No.

Dar es Salaam City Council

The United Republic of Tanzania

Dar es Salaam

Transport Policy and System Development

Master Plan

Summary

June 2008

JAPAN INTERNATIONAL COOPERATION AGENCY

PACIFIC CONSULTANTS INTERNATIONAL

CONSTRUCTION PROJECT CONSULTANTS

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The exchange rates applied in this Study are:

US$ 1.00 = Tshs. 1,271.26

US$ 1.00 = Japanese Yen 116.74

(as of December 2007)

Preface

In July 2005, The Government of Tanzania (hereinafter referred to as GOT) officially requested the Government of Japan (hereinafter referred to as GOJ) to provide Japan's technical assistance in developing a transportation master plan named the "Urban Transport Policy and System Development Master Plan for the City of Dar es Salaam" (hereinafter referred to as the Study).

In response to the request from GOT, Japan International Cooperation Agency (hereinafter referred to as JICA) dispatched a preparatory study team, and the Scope of Work of the Study and the Minutes of Meeting were signed and exchanged between Dar es Salaam City Council (hereinafter referred to as DCC, the implementation agency of the Study) and JICA in December 2006.

JICA has selected a consortium of consultant, consisting of Pacific Consultants International (hereinafter referred to as PCI) and Construction Project Consultants Inc. (hereinafter referred to as CPC), both of Tokyo, Japan, in February 2007. The Study Team, under the direction of Mr. Junji Shibata, PE., has initiated technical efforts since April 2007 and has completed the Study in June 2008.

The overall goal of the Study is to formulate Transportation Policy and System Development Master Plan with the target year of 2030 for the city of Dar es Salaam. Under the short-term objectives of the Study, it is requested to formulate short-term action plans to alleviate the current traffic congestion problems and prepare Preliminary Feasibility Study (pre-FS) for the selected priority projects. Concurrently it was required to develop a Capacity Development plan in order to assure effective implementation of the proposed projects.

Since the initial mobilization in April 2007, the study team has, over a 12 month period, conducted a series of traffic surveys, database development, transport modeling, preliminary feasibility studies and master plan development. In parallel with the study progress, a series of meetings were organized, which has resulted in an increase of ownership mind of the Study as well as quality of the products.

Finally, it is my hope that this report will contribute to prosperity of the city of Dar es Salaam towards a world city and I wish to express my sincere appreciation to all the officials and stakeholders for their generous cooperation to the Study.

June 2008

Eiji Hashimoto

Vice President

Japan International Cooperation Agency

June 2008

Mr. Eiji Hashimoto
Japan International Cooperation Agency
Tokyo, Japan

Letter of Transmittal

Dear Sir,

We are pleased to submit herewith the Final Report of the "Dar es Salaam Transport Policy and System Development Master Plan".

The Study was undertaken in the United Republic of Tanzania from April 2007 through June 2008 by a consortium of consultant, consisting of Pacific Consultants International and Construction Project Consultants Inc., both of Tokyo.

The final deliverables include Executive Summary Report, Master Plan Report, Feasibility Study Reports of the selected two priority projects, a series of Technical Reports, and CDs including GIS database, Traffic Data and Transport Model developed by STRADA.

We would like to express our sincere gratitude and appreciation to all the officials of your agency and the JICA advisory committee. We also would like to send our great appreciation to all those who extended their kind assistance and cooperation to the Study Team, in particular, Dar es Salaam City Council as the counterpart agency.

We hope that implementation of the projects and recommendations suggested in the study reports will contribute to further development and prosperity of Dar es Salaam, the United Republic of Tanzania.

Very truly yours,

柴田純治

Junji Shibata, PE.
Study Team Leader
Pacific Consultants International

Dar es Salaam Transport Policy and System Development Master Plan

Summary

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I. Introduction

The overall goal of the Study is to formulate the Urban Transportation Policy and System Development Master Plan with the target year of 2030 for the city of Dar es Salaam. Under the short-term objectives, it is requested to formulate action plans to alleviate the current traffic congestion problems and prepare preliminary a feasibility study (pre-FS) for the selected two priority projects: Gerezani Area Transport Enhancement Project and Tazara Intersection Improvement Project. Concurrently it is required to develop a capacity development plan in order to assure effective implementation of the proposed projects, which has been developed as a proposal to the establish National Center for Transport Studies (NCTS). Institutional development is another important issue in order to implement the proposed projects in a sustainable manner. An organization named the Dar es Salaam Urban Transport Authority (DUTA) is proposed in this regard, which is responsible for overall transport development in Dar es Salaam.

II. Dar es Salaam Vision

Dar es Salaam is the principal economic center of Tanzania and the city will further enhance its pivoting economic and social roles. The year 2030 Development Vision for Dar es Salaam can be represented by the "Gamma Objective", meaning that the long-term goal for all investments and initiatives should be oriented to reaching the status of a Gamma World City. The city will become a principal regional gateway for Tanzania and surrounding (landlocked) countries linking the city and region to other predominantly European and Asian world cities.

Figure 1 Towards a Regional Gateway

III. Planning Framework

Global assumptions

1. Population: the population of Dar es Salaam will increase from 2.6 million in 2003 to 4.0 million in 2015 and to 5.8 million habitants in 2030. Accordingly, some 2.8 million habitants will increase in Dar es Salaam in the next 23 years from 2007 to 2030. A question from the land use planning is how and where to accommodate this additional population.
2. Scholl enrollment: the total population of school enrollment will increase from 0.7 million in 2007 to 1.9 million in 2030 (see **Table 1**).

Table 1 School Enrollment in Dar es Salaam, 2030

Year	Primary	Secondary	Tertiary	Others	Total
2007	458,500	187,000	31,700	23,200	700,500
2030	983,000	382,800	310,000	226,500	1,902,400

Source: JICA Study Team

3. Job opportunity: the work population will grow from 0.93 million persons in 2002 to 2.32 million persons in 2030, especially the work population in the tertiary sector will increase three-fold from 0.64 million persons in 2002 to 1.97 million persons in 2030 (see **Table 2**).

Table 2 Work Population by Economic Sector in Dar es Salaam, 2030

Year	Primary	Secondary	Tertiary	Total
2002	164,279	123,016	640,239	927,534
2030	116,000	232,000	1,972,000	2,320,000

Source: JICA Study Team

4. Vehicle ownership: the total number of passenger cars plus pick-ups used in Dar es Salaam is estimated at 77.8 thousand vehicles in 2007, which will increase to 179.8 thousand in 2015 and 515.4 thousand in 2030.

5. Economic growth: the Master Plan employs an average real economic growth rate of 5.5 percent per annum for Tanzania Mainland, as a moderate-high economic growth scenario of the country. Based on this assumption, GDP per capita will increase 2.04 times between 2003 and 2030 in Tanzania Mainland. While, it is assumed that Dar es Salaam economy will grow faster than the national average. Considering its dominance of the tertiary industry in Dar es Salaam, the average annual growth rate of regional GDP is to be 7.6 percent between 2003 and 2010 and then it will gradually decrease to 6.1 percent between 2025 and 2030. The per capita income in Dar es Salaam will also grow faster than the national average. Accordingly, the per capita income of Dar es Salaam will increase 2.65 times between 2003 and 2030 in real terms (see **Table 3**).

Table 3 Economic Growth Assumptions

Year	TANZANIA			Dar es Salaam		
	GDP Growth Rate	GDP Per capita Growth Rate	Per capita GDP 2003=100	GRDP Annual Growth Rate	GRDP Per capita Growth Rate	Per capita GRDP 2003=100
2003-2010	5.5%	2.5%	119	7.6%	3.5%	127
2010-2015	5.5%	2.6%	135	7.0%	3.6%	152
2015-2020	5.5%	2.7%	155	6.7%	3.7%	182
2020-2025	5.5%	2.8%	177	6.4%	3.8%	220
2025-2030	5.5%	2.8%	204	6.1%	3.8%	265

Source: JICA Study Team

Spatial Structure

The population of Dar es Salaam will reach 5.8 million inhabitants by 2030. This indicates that another roughly 2.8 million people need to be accommodated within the city for the next two decades. A question is where this population will be accommodated. If adequate land development policies are not prepared, urban sprawl and illegal settlements would continue and extend beyond the boundary of jurisdiction, especially along the major arterial roads such as Morogoro, New Bagamoyo, Nyerere and Kilwa road. This will cause chaotic traffic congestions on the city's road system and further deterioration of the living environment.

1. **Spatial Development Constraints – SUDP suggestion:** the SUDP designated potential hazardous areas including swamps, land erosion and flood plain areas as unsuitable areas for the future urbanization. The SUDP also identified natural resources to maintain the ecosystem of the city. Such physical constraints for future urbanization are illustrated in **Figure 1**.

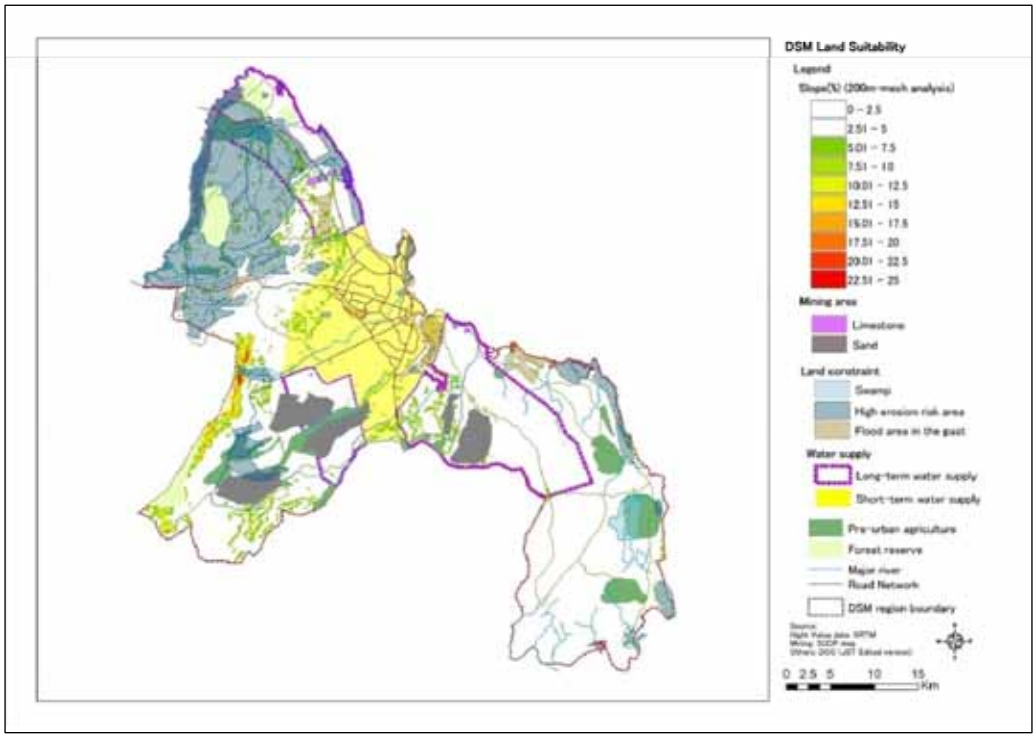


Figure 1 Physical Constraints for Future Urbanization by SUDP

2. **Urban Growth Boundary:** in order to avoid disordered urban sprawl and expansion of unplanned settlements to the peripheral area, it is recommended to employ the concept of "urban growth boundary (UGB)" which identifies a spatial limit of urbanization for the next 20 years. The UGB can be reviewed every 5 years based on the analysis of population growth, natural conditions, land development constraints, and infrastructure development programs. The inside of the UGB is the priority area of intensive urban development to accommodate the future population. **Figure 2** illustrates a proposed UGB towards year 2030.

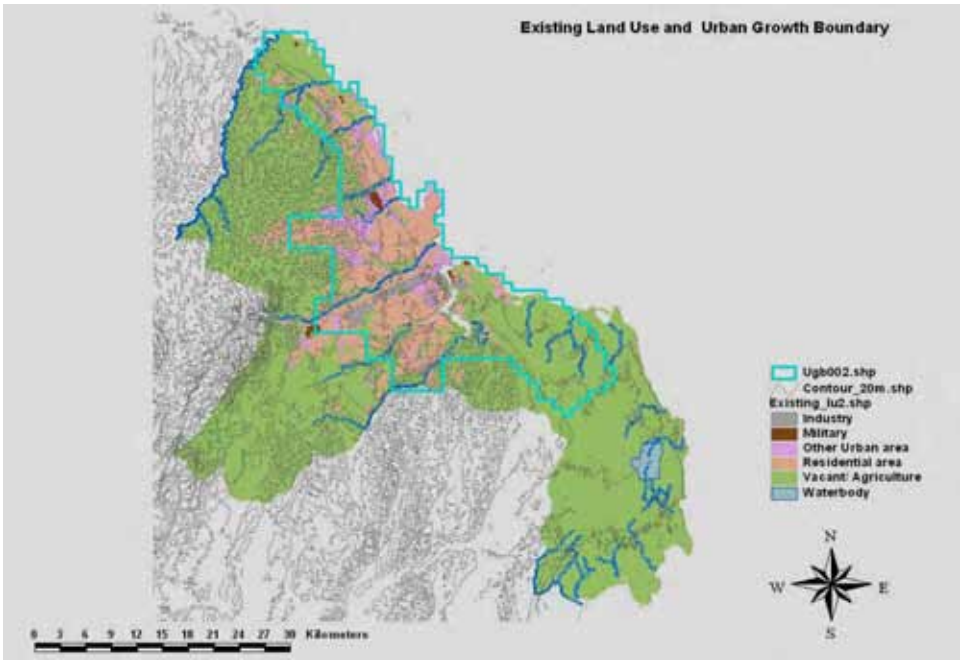


Figure 2 Existing Land Use and Future Urban Growth Boundary

3. **BRT corridor development:** it is proposed to employ the idea of Strategic Corridor Development where urban development and public and private investments are expected to be concentrated in strategic development axes.

