

**MINISTRY OF WORKS, TRANSPORT AND COMMUNICATION (MoWTC)
TANZANIA NATIONAL ROADS AGENCY (TANROADS)
UNITED REPUBLIC OF TANZANIA**

**DATA COLLECTION SURVEY
ON
DODOMA CITY ROADS
IN
THE UNITED REPUBLIC OF TANZANIA

FINAL REPORT**

FEBRUARY 2019

JAPAN INTERNATIONAL COOPERATION AGENCY

**ORIENTAL CONSULTANTS GLOBAL CO., LTD.
INTERNATIONAL DEVELOPMENT CENTER
OF JAPAN INC.**

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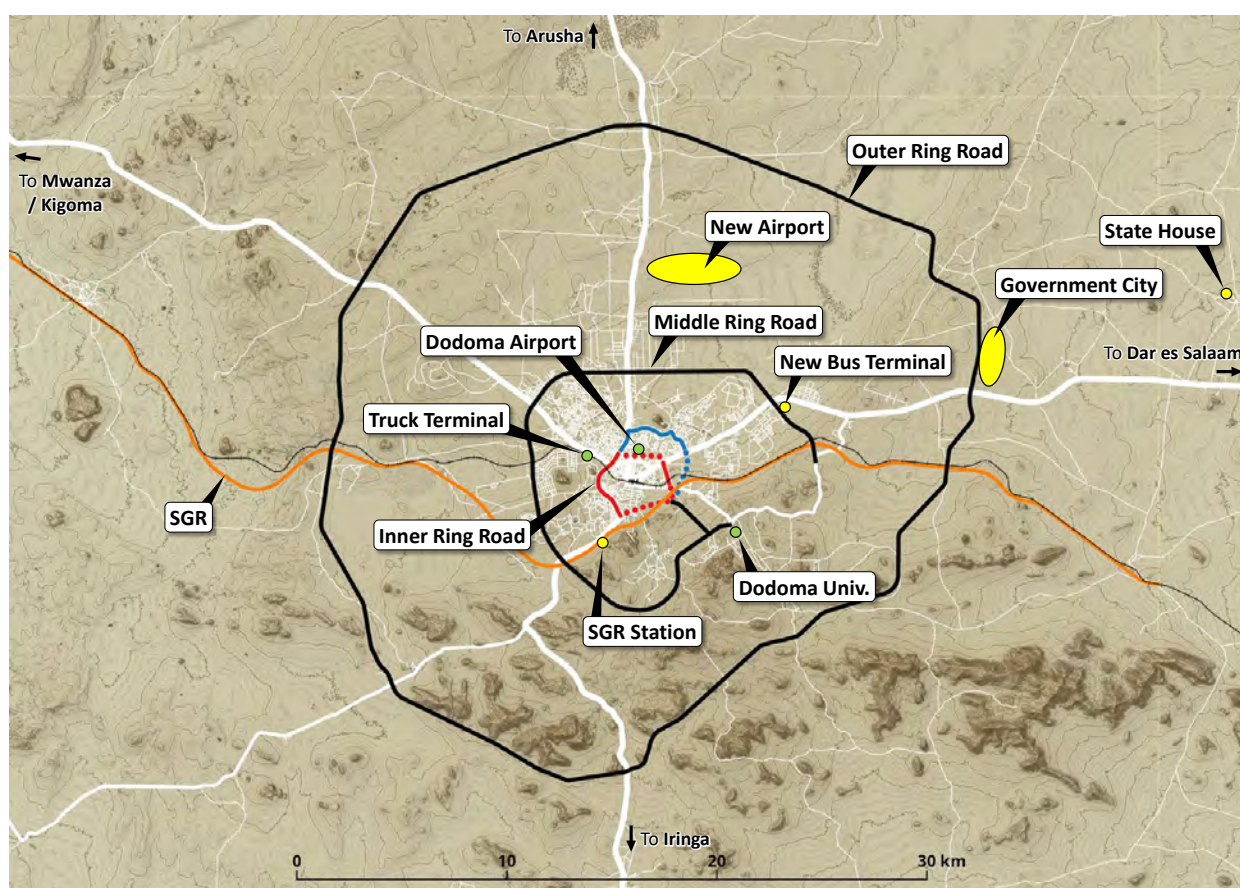
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The United Republic of Tanzania



