategic Plan and Dar es Salaam Traffic Management Design Document”: 19 weeks after contract signing.
- ix. Completion of the procurement processes: 20 weeks after contract signing.

#### e) Project deliverables and Payment Schedule

The project deliverables and payment mode are shown in table below

*Table 8.1 Deliverables Milestone Table*

No	Deliverable	No. of Weeks from Commencement	Per Cent (%)
<b>Lump Sum</b>			
1	Inception report which shall include: Detailed Work Plan and Training Program	2	0
2	Project Management Plan (PMP) Document	4	10

	Systems Engineering Management Plan (SEMP) Document		
3	ITS Strategic Plan Document	6	10
4	Updated Concept of Operations and ITS System Requirements Document	8	10
5	ITS Design Document for BRT 3 and 4	10	15
6	Dar es salaam City and National ITS Architectures Framework document	12	15
	a) Dar es Salaam Traffic Management Strategic Plan for BRT 2,3,4,5, 6 and Dar es salaam metropolitan b) Dar es Salaam Traffic Management Design Document for BRT 2,3,4,5, 6 and Dar es salaam metropolitan	14	20
7	Tender Documents for System Integrator (SI) Tender Document for Supervision Consultant	17	10
9	Completion of procurement processes	20	10

**Note:**

1. In all activities identified in the schedule above the consultant shall be required to submit the draft reports for client and stakeholders review and comments prior submission of final reports acceptable by the client.
2. The consultant shall be required to make presentations to stakeholders for all draft reports delivered a week after the submission. Stakeholders meetings will be organised by the client

**f) Duration of the Services**

The duration of the contract will be six (6) months, with an estimated total time input of five (5) months required from the Consultant to undertake the services.

- i. The Consultant is expected to be based in Dar es Salaam for a minimum duration of four weeks (4) to carry out activities outlined in the scope of work and to provide inputs on the planning and design of the Intelligent Transportation System (ITS) for DART BRT Phase 3 and Phase 4 corridors.

**g) Client's responsibility**

- i. To provide infrastructure design reports and any other information necessary to support the PMC in delivering the assignment,
- ii. Assist in coordinating with key stakeholders to facilitate the successful delivery of the assignment.

**h) Consultant's Responsibilities**

The Consultant shall cover all costs associated with their team members, including housing and accommodation, international flight tickets, miscellaneous travel expenses, mobile phones and any other facilities required for undertaking the assignment. These costs may be claimed as reimbursable expenses, subject to agreed ceiling values or should be included in the consultant's fee proposal.

**i) Project Assignment condition**

The Optical Fiber network design section should involve local key personnel who are qualified professionals with proven experience in fibre network design and implementation.

**References**

The Agency may provide the following reference documents

- i. ITS System Requirements Document for DART BRT*
- ii. Dar as Salaam ITS Strategic Plan Document*
- iii. Conceptual Fiber Communication Network Design Document*
- iv. List of possible Stakeholders*