   One of the priority potential development axes is the BRT Phase 1 corridor along Morogoro road, connecting the City Center with Kariakoo, Magomeni, Manzese, Ubungo and Kimara. Major urban activities will be encouraged to concentrate along this corridor, aiming to establish a compact and efficient urban structure. In order to make such an idea happen, secondary arterial roads should be developed in parallel with Morogoro road. **Figure 3** illustrates an image of such a corridor development pattern. The area between the arterial roads shall be designated as a special development zone to encourage intensive urban development.

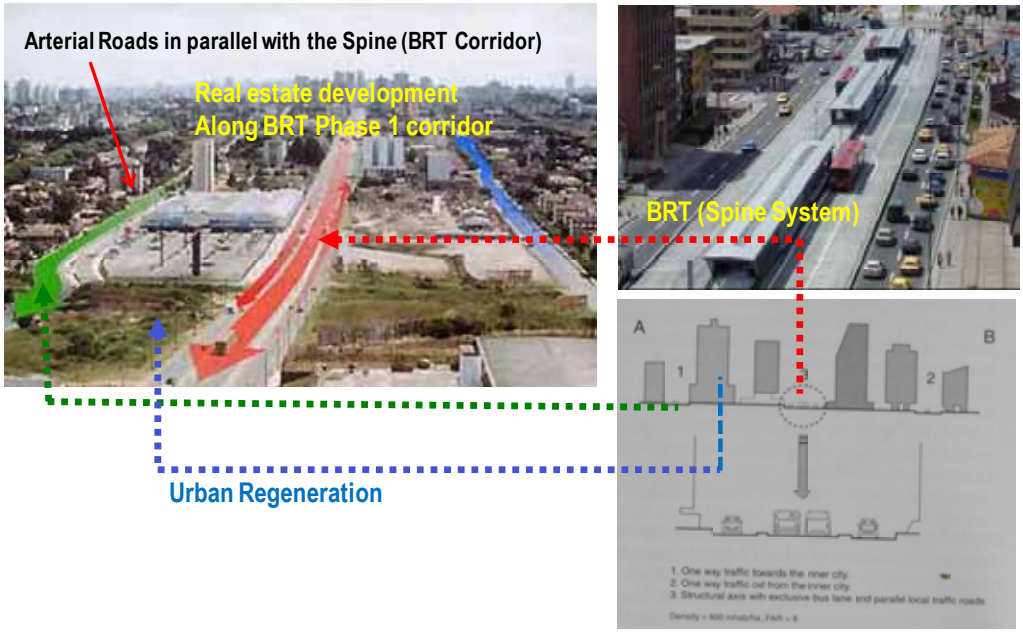


Figure 3 Image of Intensive Corridor Development

   In the long-term perspective, the strategic corridor development will be extended to the south along Kilwa road and then to the east to the Kigamboni area after construction of a bridge crossing the river.

4. **Satellite Centers:** The UGB is extended along the coast, stretching about 60 km. The current one growth pole (everything is in CBD) structure in terms of opportunity of businesses and social activities does not necessarily work effectively when the urbanized area is extended to the north or south edges of UGB, because such a development pattern requires an extremely longer journey to reach CBD. Hence it is strongly recommended to develop satellite centers, which are self-sustainable to a certain extent, at around a 15 km distance from the current city center, where people can reach job opportunities and social services. **Figure 4** shows indicative locations of the satellite centers.

5. **Spatial development scenario:** the strategic corridor development pattern is the most preferred urban structure for Dar es Salaam in terms of cost effectiveness in various aspects. The BRT Phase 1 operation is expected to be a trigger to encourage the change of urban structure: i.e., from a mono-centric radial development pattern to the strategic corridor development pattern. The property value along the corridor will increase significantly and urban development will take advantage of these changes. There are significant opportunities for the public and private sectors to invest in urban development to seek more effective use of the land along the corridor. In theory, however, the polycentric satellite centers development pattern may be the better option in the

long-term perspective. The Master Plan proposes three satellite centers within UGB as shown in **Figure 4**. **Figure 5** shows conceptual development scenario for Dar es Salaam in a timeframe from 2007 to 2050.

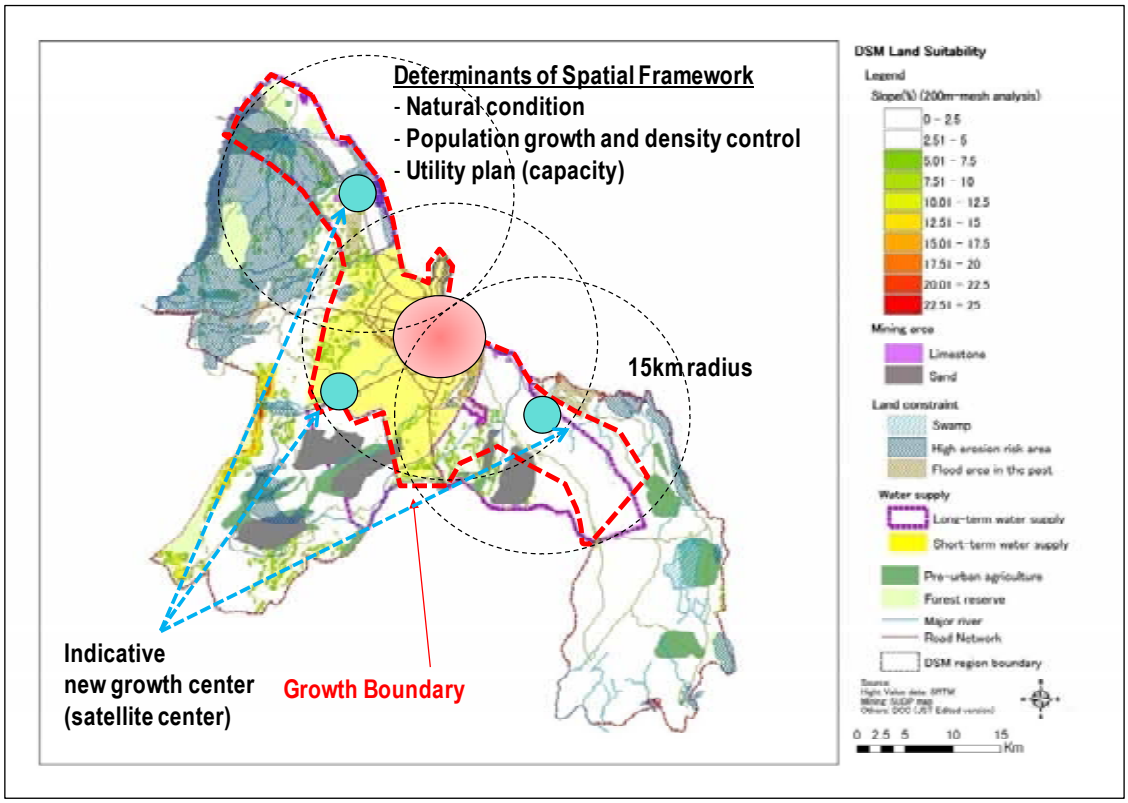


Figure 4 Satellite Center Development in a long-term perspective

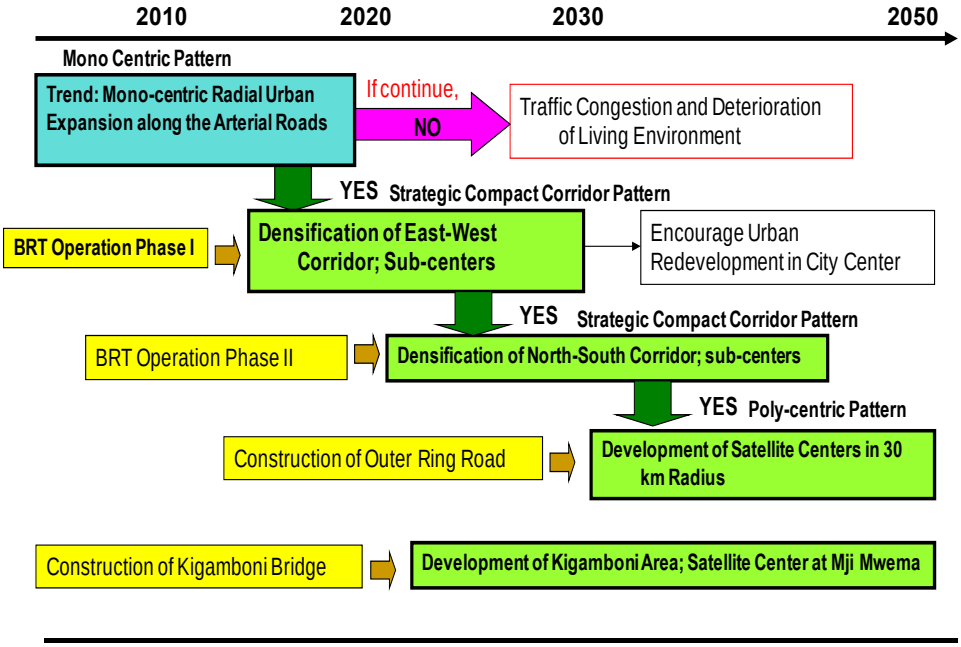


Figure 5 Urban Development Scenario for Dar es Salaam towards 2050

IV. Urban Transport Development Policy

In this section, major policies and strategies indicated in the Master Plan are summarized, then detailed discussions are available in the sections following.

Short-term Policies and Strategies

The short-term policies and strategies focus on alleviation of the current and foreseen traffic problems in near future and preparatory works for consequent actions, especially in the field of institutional and administrative improvement. These actions include:

- Implementation of urgent projects

  Several critical locations are identified in the study area as follows:

  - Ubungo Intersection, Tazara Intersection and Bandari Intersection, followed by the Mwenge Intersection (Sam Nujoma and New Bagamoyo Roads), Morocco and Magomeni Intersections.
  - Chang'ombe Intersection can be upgraded in line with the BRT realization.
  - The Selandar Bridge area: construction of a road-paralleling Ali Hassan Mwinyi Road by land reclamation is needed.

  A preliminary study has been prepared respectively for the Gerezani area transport enhancement and the Tazara intersection improvement. These documents should be utilized for the next step, that is, budgeting for the detailed design and construction work.

- BRT Phase 1 project implementation and supportive activities

  DART Agency, as the system manager, is expected to develop attractive business models (through designing the contracts) for potential BRT/feeder bus operators and other business entities to be involved in the BRT-related business in Dar es Salaam.

- Public administration reform in the urban transport sector

  It is recommended to establish the Dar es Salaam Urban Transport Authority (DUTA) as a single authority being responsible for the urban transport enhancement in Dar es Salaam. As the first step towards DUTA, it is desired to establish a board of management by inviting relevant stakeholders horizontally and vertically.

- Capacity development

  A good database and computerized transport models have been developed for urban planning and urban transport planning purposes in this study. These products should be recognized as very valuable assets or foundations for further planning activities. To use these assets effectively, it is highly recommended to establish the National Institute of Transport Studies (NCTS), which will be in charge of training the transportation planners in Tanzania.

- Local tax revenue enhancement

  A very limited budget has been allocated to urban transport facilities, and in most cases, such a budget came from organizations at the national level, but very little from the local government. Most of the trunk systems in Dar es Salaam will be financed by the central government, but many tertiary roads and local community roads should be developed by the local government, with a focus on quality pedestrian-environment development. Accordingly the capacity of revenue authority at the local government level, both in terms of human resources and taxation coverage,

should be improved.

- Urban Regeneration Plan along Morogoro Road
  The BRT Phase 1 project will provide prosperous real estate and commercial/business opportunities along the corridor. Various urban functions including commercial/business office buildings, entertainment facilities, hotels, restaurants, schools, hospitals, government service functions, etc. will be attracted to the land along the BRT Phase 1 corridor. In order to properly guide such demand in the real estate market, a local plan should be immediately prepared.

Medium- and Long-term Policies and Strategies

Based on the preparatory works under the short-term policies and strategies, continuous effort should be made on the following:

- Establishment of the Dar es Salaam Transport Authority
  The initiative made by the board of management should lead to the "executive phase" and consequently the "consolidation phase". At this stage, NCTS is expected to fully function as a technical supporting body to DUTA as well.

- Enhancement of NCTS
  Following the establishment of the transport-training center in the initial phase, consequent phases should take place:

  Phase 2: Department of Transport Planning shall be established and expand the functions of the Centre to include transportation research activities.