Dodoma Region



Dodoma City

Basic Data (as of Oct 2018, source: Ministry of Foreign Affairs of Japan)

■ Area:	945,000 km ²	■ Economic Growth Rate:	7.1% (2017, source: World Bank)
■ Population:	57.31 million (2017, source: World Bank)	■ Inflation Rate:	5.1% (2017, source: World Bank)
■ Capital:	Dodoma	■ Unemployment Rate:	2.2% (2017, source: World Bank)
■ Largest City:	Dar es Salaam	■ Trade Amount:	(1)Export USD 4,872 million (2016, Bank of Tanzania) (2)Import USD 8,950 million
■ Languages:	Swahili (official), English	■ Currency:	Tanzania Shillings (TZS)
■ Religions:	Muslims (about 40%), Christians (about 40%), Traditional Religions (about 20%)	■ Japan's Economic Cooperation:	(1) Loans 82,100 billion (2) Grants 177,138 billion (3) Technical Cooperation 85,723 billion (cumulative total as of 2015)
■ Major Industries:	Service business, mining, manufacturing, construction, agriculture, forestry and fisheries		
■ GDP:	USD 52.1 billion (2017, source: World Bank)		
■ GNI per capita:	USD 905 (2017, source: World Bank)		

Project Location Map

**Data Collection Survey on Dodoma City Roads
in the United Republic of Tanzania**

Final Report

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Abbreviations

AfDB	African Development Bank
BRT	Bus Rapid Transit
CBD	Central Business District
CDA	Capital Development Authority
CRP	Compensation and Resettlement Plan
DBST	Double Bituminous Surface Treatment
D/D	Detailed Design
DP	Displaced Persons
DSM	Dar es Salaam
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMA	Environmental Management Act
EPZ	Export Processing Zone
EU	European Union
F/S	Feasibility Study
FY	Fiscal Year
FYDP	Five Year Development Plan
GDP	Gross Domestic Product
GIS	Geographic Information System
GNI	Gross National Income
GOT	Government of Tanzania
HGV	Heavy Goods Vehicle
HH	Household
ICAO	International Civil Aviation Organization
IRR	Inner Ring Road
JCT	Junction
JICA	Japan International Cooperation Agency
MOLHSD	Ministry of Lands, Housing and Human Settlements Development
MOWTC	Ministry of Works, Transport and Communication
MRR	Middle Ring Road
NEMC	National Environmental Management Council
NEP	National Environment Policy
NMT	Non-motorized Traffic
OD	Origin-Destination
ODA	Official Development Assistance
ORR	Outer Ring Road
PAPs	Project Affected Persons
PCU	Passenger Car Units
PO-RALG	President's Office–Regional Administration and Local Government
QV	Quantity-Velocity
RA	Roundabout
RAP	Resettlement Action Plan
RAS	Regional Administrative Secretary
RMMS	Road Maintenance Management System
ROW	Right of Way
SGR	Standard Gauge Railway
TANROADS	Tanzania National Roads Agency
TARURA	Tanzania Rural and Urban Road Agency
TCAA	Tanzania Civil Aviation Authority
TFS	Tanzania Forest Services
TOD	Transit Oriented Development
TRC	Tanzania Railway Corporation
TZS	Tanzania Shillings
TSIP	Transport Sector Investment Programme
USD	United States Dollar
V/C	Volume Capacity Ratio
WIM	Weigh in Motion
YR	Year