  Phase 3: National Centre for Transport Studies will be fully developed into a more independent body that strengthens both training and research functions.

- Establishment of the Dar es Salaam Urban Development Agency (DUDA)
  In order to guide future urban regeneration in Dar es Salaam, and in particular to implement the local plan prepared for the land along the Morogoro corridor, it is recommended to establish a new organization, called the Dar es Salaam Urban Development Agency (DUDA). This agency will be responsible for urban planning and development issues in Dar es Salaam, with close cooperation with the Dar es Salaam Urban Transport Authority (DUTA).

- Involvement of Private Sector
  Involvement of the private sector should be encouraged in various business opportunities related to the urban transport provision. The DART Agency needs to take the initiative to develop good and attractive business models for those potential entities. In the long-term perspective, it might be possible to invite investors into the toll business in Dar es Salaam. The proposed urban expressway system should consider every possibility of inviting private investors in developing the system.

- Monitoring and Revision of the Master Plan
  In general, any kind of master plan requires periodic reviews and updates. This Urban Transport Master Plan, of course, should be reviewed every 5 years by DUTA. Monitoring on the progress of the proposed implementation plan is essential in revising the Master Plan. DUTA should take a leading role in monitoring the progress in this regard.

Spine Policies and Strategies

There are several very principal policies that should be maintained for the next twenty years that are called Spine Policies and Strategies in this study.

- Quality development towards the enhancement of financing capabilities

  Capacity or affordability of borrowing money from external sources, including international financial markets such as bond issuing for the proposed urban transport infrastructure development, should be enhanced. However, it is in fact dependant on the stability and scale of the national economy. In order to enhance such capacity of the national economy, it is very much desired to increase exports to earn foreign currencies, however, Dar es Salaam itself will not be able to generate such exporting goods. While as a gateway city of Tanzania as well as of the Eastern African countries, Dar es Salaam should function as a trading and financial center of the region, which will support various industrial activities in the region. In order to invite such functions (investors), a quality living environment, transportation and communication infrastructures should be prepared in advance. BRT Phase 1 must be the first and most important initiative towards the creation of the quality of life in Dar es Salaam.

- Pedestrian and NMT-focused development and Urban Road Design Standards

  The development of a transport infrastructure in Dar es Salaam has been dominated by major facilities, namely trunk roads; while less attention has been paid to pedestrian facilities such as a safe and seamless footpath network, comfortable bus shelters, safe cycling paths, etc. One of the reasons to explain this is the lack of urban road (facility) design standards, which clearly indicate requirements of such pedestrian and NMT facilities. At the same time, towards a World City in the region, Dar es Salaam needs to provide quality urban transport and a living environment that the citizens can be proud of and visitors would appreciate. It is highly recommended to prepare urban (road) facility design standards employing the "universal design" concept in this regard. Every transport infrastructure development in Dar es Salaam should pay careful attention to the pedestrian and NMT environment.

- Public transport-oriented development

  The current modal split between private cars and buses is 11:89 (2007), which will change to 39:61(2030) where no significant demand management measures (other than BRT) are taken in place. It is actually quite difficult to attract people to use public modes of transport as their income increases. However, it is very necessary to increase use of future public modes of transport (BRT and secondary buses) by taking every opportunity. One of the guidelines for the future urban development concept is "public transport-oriented development" in which every effort in the field of urban development and transport infrastructure development should be focused on, on the encouragement of using the public modes through land use planning and quality design. General strategies for public transport system development in Dar es Salaam are as follows:

  - Encouraging people from "own" to "use"
  - "On demand" or "Demand-responsive"
  - Variety of means with many choices to meet users' desires
  - Healthy and enjoyable
  - "Universal Design"
  - Better comfort than using a private car
  - Environmentally friendly system (public enlightenment regarding their awareness to the environment is necessary)
  - Recognition as a valuable "common asset" of the city – BRT and associated systems
  - Public transportation system itself can become an attraction for tourists and visitors.

- Accessibility to all

The transport infrastructure should accommodate demands of many kinds of citizens and visitors in various aspects. In particular, careful and continuous attention should be paid to the so-called vulnerable people, including: poor people, elderly people, disabled people, women, and children. To meet every kind of demand for such people, the Government should make efforts as much as possible through various policy instruments. From the design point of view, the concept of "universal design" should be taken into consideration in developing the infrastructure. Besides, visitors are very important especially for Dar es Salaam as the gateway city of the country. For those people, it is important to provide information that is easy to understand the systems in the city.

- Mobility to all

  In general, emphasis is placed on public transport system development. Accordingly, BRT users will be able to enjoy high mobility in the city. While car users mobility will remain at the same level of the current situation (which is suggested by the traffic simulation). However, it is necessary to provide high mobility for car users as well, especially for commercial vehicle operators and high-profile car users. For this purpose, some road segments (routes) should be designated as "heavy-loaded roads" and "expressways" and should also be provided to cover the whole area of Dar es Salaam.

- Intensive development within UGB

  This Master Plan designates the spatial growth limitation of the city by proposing the urban growth boundary (UGB) to accommodate a population of about 6 million in 2030. Efficient provisions of infrastructures require "ordered or controlled density" in terms of land use within UGB. In this regard, no significant infrastructure development is recommended outside UGB, while intensive infrastructure provision is encouraged within UGB.

V. Road Transport Sector Plan

Functional Road Classification Scheme

The establishment of a good functional road hierarchy is expected to catalyze the following benefits within the Dar es Salaam context:

- Provide a potential framework for policy, planning, implementation, management and monitoring;
- Assist with establishing design standards and guidance appropriate for an urban environment; and,
- Develop an understanding of road network functions.

Such a revised classification scheme forms an integral element of the Master Plan. Toward that end, it is proposed that a scheme be defined, which includes expressways/motorways, primary arterial roads, secondary arterial roads, tertiary arterial roads, community/local roads and special roads. The functional intent is:

- Expressways/motorways embody a high-type segregated design, and are to be used exclusively by motor vehicles. This road class will connect, for example, CBD with suburban satellite centers, residential areas, airport(s), seaport(s), and other high-activity trip generation precincts. Expressways/motorways can be tolled, should this prove desirable.
- Arterial roads are stratified into primary, secondary and tertiary facilities according to the level of services. Primary arterial roads represent critical road transport spines that anchor

future urban evolution and economic activity. BRT, a vital form of urban mobility (mass transit) for Dar es Salaam, is thus seen as an integral part of this road class in that BRT busways may only be placed into primary arterial roads. Secondary arterial roads provide mobility for medium distance traffic, such as between wards or districts within the city. Network bus services may be provided on this type of road, but will largely operate in mixed traffic. Tertiary arterial roads provide accessibility to defined geographical areas within the city, and are intended to provide linkage with other higher-order roads.

- Community roads or local roads provide accessibility to and/or between neighborhoods, communities and individual plots.
- Special roads used for specific purposes, such as a pedestrian mall, exclusive BRT roads, scenic roads, non-motorized vehicle ways, and pedestrian ways.

The main characteristics of each functional class are summarized in **Table 4**.

Table 4 Proposed Urban Road Functional Classification Scheme

Classification	Facility Stratification	Application	Intent
Expressways / Motorways	Tolled or non-tolled	Entire Region	- Exclusively vehicular use; no pedestrian facilities - Access-controlled with grade-separated interchanges - Accommodate longer and faster trips
Arterial Roads	Primary Arterial	Entire Region Link to trunk roads outside of Dar Es Salaam	- Form core metropolitan spines - Accommodate longer trips - Connect major trip generators (sub-centers, port(s), airport(s), etc.) - Link to national trunk roads - Can accommodate BRT busways
	Secondary Arterial	Between wards. Link to primary arterials	- Accommodate travel demands between wards in the region - Link to primary arterial roads - Network bus services provided - Transit priority (but nor BRT busways) possible
	Tertiary Arterial	Between neighboring precincts Link to primary and secondary arterial roads	- Provide circulation within, as well as between, wards, sub-wards, and residential areas - Link to secondary roads - Network bus services (likely smaller vehicles) possible
Community Roads	Access Roads (local collector roads)	Within community and residential area Link to feeder roads	- Local circulation and property access. - Can be used by informal forms of public transport
Special Roads	BRT roads	Exclusive BRT road, excluding other vehicle types	Enhanced BRT operation in support of a primary arterial network within unique precincts
	Transit Malls	Within CBD or busy commercial areas	Only for public transport (buses) and pedestrian uses
	Roads for non-motorized modes	Various locations	Safe roads exclusive for pedestrians and non-motorized vehicles
	Scenic roads/walkways	Along the coast and other scenic areas	Improve landscape, provide comfort and facilitate tourism
	Pedestrian Malls	Within CBD or busy commercial areas	Provide exclusive pedestrian space and related amenities

Source: JICA Study Team

Table 5 Potential Functional Classification Profiles

Classification	Facility Stratification	Design Speed (km/hr)	Lane Width (meters)	Typical Number of Lanes
Expressways / Motorways	Tolled or non-tolled	80-100	3.50-3.75	4-6
Arterial Roads	Primary Arterial	60-80 (less with BRT busways)	3.25-3.50	4-8 (including BRT lanes)
	Secondary Arterial	40-60	3.25-3.50	4 (plus turning lanes)
	Tertiary Arterial	30-40	3.00-3.25	2
Community Roads	Access Roads	Varies by use	3.00	2
Special Roads		Varies by purpose	Varies by purpose	Varies by purpose

Source: JICA Study Team

The unique requirements of mass transit (BRT) and commercial vehicles carry distinct implications. BRT busways are to be provided in (and only in) primary arterial roads. In addition, the needs of heavy commercial vehicles entail that the needs of cargo, BRT and other road users are harmoniously integrated within the functional classification system. It is therefore proposed that a three-level stratification be implemented. (**Table 6**).

- Primary Type I arterial does not contain any BRT busway facilities.
- Primary Type II and III arterials contain busways, but with differing station designs. While BRT stations may, at first inspection, be seen in a peripheral light vis-à-vis a functional road classification, there nevertheless exist important efficiency and safety considerations in the interplay of BRT passengers, heavy commercial vehicles and other elements of the traffic stream.

Table 6 Stratification of the Primary Arterial Classification

Classification	Implications by Vehicle Grouping		
	Bus Rapid Transit	Heavy Commercial Vehicles	Comments
Primary Type I	No BRT busways provided	Use permitted, and particularly encouraged in case of some designated facilities (truck routes).	Network (i.e. non-busways) bus services expected in the absence of BRT. Provision of curbside bus bays encouraged. Service trucks likely pronounced.
Primary Type II	BRT busways provided. Station design involves at-grade crossing of adjacent traffic lanes by BRT patrons (the Phase I BRT Project Concept)	Not permitted.	Network bus services to be minimal due to the BRT service. Service truck activities unavoidable, but should be discouraged.
Primary Type III	BRT busways provided. Station design involves grade-separated (pedestrian overpasses) crossing of adjacent traffic lanes by BRT patrons.	Use permitted.	Network bus services to be minimal due to the BRT service. Service truck activities expected.

Source: JICA Study Team. Heavy commercial vehicles considered: articulated trucks and truck-trailer combinations.

Commercial Vehicle Needs

Several key recommendations have emerged based on the cargo activity analysis.

- The issue of truck routes is becoming increasingly relevant already within the current context. Within the framework of the Master Plan, an indication of an "immediate action" truck route is depicted in **Figure 6**, to include a circumferential link (the Nelson Mandela Road belt) with radial connectors along the main corridors of heavy vehicle activities.
- Heavy commercial vehicles would be restricted from penetrating within the Mandela belt on roads other than the truck route network. A "service license" exemption for qualifying enterprises is possible with proper permits and with payment of an appropriate fee.
- A truck depot, suitable for the transfer of cargo between heavy commercial vehicles and service trucks, should be established to support restrictions in road facilities available for large trucks. Such a facility would be placed along Morogoro Road, several kilometers west of Nelson Mandela Road (Kimara truck terminal).
- Inland container depot (ICD): it is far preferable that any ICD be located outside of the Nelson Mandela Road belt, ideally near the perimeter of Dar es Salaam (integration with the Kimara truck terminal should be considered).
- The placement of BRT, a heavy vehicle truck route network and urban activities are closely linked within the functional classification system. For example, Morogoro Road, east of Nelson Mandela Road, is identified as a Primary Arterial Type II facility due to the implementation of the BRT Phase I and anticipated intense urban activity. While, Morogoro Road, west of Nelson Mandela Road, should be designated as a Primary Arterial Type III facility because it is included as a key element of the near-term truck route network. The implication of this is that the BRT Phase I concept, west of Morogoro Road, must be re-designed to permit elevated (pedestrian walkways) access to, and egress from, BRT stations.

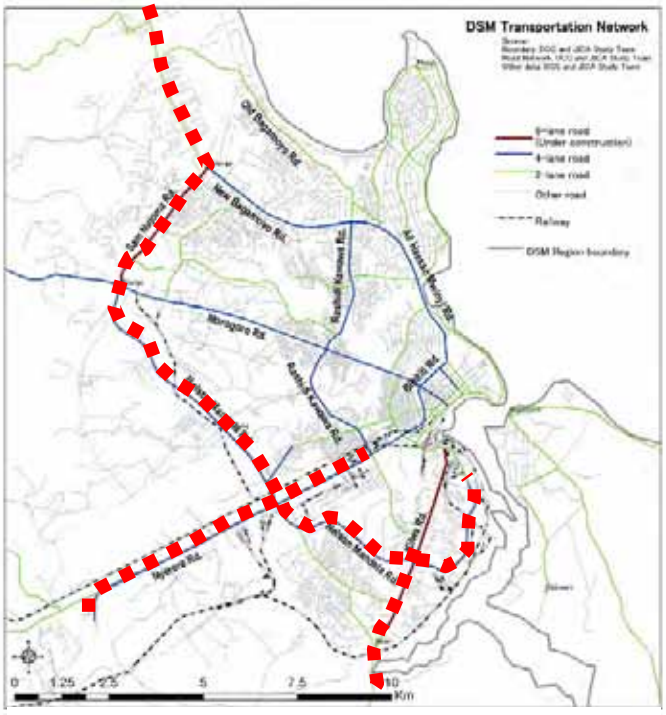


Figure 6 Proposed Near-term Truck Route Network for Heavy Commercial Vehicles (red dotted line)

Evolution of the Master Plan Road Network

(1) Year 2030 Network

A total of 1,091 km of roads, including the proposed expressway, were tested and confirmed with the year 2030 traffic demand of the UGB assumption. As suggested in the planning framework, intensive road improvement and construction are proposed within the UGB as shown in **Figure 7** and **Table 9**. Most of the roads on the Kigamboni side are new roads that are expected to attract future urban development in the south of Dar es Salaam.

The transport policy suggests that the priority should be given to people's mobility, but at the same time, mobility of cars is important in order to improve the attractiveness of Dar es Salaam as a Gunma World City in the future. Accordingly, an expressway system is proposed, which runs through the entire UGB area as a spine road system for the region.

(2) Performance of the Proposed Master Plan Road Network

The average vehicular travel speed in 2007 was estimated at 25.6 km per hour, which will decrease to 10.0 km per hour in 2030 if nothing will be done. This simulation indicates that the situation will be chaotic if nothing is done in the next twenty years. With the year 2030 proposed network, the average volume capacity ratio will increase to 0.89, which is still a reasonably acceptable level of service as a whole. However, vehicular travel speed will slightly decrease to 25.2 km per hour. The "Core Network" which has no expressway system performs good as well.

The share of public transport modes will decrease from 84.4 % in 2007 to 66.4% in 2030 due to the increase of vehicle ownership. The number of registered vehicles is expected to increase from 74,000 in 2007 to 515,000 in 2030. It is quite difficult to restrict the vehicle ownership itself, but the simulation suggests a sort of traffic demand management technique might be necessary, especially in CBD, if we wish to increase the modal share of public transport in 2030.

Table 7 Network Performance Summary

	Travel Distance (PCU*km)	Travel Time (PCU*hr)	Capacity*km (PCU*km)	Road Length (km)	Ave. VCR	Ave. Travel Speed (km/h)
2007 Existing Case	4,790,442	187,005	7,305,131	783	0.66	25.6
2015 Without Case	10,054,140	647,281	7,305,131	783	1.38	15.5
2015 Base Case	8,008,715	263,979	12,485,079	959	0.64	30.3
2030 Without Case	23,688,605	2,379,228	7,305,131	783	3.24	10.0
2030 Base Case	22,012,455	871,949	24,741,882	1,215	0.89	25.2
2030 Without Expressway	20,951,285	1,007,062	20,262,879	1,142	1.03	20.8

Source: JICA Study Team

(3) Year 2015 Network

A total of 149 km of road improvement and construction work, plus five flyovers and a traffic management system (e.g., seven signalized intersections) in CBD are recommended as the projects to be completed (open to public) by the year 2015 as shown in **Table 8**.

The 2015 priority projects include the New Bagamoyo road-widening project, widening of major primary arterial roads for future BRT operations after BRT Phase 1, Tabata BRT special road using the unused rail corridors, a series of Morogoro BRT corridor development, and the Outer Ring Road (this is different from the existing idea of ORR alignment).

Table 8 The Priority Road Development by 2015

Project No.	Project Name/Location	Road Class	Project Length (km)	Project Cost (mil Tshs)	Note
101	New Bagamoyo Road Widening	1	17.0	81,371	Excluding project cost of BRT buses
103	Kigamboni Bridge and Access Road Improvement	1	8.1	130,116	
104A	Inner Ring Road/Kawawa Road Development	1	3.6	16,882	
104B	Inner Ring Road/Kawawa Road Development	1	2.8	6,339	
105	Nyerere Road Widening	1	15.1	51,128	Excluding project cost of BRT buses
106	Outer Ring Road Development	1/2	30.3	91,120	
107	BRT Phase 1 Corridor and Road Development	3	9.4	11,635	
108	BRT Phase 1 Corridor and Road Development	2	5.4	21,743	
109A	Gerezani Area Transport Enhancement	1	15.8	21,588	Excluding project cost of BRT buses, including BRT flyover to Kariakoo.
109B	Gerezani Area Transport Enhancement	1	2.6	5,973	Excluding project cost of BRT buses
110	Selander Bridge Bypass	2	7.2	30,411	
111	Kigamboni Corridor Road Development	2	8.4	20,990	
112	Tabata BRT Development	4	15.5	106,390	Excluding project cost of BRT buses
113	Flyover Installation	1	0.0	78,048	4 intersections: Tazara, Ubungo, Mwenge, Kawawa-Nyerere
114	CBD Traffic Management	1/2/3	0.0	2,792	7 Signalized Intersections
120	Mikocheni Road Widening	2	3.1	6,457	
132	Changombe/Tandika Road Widening	2	4.3	10,019	
		Total	148.6	693,002	

Source: JICA Study Team

2030 ROAD DEVELOPMENT PLAN

Project No. (lanes)	Length (km) Widening	New Construction
101 (6)	17.0	---
102 (6)	12.9	---
103 (6)	---	8.1
104A (6)	3.6	---
104B (4)	2.8	---
105 (6)	15.1	---
106 (4)	10.0	20.4
107 (2)	3.5	5.9
108 (4)	4.8	0.6
109A (6)	15.8	---
109B (4)	2.6	---
110 (4)	5.9	1.3
111 (4)	8.4	---
112 (BRT)	---	15.5
113	Flyover	
114	CBD Traffic Management	
115A (4)	---	17.8
115B (2)	1.6	1.6
116 (4)	0.1	22.5
117 (4)	---	3.1
118 (4)	---	2.6
119 (4)	---	19.4
120 (4)	1.5	1.6
121 (4)	5.0	---
122 (4)	7.7	---
123 (4)	8.0	---
124 (4)	5.3	---
125A (6)	---	16.0
125B (4)	---	8.0
126 (4)	2.8	0.9
127 (4)	0.8	6.0
128 (4)	1.9	3.9
129 (4)	6.1	1.4
130 (4)	4.5	---
131 (4)	4.8	1.9
132 (4)	4.3	---
133 (6)	3.5	---
134 (4)	6.3	0.7
135 (4)	1.1	1.5
136 (4)	26.1	---
137 (4)	18.8	---
138 (4)	1.7	---
139 (4)	---	3.4
140 (4)	---	4.5
141 (4)	---	6.6
142 (4)	---	6.4
143 (4)	---	12.0
144 (4)	2.8	3.0
145A (6)	4.9	---
145B (4)	8.8	---
146 (4)	1.1	0.6
148 (2)	1.8	---
149 (2)	9.8	2.4
150 (2)	6.1	6.6
151 (2)	104.0	---
152 (2)	53.7	---
153 (2)	75.3	---
154 (2)	21.5	5.8
155 (2)	93.2	---
156 (2)	14.2	33.5
157 (2)	1.9	21.9
158 (2)	14.2	9.8
159 (2)	12.8	4.7
160 (2)	5.4	1.8
161 (2)	1.9	2.6
TOTAL	647.6	286.3

Urban Growth Boundary

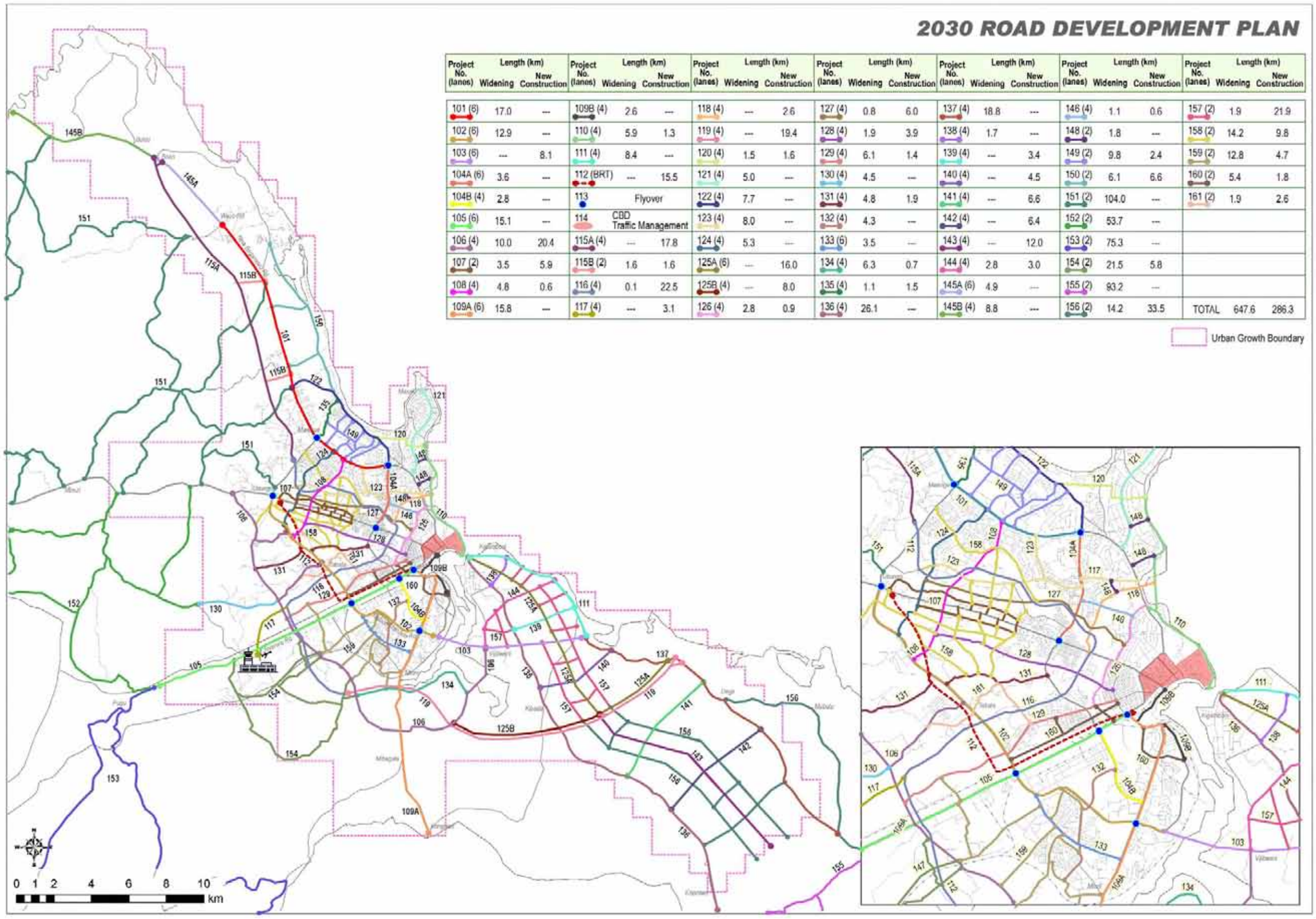


Figure 7 The Master Plan Road Network

Table 9 The Master Plan Road Development Project List

Project No.	Project Name	Road Classification	Project Length (km)	Project Cost (Million Tshs)
101	New Bagamoyo Road Widening	1	17.0	81,371
102	Nelson Mandela Road Widening	1	12.9	59,290
103	Kigamboni Bridge and Access Road Improvement	1	8.1	130,116
104A	Inner Ring Road/Kawawa Road Development	1	3.6	16,882
104B	Inner Ring Road/Kawawa Road Development	1	2.8	6,339
105	Nyerere Road Widening	1	15.1	51,128
106	Outer Ring Road Development	1/2	30.3	91,120
107	BRT Phase 1 Corridor and Road Development	3	9.4	11,635
108	BRT Phase 1 Corridor and Road Development	2	5.4	21,743
109A	Gerezani Area Transport Enhancement	1	15.8	33,121
109B	Gerezani Area Transport Enhancement	1	2.6	5,973
110	Selander Bridge Bypass	2	7.2	30,411
111	Kigamboni Corridor Road Development	2	8.4	20,990
112	Tabata BRT Development	5	15.5	106,390
113	Flyover Installation	1	0.0	78,048
114	CBD Traffic Management	1/2/3	0.0	2,792
115A	Expressway (Wazo-Sam Nujoma)	4	17.8	50,545
115B	Expressway (Wazo-Sam Nujoma)	3	3.2	4,009
116	Expressway (Sam Nujoma-Airport)	4	21.8	2,047,993
117	Expressway (Sam Nujoma-Airport)	2	3.1	9,075
118	Expressway (Sam Nujoma-Airport)	2	3.4	9,776
119	Expressway (Airport-Kigamboni)	4	19.4	55,193
120	Mikocheni Road Widening	2	3.1	6,457
121	Haile Selassie Street Widening	2	5.0	10,666
122	Old Bagamoyo Road Widening	2	7.7	19,470
123	Mwinyjuma Road Widening	2	8.0	22,270
124	Shekilango Road Widening	2	5.3	19,183
125A	Kigamboni Road Development 7	1	16.0	69,008
125B	Kigamboni Road Development 8	1	8.1	25,743
126	United Nations Road Widening	2	3.7	7,839
127	Morogoro Road Bypass (North)	2	6.8	19,922
128	Morogoro Road Bypass (South)	2	5.8	17,497
129	Uhuru Street Widening	2	7.5	16,078
130	Kimanga/Tabata Road Widening	2	4.5	9,443
131	Tabata Road Development	2	6.6	19,236
132	Changombe/Tandika Road Widening	2	4.3	10,019
133	Mbagala/Tandika Road Widening	2	3.5	11,044
134	Mbagala Road Widening	2	7.0	14,555
135	Sam Nujoma Road Extension	2	2.6	5,426
136	Kibada Road Widening	2	26.1	61,154
137	Kigamboni Road Widening	1/2	18.8	46,748
138	Kigamboni Road Development 1	2	1.7	3,594
139	Kigamboni Road Development 2	2	3.4	9,782
140	Kigamboni Road Development 3	2	4.5	9,326