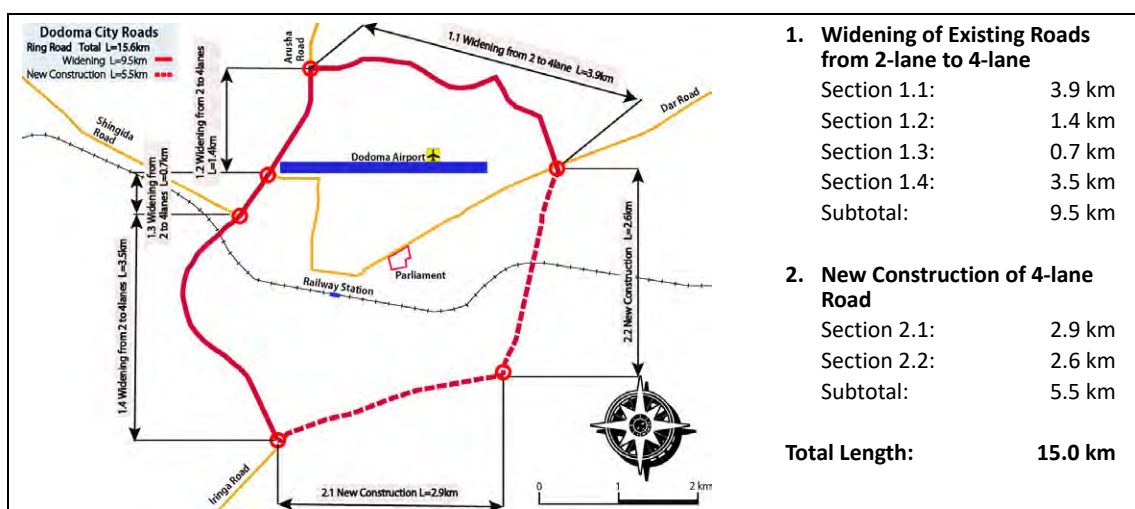
EXECUTIVE SUMMARY

1. Background of Survey

Dodoma City is the capital of the United Republic of Tanzania (hereinafter referred to as Tanzania), located in the central part of the country and with a population of about 400,000 people (in 2012). Dodoma City was declared the capital city of Tanzania on 1st of October 1973 with the objectives of centralizing the capital within the country and attracting social and economic advancements to the country's central regions. In 2017, the Government of Tanzania has declared to completely shift the capital function to Dodoma City by 2020. As a result, it is expected that the population of Dodoma City will increase significantly. This increase in population will subsequently result in a demand for large-scale infrastructure development, particularly those of transport sector, in the city.

Dodoma City is a hub of road transport intersecting the Central Corridor (extending from Dar es Salaam Port, the main unloading port of Tanzania, to Kigoma in the west and Mwanza in the north) and the Great North Corridor (connecting northern city Arusha to southern cities Songea and Iringa in Tanzania). Therefore, there is concern that severe congestion will occur on the city roads as the traffic volume increases given the conjunction of the roads serving the Central and Great North Corridors. In the vicinity of Dodoma City, road improvement projects under the support of the European Union (EU) and the African Development Bank (AfDB) are being implemented. In addition to this, the Government of Tanzania has requested to the Government of Japan for Japan's Grant Aid for improvement of roads in Dodoma City.

The requested project components for Japan's Grant Aid consist of i) widening of existing 9.5 km road sections from 2-lane to 4-lane and ii) construction of 5.5 km 4-lane new road sections as shown in Figure 1. It was expected that the requested road sections would function as a ring road for balancing and smoothening traffic flow in city centre by diverting through-traffic.



Source: TANROADS

Figure 1 Layout Plan of the Requested Road Sections

2. Outline of Survey

This survey was aimed at i) collecting information on the current road conditions in Dodoma City including the requested road sections for Japan's Grant Aid, ii) analysing the issues and challenges of the project implementation, and iii) examining the possibility of the proposed projects to access Japan's Official Development Assistance (ODA).

The survey was commenced from December 2018 and the first assignment in Tanzania was carried out in January 2019. Based on the information and data given by the Government of Tanzania, Study Team prepared the Draft Final Report. The content of the report was discussed with the Government of Tanzania at the second assignment in Tanzania carried out in February 2019. This Final Report was finalized incorporating the result of discussions.