Project No.	Project Name	Road Classification	Project Length (km)	Project Cost (Million Tshs)
141	Kigamboni Road Development 4	2	6.6	13,765
142	Kigamboni Road Development 5	2	6.4	18,670
143	Kigamboni Road Development 6	1	12.0	34,352
144	Vijibweni Road Widening/Development	1	5.7	16,564
145A	New Bagamoyo Road Extension	1	4.9	17,083
145B	New Bagamoyo Road Extension	1	8.8	23,470
146	Upanda Road Improvement	2	1.7	6,070
148	Msasani Area Road Improvement	3	1.8	2,274
149	Regent Area Road Development	3	12.2	16,346
150	Old Bagamoyo Road Extension	3	12.7	18,335
151	Kinondoni Regional Road Development	3	104.0	131,164
152	Kinondoni Regional Road Development 2	3	53.7	70,289
153	Ilala Regional Road Development	3	75.3	98,238
154	Ilala Regional Road Development 2	3	27.3	36,364
155	Temeke Regional Road Development	3	93.2	119,057
156	Temeke Regional Road Development 2	3	47.7	64,100
157	Temeke Regional Road Development 3	3	23.8	32,002
158	Corridor and Road Development 3	3	24.0	33,588
159	Tandika Area Road Improvement	3	17.5	25,512
160	Industrial Area Road Improvement	3	7.2	8,861
161	Tabata Area Road Improvement	3	4.5	6,892
162	Flyover Installation (Phase2)	1	0.0	58,536
Total			933.7	4,209,932

Note: The number for road classification indicates; 1: Primary Arterial, 2: Secondary Arterial, 3: Tertiary Arterial, 4: Expressway, and 5: Others (Tabata BRT Development, dedicated for BRT).

(4) Critical Locations – Priority Intersections

The highest priority locations include Ubungo Intersection, Tazara Intersection and Gerezani area (Bandari Intersection) .

Ubungo intersection

The Master Plan is fully supportive of the DART BRT concept, however, it is very likely that the BRT Phase I design, as of December 2007, will cause an unwanted delay and operational difficulties at Ubungo Intersection, largely due to U-turn facilities proposed north and south of Morogoro Road. An optimization of Ubungo Intersection from the existing Phase I concept is possible, considering current levels of demand (adoption of four-phase signalization, inclusion of right-turns at the intersection proper), the reduction of Dala Dala activity per a post-BRT scenario, and the relocation of the Ubungo Dala Dala terminal access point.

However, in the longer term, increasing traffic may overwhelm this at-grade solution. The demand analysis suggests that construction of a mixed traffic flyover, using to split (portal) designs to account for future BRT lanes along Sam Nujoma Road, is likely to offer the most benefits in terms of intersection (and indeed corridor) traffic operations. It is suggested that the flyover be constructed along the Nelson Mandela-Sam Nujoma Roads axis, thus reinforcing the “inner ring road” concept whose realization will preempt “congestion transfer” to downstream junctions.

Tazara intersection

Traffic demand at Tazara Intersection has been pronounced already at present, and expected to further escalate in the future. The current peak hour sufficiency reviews confirm that the intersection is operating at an unacceptable high saturation ratio, one of the worst monitored in the study area. Furthermore, the demand forecast suggests that any at-grade solution at this location represents only a near to mid-term benefit, and that growing traffic volumes will likely overwhelm any at-grade betterment. The Master Plan reviews have confirmed the desirability of implementing a Nelson Mandela Road flyover at Nyerere Road.

Gerezani area

Kilwa Road is being widened over a distance of approximately 12 kilometers extending south of its northern terminus at Bandari Intersection. The improved cross-section will consist of four mixed traffic lanes (two in each direction), with a sufficient median reserve to accommodate a future two-lane BRT busway. As a consequent project of this Kilwa road-widening project, the Gerezani area transport enhancement project is proposed as follows:

Bandari and Gerezani Road: following the existing road alignment, widening to 6 lanes (including 2 BRT lanes) in this section is recommended.

Flyover Bridge crossing Nyerere: a BRT-exclusive flyover is necessary to overpass the Nyerere Road, TRL and Msimbazi Street to avoid conflict with other traffic for smooth BRT operations.

VI. Public Transport Sector Plan

Policy and Organization

The Government is requested to set a strategic vision for the urban transport system through its transport policy, and this vision needs to be translated into strategic policy instruments by an authority that has the power to oversee and coordinate it. The establishment of Dar es Salaam Urban Transport Authority (DUTA) is proposed in this regard.

In the context of a passenger transport network, a strategic policy sets guidelines for:

- Network coverage and accessibility;
- Broad service parameters (fare policy, service frequency, passenger comfort standards, safety standards);
- System specifications and system branding;
- Planning for future services including service and system expansion.

The Authority (DUTA) will delegate the implementation of these polices to the system manager (DART) and monitor overall system performance. It will also develop urban transport development policies & plans that support transport integration across all sectors.

System Management and Funding Arrangements

The system manager for public transport in Dar es Salaam is the DART Agency. Guided by the strategic policy set by the Authority, DART will develop a tactical policy to manage the business of public transport. DART contracts the operation of the buses through a performance-based contract to bus operators who perform services according to the requirements as specified in the contract. As DART has total responsibility for the performance of the business, it monitors and enforces the conditions of the contract.

Funding needs to be rearranged so that revenues accrue to the network and not to the operator

(separating the operator costs from network revenue). This will improve integration, allowing fares to be 'network based', and have the operator paid to deliver services to the network. Under such a regime, the system manager would collect revenue (through an integrated ticketing system) and pay operators for services provided to the network as shown in **Figure 8**.

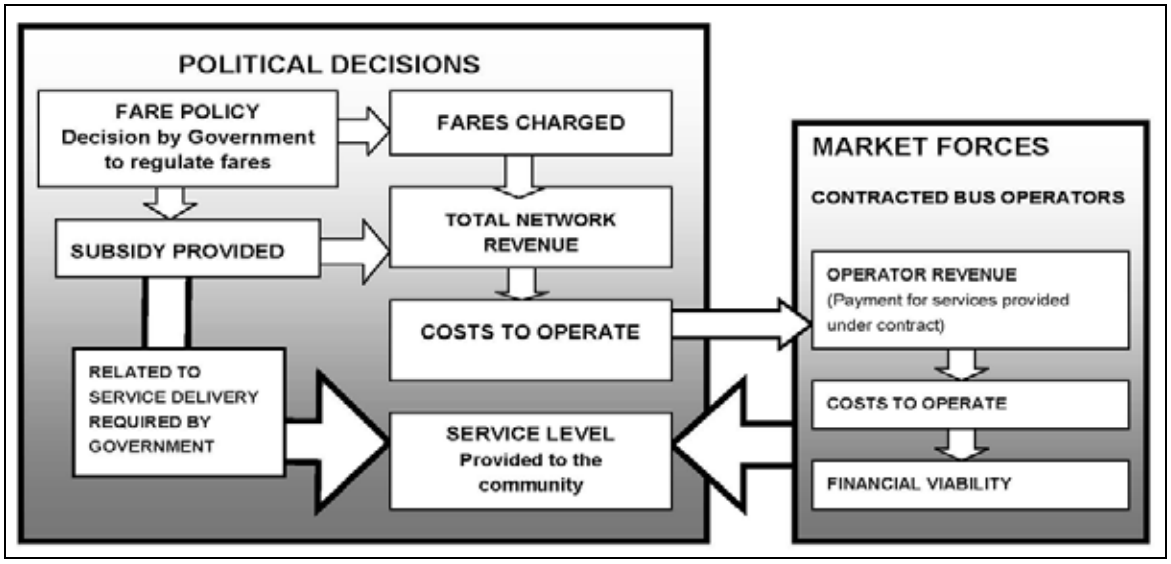


Figure 8 Separating System Revenue and Operator Revenue

Route Network Design Principles for Dar es Salaam

A complete bus network for the study area involving five phases of BRT introductions up to Year 2017 is prepared. At each phase of implementation, routes are added and in some cases secondary routes are replaced by BRT trunk routes.

(1) Types of service

The bus network design identifies different 'service types' as follows:

BRT trunk line: Buses that operate exclusively on the BRT (15 metre or 18m articulated buses).

BRT complementary buses: 12m or 15m buses that operate along regular bus routes (that also may have some measures of bus priority treatment) but can also enter the BRT busways and service the station platforms. These buses will have 2 doors on the left-hand side for curbside pickup and 2 right-hand doors for station access.

Secondary buses: 12 m city buses that operate on regular bus routes (but do not enter the BRT busways). These routes also service areas other than busway connections.

Feeder services: being the smaller buses (30 seats or less that provide short feeder services to the BRT).

(2) Passenger demand

The route design is substantially based on the existing demand figures that have informed the route design, identifying which services require direct connection and where a transfer is feasible, at the same time it was tested and confirmed by the traffic model.

(3) Accessibility and connectivity

The route design has followed high demand routes, to ensure a large proportion of travelers are able to make a more or less direct trip with minimal transfer necessary. While, for lesser demand trips the network gives an option for passengers to transfer at many points where routes connect (not just at terminal stations) so it offers the benefits of a true network.

(4) BRT route numbering system

Passengers will quickly become accustomed to the route system where the route numbering system is intuitively associated with area and corridors. For the BRT routes only, the logic is a three-digit number where the first number denotes area serviced (origin) the second number being the main corridor traversed and the destination is denoted by the third number (**Figure 9**).

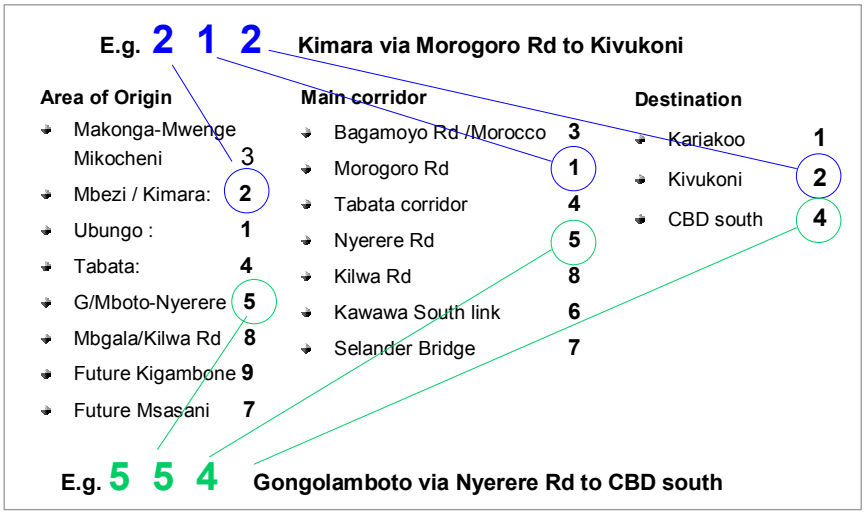


Figure 9 Explanation of route numbers for BRT routes

Phased Introduction of Bus Routes

The bus route network development will follow the order of phased BRT development. These phases are reliant on road construction and in some cases require flyovers to ease the intersection and traffic conflict issues (see **Table 10** and **Figure 10** and **11**).