Detailed Tasks	2018	2019		
	Dec	Jan	Feb	Mar
Data Collection and Analysis of Related Documents	□			
Preparation of Draft Inception Report	□			
Discussion and Finalization of Draft Inception Report	△			
Explanation of Inception Report to Tanzania Government		▲		
Data Collection on Road Development Plans/Projects in Dodoma City and its Surroundings		■		
Confirmation of Executing Agency		■		
Road Condition Survey		■		
Data Collection and Analysis on Traffic Data		■		
Data Collection of Topographic and Geotechnical Conditions		■		
Study on Overall Project Scope, Segmentation and Prioritization		□		
Study on Possible Project Scope under Japanese ODA		□		
Preparation of Draft Final Report		△		
Explanation and Discussion on Draft Final Report			■	
Interview to Japanese Contractors			□	
Preparation of Final Report			□	
Submission of Reports		◎ ICR	◎ DFR	◎ FR

□: Work in Japan, ■: Works in Tanzania, △: Meeting in Japan, ▲: Meeting in Tanzania, ◎: Report Submission
 ICR: Inception Report, DFR: Draft Final Report, FR: Final Report

Figure 2 Survey Schedule

3. Road Developments in Tanzania

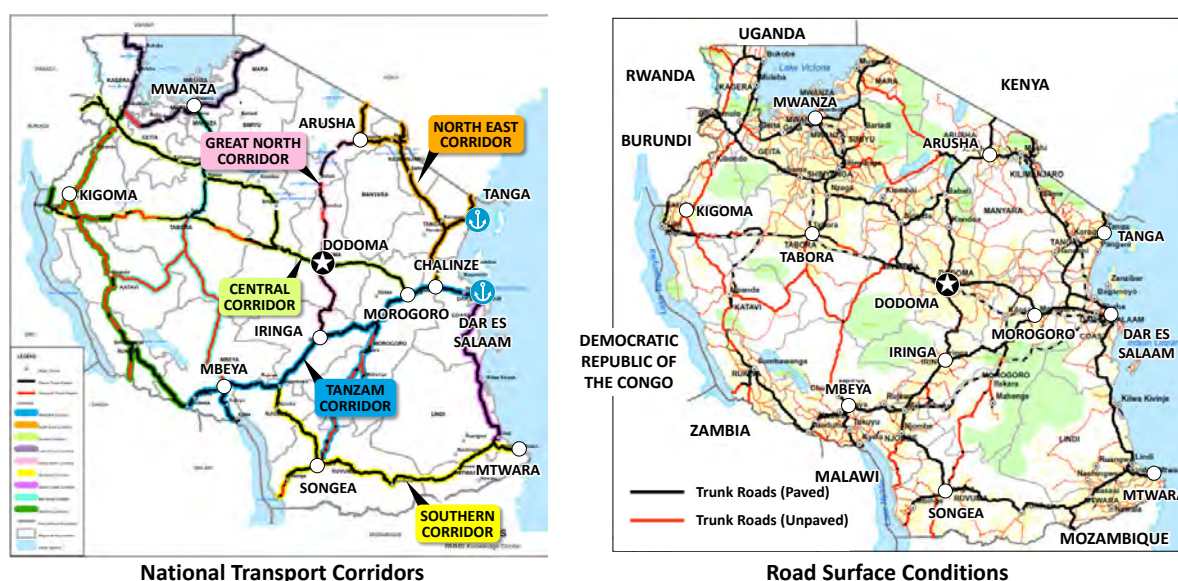
(1) Road Administration

Tanzania's road administration has been undertaken by the Tanzania National Roads Agency (TANROADS) under the Ministry of Works, Transport and Communication (MoWTC) for the National Roads (Trunk and Regional Roads) and by the Tanzania Rural and Urban Road Agency (TARURA) under the President's Office–Regional Administration and Local Government (PO-RALG) for District Roads (Collector Roads, Feeder Roads, and Community Roads) respectively. TARURA is relatively a new organization established in July 2017 and bears the role that was previously carried out by the Local Government Agencies under PO-RALG. The road sections proposed for Japan's Grant Aid that are investigated in this survey comprise the sections under the jurisdiction of TANROADS and TARURA.

(2) Upper Level Development Plans

Tanzania's long-term national development plan "The Tanzania Development Vision 2025" advances guidelines for joining middle-income countries by 2025, which include i) high quality livelihood, ii) peace, stability and unity, iii) good governance, iv) a well-educated and learning society, v) a strong and competitive economy. It is essential to develop infrastructure to support socioeconomic activities in order to achieve this growth targets. The necessity of developments of roads, electricity, water, and telecommunications is further emphasized in the vision.