Table 10 BRT Development Program

Section	Road space availability	BRT introduction
Phase 1 Morogoro road	2007 (Committed project)	2010
Phase 2 Nyerere road	2007 (Available corridor)	2012
Phase 3A Kilwa road	Road widening will be completed in 2009; requires elevated BRT to CBD (This phase can also be part of be phase 2)	2012/2013
Phase 3B TRL corridor	2009 (subject to negotiation with TRL)	2014
Phase 4A Sam Nujome Rd Phase 4B Bagomoyo Rd	2011 (Completed roadwork)	2015
Phase 5	Requires a bridge to be constructed to Vibijweni / Kigamboni - extension of Nelson Mandela Rd	2015-2020

Source: JICA Study Team

BRT and Secondary Bus Route Plan by 2015

BRT	Route No.	Route	Length (km)
	112X	Ubungo to Kivukoni Express	10.8
	211X	Kimara to Kariakoo Express	14.5
	212	Kimara to Kivukoni	16.0
	248	Kimara to Tandika via Tabata line	19.0
	311	Mwenge to Kariakoo via Sam Nujome & Ubungo	13.4
	331	Morocco to Kariakoo	7.3
	332Ext	Mwenge to Kivukoni via Bagamoyo Rd & Morocco	13.0
	344	Makongo - Mwenge - Ubungo - Tabata to CBD (Tabata Rail Corridor)	20.0
	500	Airport - Mtoni via Nyerere Rd & Mbagala Rd	12.5
	554	Gongolamboto via Nyerere Rd to Karaikoo	16.0
	881/2/4	Mtoni to Kariakoo via Kilwa Rd / Mbgala to Kivukoni via Kilwa Rd / Kongowe to CBD via Kilwa Rd	11.0/16.0/18.0
		Total Operation Length (BRT)	187.5

Secondary	Route No.	Route	Length (km)
	S1	Kawe - Mikocheni -Msasani to Tandika via Bagamoyo Rd, Kawawe Rd Changombe	20.5
	S2	Makonga to Kariakoo via Bagamoyo Rd, Ali Hussein Rd, Bibi Titi	20.0
	S3M	Ubungo to CBD via Mandela Rd - Uhuru Rd, Bugurundi	14.7
	S5	Masani Peninsula to CBD via Selander Br. to Mirambo St loop.	12.3
	S7	Mwananyamala-Kinindoni to Upanga Fire Station via Selander Br. & United Nations Rd	8.1
	S8	Tandika -Temeke to Kariakoo via Mandela Rd & Uhuru Rd Bugururni	12.3
	S9	Tandale to Port via Kawawa Link & Changombe	17.5
	S10	Kiwalani to Kariakoo via Nyerere & Uhuru St Bugururni	8.7
	S11	Ubungo - Mabibo to Magomeni Mapipa	9.5
	S12	Mikocheni - Kijitonyama- Ubungo - University Ubungo Chokuu	13.7
	S13	Boko to Makongo	21.3
	S14	Mbezi To Kimara	10.0
	S21	Msasani to Port via Bibi Titi Rd, Kariakoo and Bandari Rd	16.0
	S22	Tandika to Kariakoo via Shandrimoya Rd	12.2
	S85	Mandela Rd (ot Mbagala Rd), Nyerere Rd, Kilwa Rd, Temeke Loop	16.5
		Total Operation Length (Secondary Bus)	213.3

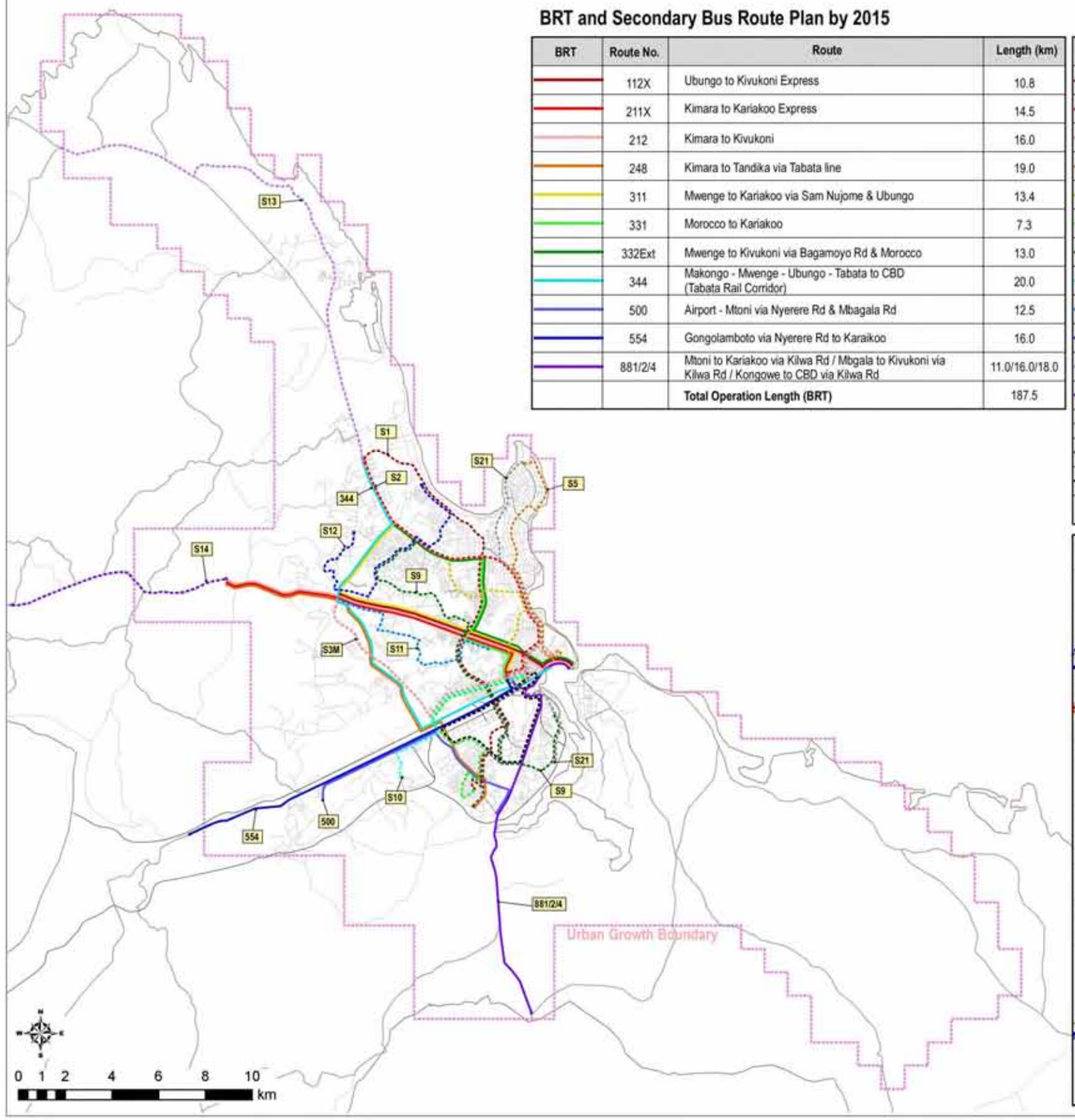
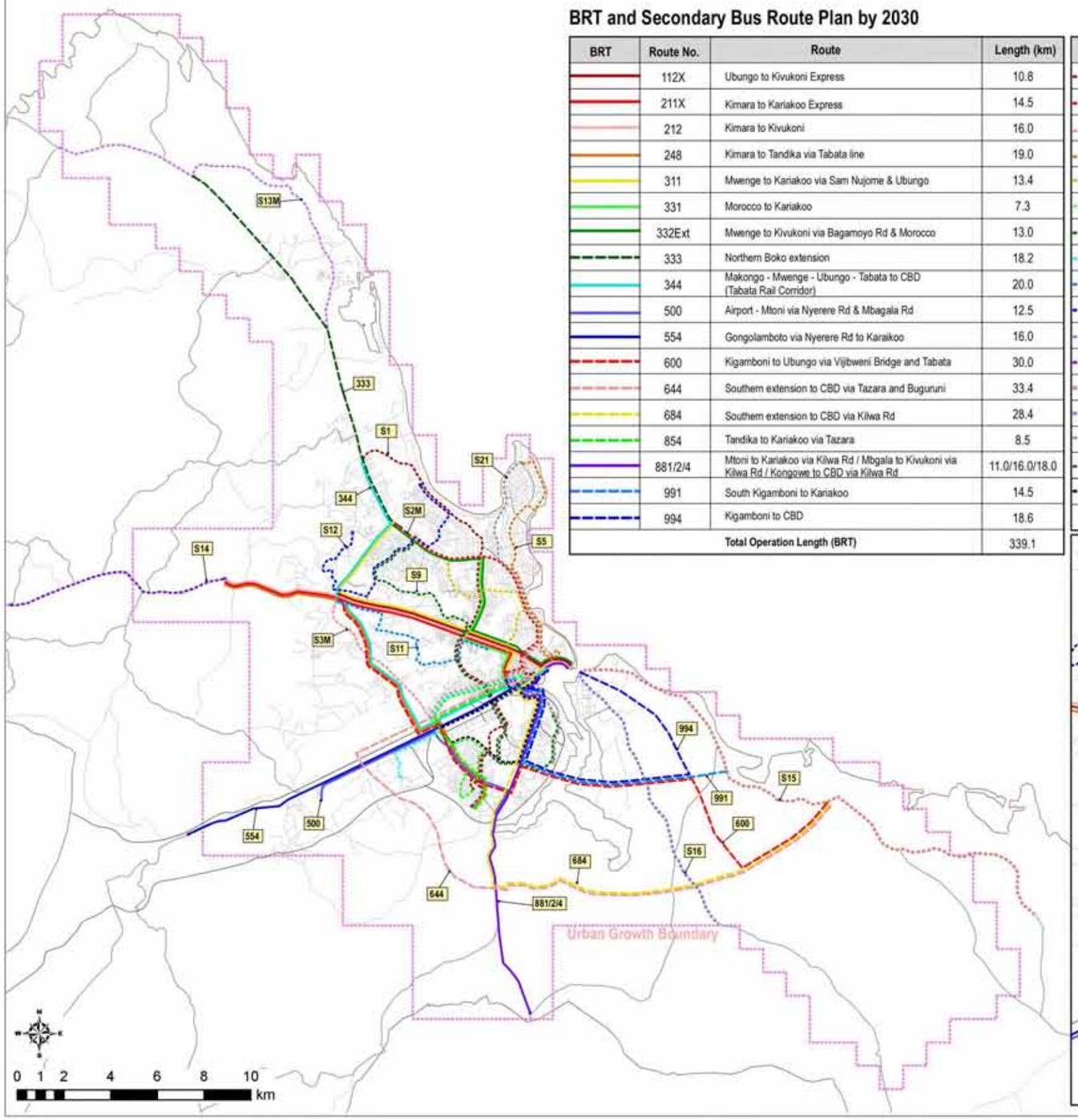


Figure 10 BRT and Secondary bus route plan by 2015



BRT and Secondary Bus Route Plan by 2030

BRT	Route No.	Route	Length (km)
	112X	Ubungo to Kivukoni Express	10.8
	211X	Kimara to Kariakoo Express	14.5
	212	Kimara to Kivukoni	16.0
	248	Kimara to Tandika via Tabata line	19.0
	311	Mwenge to Kariakoo via Sam Nujome & Ubungo	13.4
	331	Morocco to Kariakoo	7.3
	332Ext	Mwenge to Kivukoni via Bagamoyo Rd & Morocco	13.0
	333	Northern Boko extension	18.2
	344	Makongo - Mwenge - Ubungo - Tabata to CBD (Tabata Rail Corridor)	20.0
	500	Airport - Mtoni via Nyerere Rd & Mbagala Rd	12.5
	554	Gongolamboto via Nyerere Rd to Karaikoo	16.0
	600	Kigamboni to Ubungo via Vijibweni Bridge and Tabata	30.0
	644	Southern extension to CBD via Tazara and Buguruni	33.4
	684	Southern extension to CBD via Kilwa Rd	28.4
	854	Tandika to Kariakoo via Tazara	8.5
	881/2/4	Mtoni to Kariakoo via Kilwa Rd / Mbgala to Kivukoni via Kilwa Rd / Kongowe to CBD via Kilwa Rd	11.0/16.0/18.0
	991	South Kigamboni to Kariakoo	14.5
	994	Kigamboni to CBD	18.6
		Total Operation Length (BRT)	339.1

Secondary	Route No.	Route	Length (km)
	S1	Kawe - Mikocheni -Msasani to Tandika via Bagamoyo Rd, Kawawe Rd Changombe	20.5
	S2M	Mwenge to Kariakoo via Bagamoyo Rd, Ali Hussein Rd, Bibi Titi	17.0
	S3M	Ubungo to CBD via Mandela Rd - Uhuru Rd, Bugurundi	14.7
	S5	Masani Peninsula to CBD via Selander Br. to Mirambo St loop.	12.3
	S7	Mwananyamala-Kinindoni to Upanga Fire Station via Selander Br. & United Nations Rd	8.1
	S8	Tandika -Temeke to Kariakoo via Mandela Rd & Uhuru Rd Buguruni	12.3
	S9	Tandale to Port via Kawawa Link & Changombe	17.5
	S10	Kiwalani to Kariakoo via Nyerere & Uhuru St Buguruni	8.7
	S11	Ubungo - Mabibo to Magomeni Mapipa	9.5
	S12	Mikocheni - Kijitonyama- Ubungo - University Ubungo Chokuu	13.7
	S13M	Northern Route via Bunji	17.9
	S14	Mbezi To Kimara	10.0
	S15	Southern coastal route to Kigamboni	25.0
	S16	Southern inland route	14.6
	S21	Msasani to Port via Bibi Titi Rd, Kariakoo and Bandari Rd	16.0
	S22	Tandika to Kariakoo via Shandrimoya Rd	12.2
	S85	Mandela Rd (ot Mbagala Rd), Nyerere Rd, Kilwa Rd, Temeke Loop	16.5
		Total Operation Length (Secondary Bus)	246.5

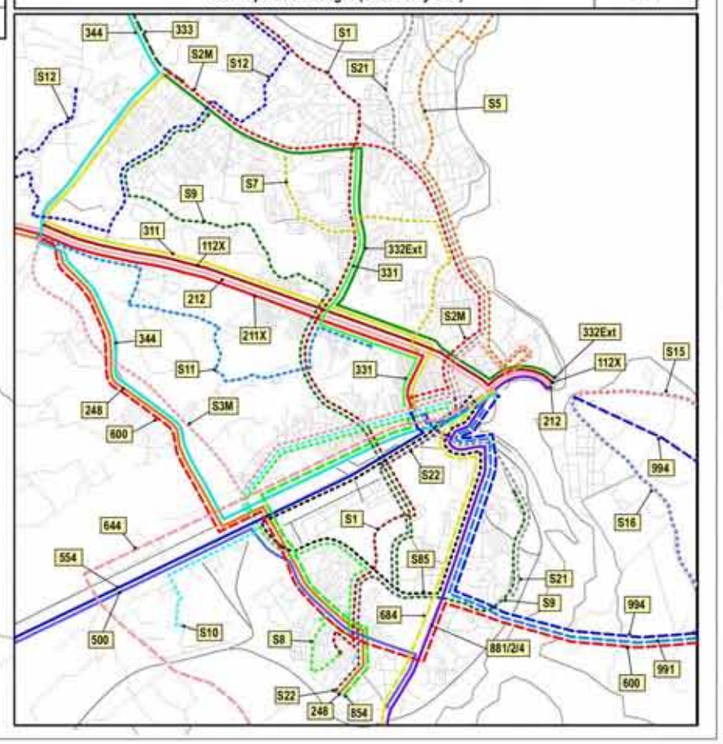


Figure 11 BRT and Secondary bus route plan by 2030

Developing Management Responsibility

To develop an effective framework for controlling and managing the public transport systems requires an organizational structure that clarifies responsibilities and accountability through a clear separation between regulator, manager and operator in both definition and function.

(1) The Role of Owner (DCC)

Essentially the 'government' is the owner of the public transport system assets, and in the case of Dar es Salaam is the DCC, which is responsible to ensure its assets are protected and utilized to its optimum capacity and for the viability and sustainability of the system and its service delivery to the city. The present administrative weakness of the DCC can be addressed by establishing the Dar es Salaam Urban Transport Authority (DUTA). This Authority is concerned with a strategic policy and regulation managing this function on behalf of the City.

(2) The Role of Regulator (DUTA)

This entity is a senior body that is highly representative across all stakeholder interests and government departments, relative to the total activity and arena of urban transport. Typically, a Board of Management in the form of a Transport Authority would conduct this task, being a representative of the government and setting a Strategic Policy to guide the line agency responsible for system management and operations.

(3) The Role of Manager (DART)

The role of the 'manager' is either that of a 'business manager' of the BRT or, if a wider system network is managed, then they are the 'system manager'. In each of these roles, the function is similar.

DART develops tactical policies to manage the public transport business in the most effective and efficient way. The system manager takes a commercial and business-like approach to maximize the profit within the framework of strategic policy.

(4) The Role of Operator

The role of the operator is to perform services according to the specifications and standards of the contract. There is a clear client/principal relationship in place and very clear expectations stipulated in the contract. It also defines the responsibilities and duties of both parties in the contract and therefore provides the basis for investment. The system manager (DART) can enforce the condition and service requirements under contract.

The DART Vision - a capable and strong system manager

It is clear that the role of a system manager (DART Agency) is paramount to develop an integrated mass transit system, and DART, through its role and function is not only able to effectively manage the business but is also best placed to assume the risk.

The institutional arrangement must actively develop the strength and capacity of DART by keeping it free from political pressure and interference, held financially accountable and maintain a strong and contractually sound management of the bus operations.

In summary, the function of DART includes:

- Development and management of bus operation performance-based contracts (PBC) and serving as 'Party A' with 'Party B' bus operators;
- Specifying service levels and standards in each contract along with the terms and conditions of each contract;

- Planning and route network development;
- Managing fare policy within guidelines set by the Authority;
- Management and maintenance of system infrastructure and information systems;
- Monitoring system performance and contractor performance;
- Survey data and user feedback;
- Benchmarking system cost recovery;
- Safety standards;
- Enforcement of standards;
- Revenue control and financial management.

The DART Business Model

A successful DART will depend on its business model, which dictates primarily:

1) how it manages the business and

2) how it manages the contracts under its control.

The business plan of DART should define its key functions and specifically its relationship with contractors, requiring a clear assignment of risk under detailed contractual frameworks. This will result in a clear and unambiguous relationship between contractors and the contracting agency and that the business and risk environment is understood by investors.

(1) Performance-Based Contract and Risk Management

This Master Plan recommends employing the concept of Performance-based contracts (PBC), which are best described as contracts that are procured for the contracting agency, kilometers of bus operations for a fixed sum per kilometer. The 'performance' aspect comes from the conditions within the contract where the operator can be penalized for failures in service delivery. Ultimately, the terms and conditions of the contract are enforceable, giving the contracting agency a strong hand in managing service outcomes.

(2) Regulatory Procedures Manual

A key mechanism to manage the contracts is a Regulatory Procedures Manual, being a standard manual of procedures and processes, under which the government administers control and management over the bus contracts. It serves as a guide for the management of system issues and monitoring of the contracts under which bus services are provided.

Involvement of the existing industries

The current planning (as of early 2008) is favoring the option of two large operating consortiums contracted under a Performance-based contract for the BRT Phase 1 operation. This idea is supported as it provides competition and also provides the economic scale under which to consolidate the large amount of smaller players. The operating entities will also provide both trunk and feeder services.

Dala Dala Bus Service Improvement Strategy

The approach to improve Dala Dala operation involves a community-based approach with the involvement of three stakeholder groups – the government, as a key stakeholder, an owner/operator community group and a management group.

The problem must be approached with recognition that the Dala Dala industry is a struggling industry,

operating and surviving on the lowest common denominator of cost and quality. At the same time, it should be noted that the Dala Dala industry is basically unmanageable due to its fragmented nature (individual ownership) and operation style, largely outside the proper management structures. Formalizing such a fragmented industry will require a committed effort to consolidate through an effective consolidation framework designed to deliver mutual benefits to regulator users, owners and operators alike.

VII. CBD Traffic Management Plan with BRT Phase 1

The core objectives of the Central Business District Traffic Management Plan are:

- Focus on a near-term (2009/2010) implementation of high priority projects whose realization is closely linked with, and mutually supportive of, the impending BRT Phase I project;
- Maintain maximum accessibility to CBD destinations, thus avoiding circuitous travel with consequent impacts upon the transport system;
- Maximize capacity of the CBD network with low-cost, high-impact solutions such as removal of on-street parking, signalization of intersections, judicious, use of one-way streets and strategic widening of streets in a limited number of cases; and,
- Avoid the construction of a major new road infrastructure; instead, focus on the provisions of public transport and pedestrian facilities.

Based on the objectives, a recommended road network and parking plan was developed. The major improved points are (**Figure 12**):

- Improvement of Ohio intersection with Bibi Titi Mohamed St. including connecting Upanga Street to the intersection of Ali Hassan Mwinyi Road.
- Connecting Jamhuri Street to Garden Avenue.
- Connecting BR Magogoni Street to Shaaban Robert Street.
- One-way system along Railway Street and Algeria Street.
- Removal of on-street parking and conversion to two lanes along India Street, Indira Gandhi Street, Mosque Street and a part of Sokoine Drive.

Since the short-term CBD traffic improvement plan is very much limited to short-term traffic mitigation measures, a more extensive approach is needed in a long-term perspective, specifically to install traffic demand management (TDM) as a major thrust of the strategy.

A set of strategies for long-term CBD traffic management includes:

- Long-term planning guidelines to govern land use and development so as not to create development without transport arteries (or be faced with very expensive options in the future to repair planning failures).
- Enhanced public transport options as a viable alternative to private car use, including BRT as well as supporting bus route networks.
- The use of an inner city circulator bus service.
- Park and ride options.
- Pedestrian streets – increase value in the heart of the city.

- Cycleways and NMT facilities
- A balanced parking plan that meets essential needs without creating perverse incentives.

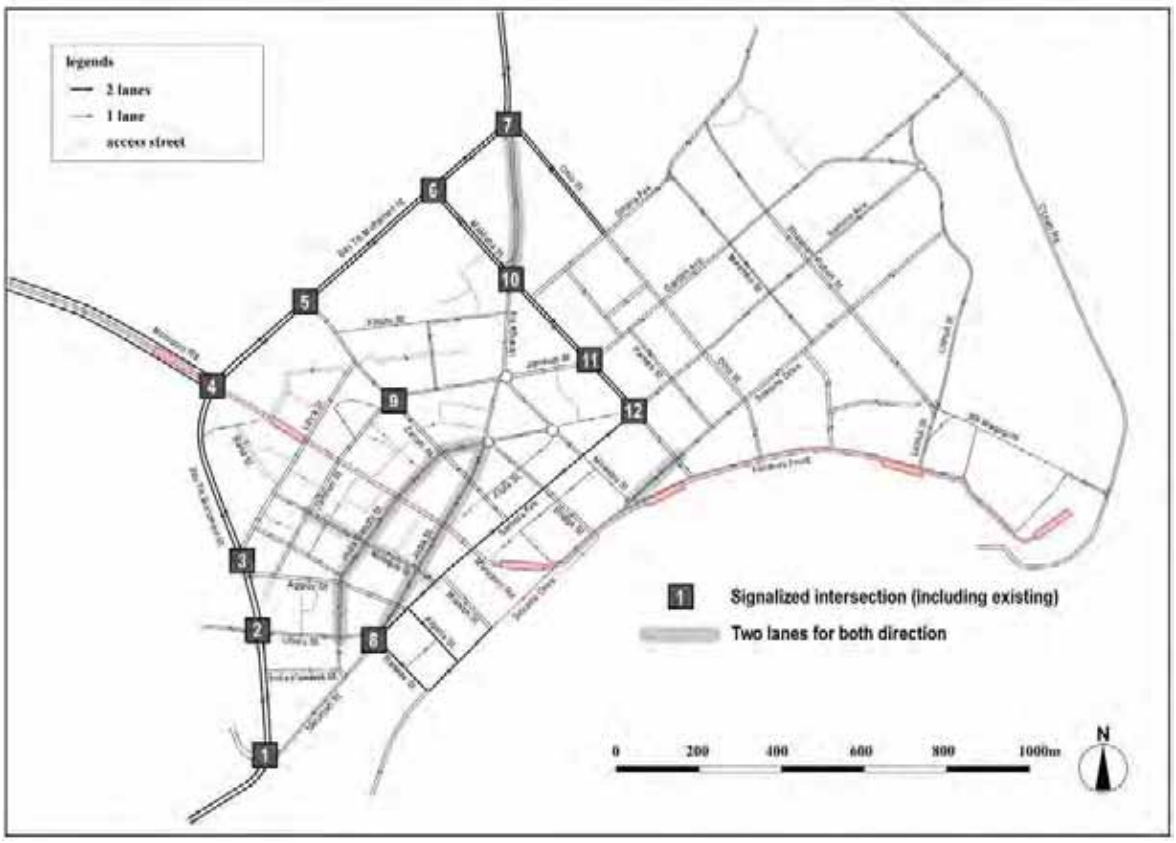


Figure 12 Proposed short-term CBD traffic capacity improvement plan

VIII. Institutional Development – Dar es Salaam Urban Transport Authority

Institutional and capacity development will drive the long-term sustainability and conditions for the Transport Policy and System Development Master Plan. The centralization of control and decentralization of local functions and responsibilities have fragmented the responsibility for transport planning and its implementation. There is a lack of executive-level planning functions or at least it is undefined in the field of urban transportation in Dar es Salaam. The establishment of the Dar es Salaam Urban Transport Authority will reinforce the executive planning level and create a representative body to coordinate and integrate efforts.

In this perspective, the role of DUTA is clearly specified, that is, acting as an intermediate and coordinating authority between the national policy and the agencies responsible for management and control of the city's transport development with the obligation to:

- Design the best urban transport system: DUTA will study the function of the transport system, identify bottlenecks and problems, and produce concrete solutions for its improvement. These solutions will lead to policy decisions made by the government and develop into regulations.
- Coordinate all players: DUTA will organize and coordinate all agencies responsible for service delivery by setting an objectives-based strategic policy.

- Control the urban transport system: DUTA, through its strategic coordinating role, will work to guarantee the best operational conditions of the urban transport system for both system users and service providers and for those assigned to maintain existing and / or constructing new infrastructures and / or services.