The Second National Five Year Development Plan (FYDP II) 2016/2017- 2020/2021 is a strategic action plan for achieving the Vision 2025 above. It targets increasing the proportion of paved roads in total road network from 6.8% to 10%, construction of Dar es Salaam - Chalinze - Morogoro Expressway (200 km), pavement of the main roads (unpaved section), strengthening of strategic development corridors such as the Central Corridor (originating from Dar es Salaam Port), the North East Corridor (originating from Tanga Port) and the Southern Corridor (see Figure 3 on the left).



Source: TANROADS (Oct 10, 2018)

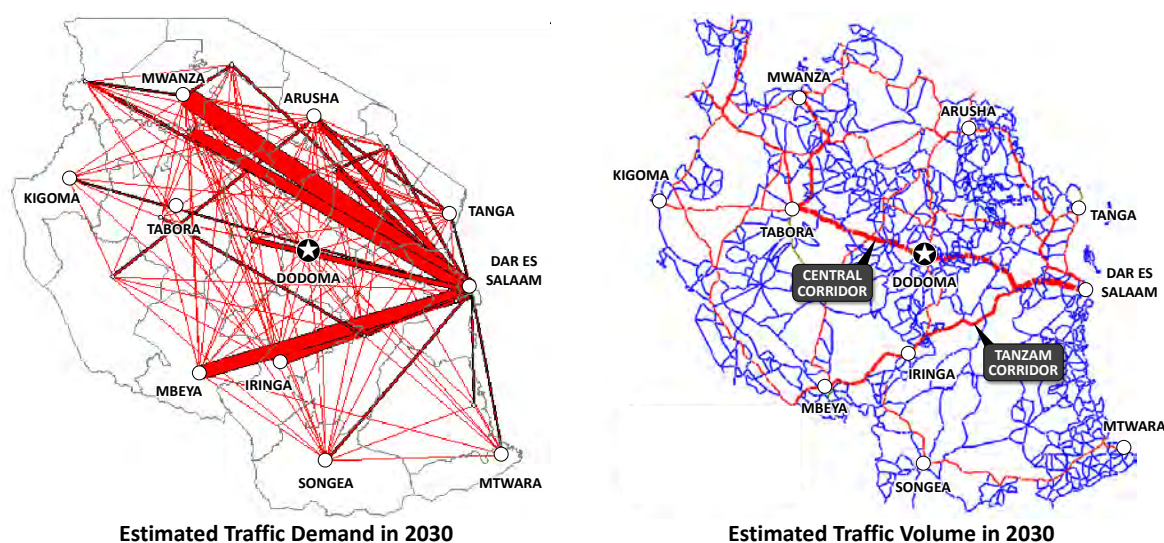
Figure 3 Tanzania's National Roads Network

(3) Road Conditions

According to TANROADS, more than 80% of freight transportation and 90% of passenger transportation in Tanzania is catered for by road traffic. Consequently, the importance of the road sector is high, but the pavement rate of the Trunk and Regional Roads (total 35,734 km) nationwide managed by TANROADS is low at 27% (9,719 km). Paving of the unpaved sections is therefore the most important concern of TANROADS. TANROADS aims to complete the paving of the unpaved section of the Trunk Roads (about 4,000 km) by 2021 (refer to Figure 3 on the right for the road surface condition of Trunk Roads). It is also recognized that relieving traffic congestion in major cities such as Dar es Salaam, Dodoma, Arusha, Mbeya and Mwanza as well as the rehabilitation of roads due to deterioration and damage of paved road sections is of high importance. For the past three years period (2015/16 to 2017/18), a total amount of Tshs 4,893.45 billion was released for both Road Maintenance & Development projects.