The path from an in-principal agreement to the formal establishment of DUTA might be long and complex. It is, therefore, recommended to employ a phased approach in developing DUTA with consulting relevant stakeholders, which is also effective to achieve a high sense of ownership across all those involved.

Three phases are foreseen in the process of establishing the DUTA:

The structural phase: *where the framework is set and coordination between all stakeholders* is introduced. This phase involves concrete steps but does not alter the present structure and / or authority. It thus focuses on preparation and coordination.

The executive phase: initiates the process towards a sustainable change. It in particular expands the coordinating role of the Board to an integrating and developing role of the new Urban Transport Authority. In this phase DUTA will also establish Planning Divisions that will manage the consolidation phase involving the line agencies in their respective areas.

The consolidation phase: the third and final phase in the process and consists in fully developing the Authority and all attached structures, including supporting departments (administration/ Legal, HR & finance) and departments responsible for specific areas under the divisions.

The full outline of a completed DUTA structure and where it sits in the framework are shown in **Figures 13 and 14**.

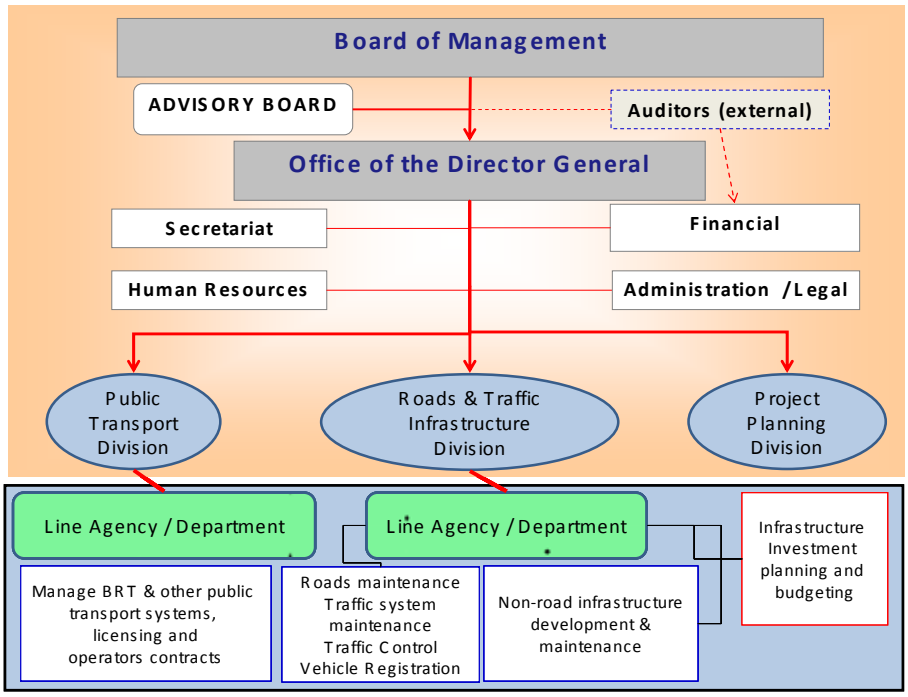


Figure 13 Final generic structure of DUTA in the context of transport oversight

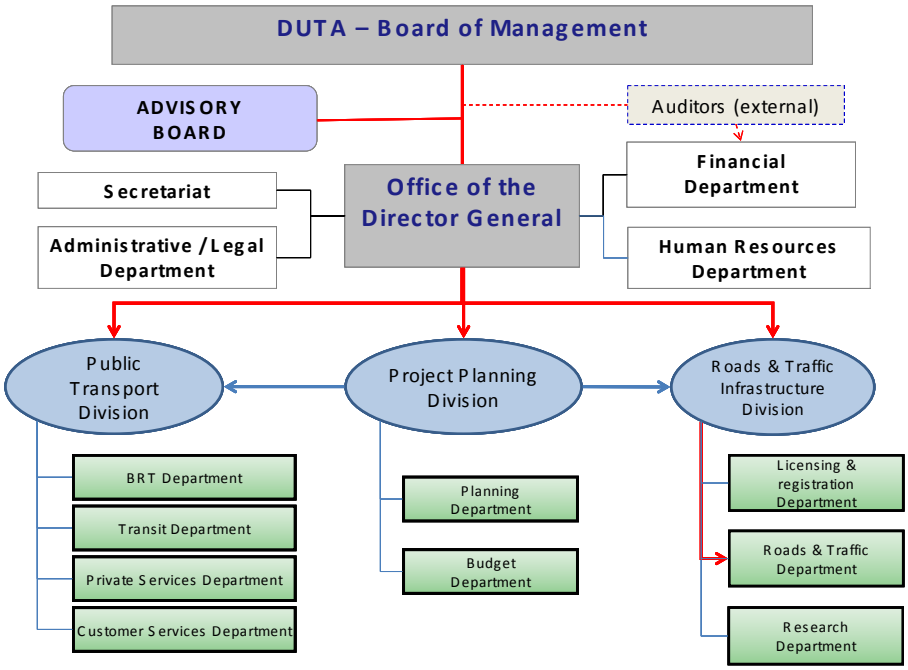


Figure 14 Operational Structure of DUTA at the final stage

IX. Capacity Development – National Center for Transport Studies

In a close consultation with the Ministry of Infrastructure Development and collaboration with other academic institutions, a consensus has been made on the agenda of NCTS, which includes strengthening transport database management, conducting training on transport planning and infrastructure management, and conducting necessary transport research and evaluations, so as to enhance the capacity of the concerning authority to effectively coordinate urban transport development issues. It is also agreed with the following phases, necessary to be accomplished to establish NCTS.

Phase 1: Transport Training Centre

The Transport Training Centre will be initially created as a special unit attached to the existing academic and/or institutions. The Centre will be tasked to upgrade the capacity of, mainly, government personnel concerned with transport through intensive and practical training in the fields of traffic engineering, planning and management.

Phase 2: Department of Transport Planning

The Department of Transport Planning will be established and expand the functions of the Centre to include transportation research. The Department will also offer students to enroll in a bachelor degree programme.

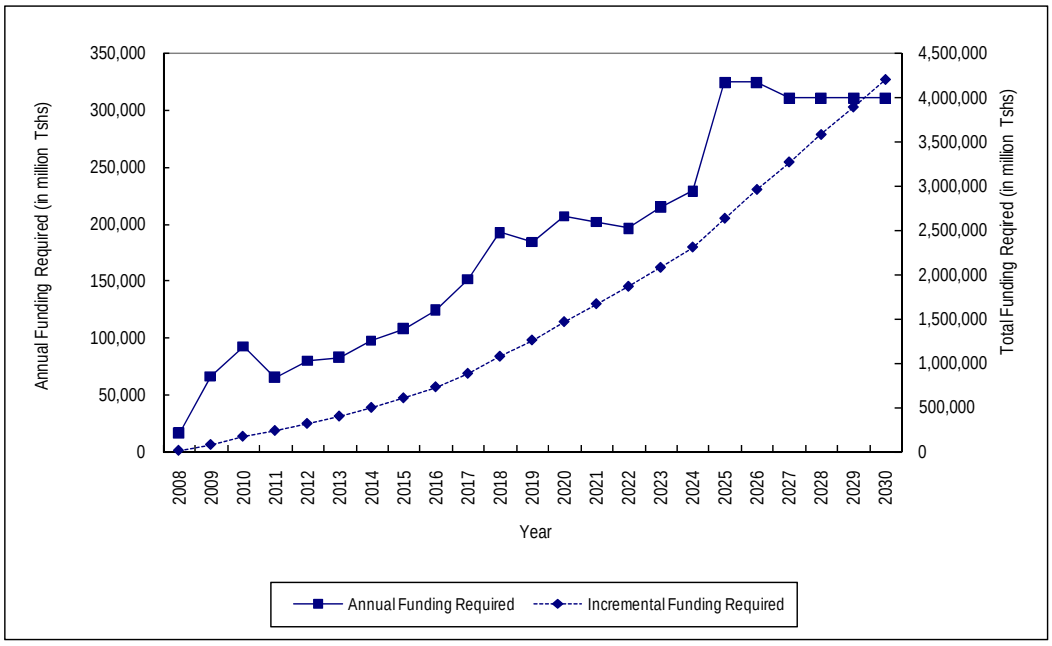
Phase 3: National Centre for Transport Studies

NCTS will be developed into a more independent body that strengthens both training and research functions. The Centre will conduct research and consultancy works in the various fields of transportation and administer graduate programs in transportation.

X. Financing Strategy

Funding requirement for the Master Plan implementation

The master plan study estimates the total initial investment cost of the Master Plan as 4,209,932 Million Tshs (3,312 Million US dollars) that will be implemented in the next 20 years (**Figure 15**).



Source: Study Team

Figure 15 Total Cost of the Master Plan

Limited financing capability and revenue enhancement strategies

The budget for the transport sector has been limited, suggesting that the budget available for the Master Plan implementation will be far below the requirement. Although the income from the Road Fund is expected to rise in the very near future, it is likely amount from that income is not considered as a sufficient enough source for the proposed projects. It is, accordingly, very essential to consider external sources, private investments and a new revenue generation scheme in the public sector.

Other than the use of external sources, which are actually dependent on the performance of the national economy, other potential sources have been discussed. Firstly, it should be pointed out that there is a great possibility to increase income from property & land taxation through revaluing the existing assets and expanding the coverage. Secondly, it is recommended to consider new a resource generation scheme such as Tax Increment Financing (TIF), and Property Rights and Development Rights.

XI. Master Plan Evaluation

Project Costs

Preliminary project costs (financial prices) were estimated based on the recent experiences in Tanzania. In estimating the costs in this study, price contingency, interest during construction and commitment charge were excluded. **Table 11** shows a summary of the overall financial and economic costs of the Master Plan. Assuming that proportion of the foreign currency portion and local currency portion is even (50:50), and applying to the Standard Conversion Factor at 0.869, the economic cost of all the

projects is estimated at 3,923 billion Tshs.

Table 11 Economic Cost of the Project

Financial Cost (million Tshs)	Foreign currency portion	Local currency portion x SCF	Economic Cost (million Tshs)	Economic Cost (million USD)
4,198,399	2,099,200	1,824,204	3,923,404	3,086

Source: JICA Study Team

Economic Evaluation of the Project

Table 12 summarizes the economic performance of the implementation of the Master Plan. The economic internal rate of return (EIRR) is estimated at 41%, the benefit cost ratio is 3.87, and sufficient positive NPV, each of these indicators suggests a very good performance of the Master Plan.

Therefore, it can be concluded that the projects proposed in the Master Plan Study as a whole are economically feasible and its implementation will contribute to the economic development and prosperity of Dar es Salaam.

Table 12 Result of Cost Benefit Analysis

Indicator	Result
Net Present Value (in Tshs, at discount rate of 12%)	2,703,552 million Tshs
EIRR	40.7%
B/C (at discount rate of 12%)	3.87

Source: JICA Study Team

XII. Implementation Monitoring

The establishment of the Dar es Salaam Urban Transport Authority (DUTA) and its efficient functioning will undeniably be instrumental in lifting the city's transport system to world city levels. Monitoring the performance of DUTA is therefore a high priority and requires a highly structured methodological approach.

As a conclusion, it is recommended to structure the performance monitoring and progress the evaluation process as follows:

1. Outcome Based Management is recommended as an overall performance evaluation method with the model itself "controlled" via Performance Based Management; and
2. Log Frame or Project Cycle Management is recommended for the evaluation of specific projects / investments.

XIII. Immediate Actions

Finally, some immediate actions to be taken by the stakeholders are summarized:

Towards immediate and sustainable implementation of the Master Plan, the following actions are urgently needed;

- Dar es Salaam Transport Authority (DUTA)

  It is very necessary to establish a coordination body for economic and effective implementation of the Master Plan that is composed of various inter-related projects.

  - Establish Board of Management with Secretariat, which is not actually an authority yet, but representatives from various stakeholders should join the board to
  - DUTA establishment under PMO – various stakeholders' involvement.
  - Funding for DUTA.

- MOID/TANROADS
  - Strategic budget allocation for major urban roads.
  - Establish urban road design standards in accordance with the proposed BRT road hierarchy.
  - Feasibility Study of the Kiganboni Bridge and Access Roads Development
- MOLHSD/DCC/Kinondoni/Ilala/Temeke
  - Preparation of local plans for the Morogoro corridor / BRT terminal areas
  - Actions for revenue increase
  - Coordination with other infrastructure sectors including water supply, sewage and drainage
- DCC and Municipalities
  - Local Tax increase – budget allocation to secondary / tertiary roads development
  - Urban Planning within the Growth Boundary
  - Coordination with other sectors, including water supply, waste-water management, etc.
- DART
  - Early successful implementation of BRT Phase 1, including effective CBD traffic management.
  - Effective business model for DART and risk management.
  - Negotiation with TRL to secure the right to use the disused Tabata line.
- National Institute of Transport
  - Early implementation of CTS (Center for Transport Studies)
  - Conduct feasibility studies of the proposed projects by the Master Plan
- Priority projects (Pre-FS Projects)
  - Preparation of the application for international donor agencies