(4) Inter-Regional Traffic Demand and Formation of Road Network

According to the “Comprehensive Transport and Trade System Development Master Plan in the United Republic of Tanzania” that was conducted by JICA, the demand for the Central Corridor and the TANZAM Corridor is prominent, indicating that the importance of these corridors is high (see Figure 4 on the right). Generally, Tanzania’s road network has been developed in a form that connects the major regional centres in the vast expanse of the country with the Trunk Roads that run at the centre of the regional cities. This also applies to Dodoma City where the Central Corridor (the east-west trunk road extending from Dar es Salaam to Kigoma or Mwanza) and the Great North Corridor (the north-south Trunk Road connecting Arusha and Iringa) intersect at the central area of Dodoma City. In the future, it is expected that the traffic volume on the Central Corridor (mainly through traffic) will increase, and traffic problems in Dodoma City will be increased such as degradation of living environment due to heavy traffic inflows to residential roads, increase in traffic pollution (exhaust gas, etc.) and traffic accidents. Therefore, construction of a ring road with a bypass road function would be needed before such a traffic problem would occur.



Source: Comprehensive Transport and Trade System Development Master Plan in the United Republic of Tanzania (JICA)

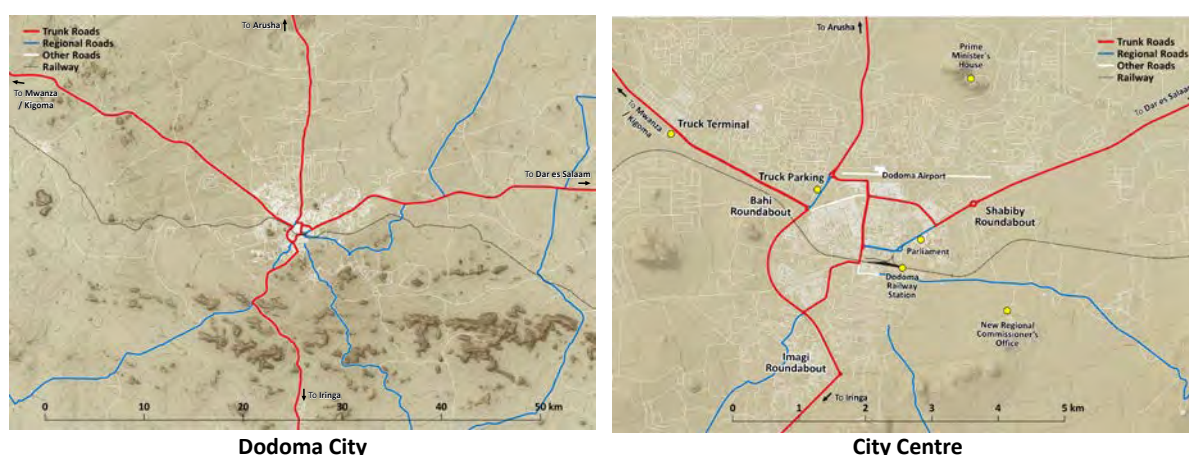
Figure 4 Inter-Regional Traffic Demand

4. Present Situation of Developments in Dodoma City and Challenges in Road Sector

(1) Road Network in Dodoma City

The road network in Dodoma City is formed by the four (4) radial arterial roads (namely; Dar es Salaam Road, Arusha Road, Singida Road and Iringa Road) and there is no subsidiary arterial road to support such arterial roads. Absence of secondary arterial roads would lead dependency (or concentration of traffic) on the arterial roads. The traffic volume on the arterial roads are reaching its capacity so that provision of the redundancy of road network is urgently necessary. The following are the observed issues on the current road network:

- **Low capacity of arterial roads:** Due to increasing traffic volume in and through Dodoma City, the arterial roads, particularly Dar es Salaam Road, oversaturate and the service level of these arterial roads will only worsen.
- **Low linkage of roads with many missing links:** Dodoma City historically developed its modular communities, particularly those along Dar es Salaam Road, and these communities were not well connected each other. TARURA Dodoma is currently making an effort to improve the local road networks connecting these modular communities, and linking these local networks to the arterial roads.
- **Low density of roads:** The four radial trunk roads in Dodoma City have for a long time served to assist the development of the City. Due to continuous expansion of planned and unplanned development in Dodoma City, the road network is becoming scarce in terms of density, and needs to be maintained to ensure accessibility and mobility around the City.
- **Low level of surface condition:** The majority of the road network in Dodoma, particularly that of local roads, still remain in unpaved condition which adversely affects accessibility and mobility around the City during the rainy season.



Source: JICA Study Team

Figure 5 Road Network in Dodoma City

(2) Traffic Condition

Traffic surveys comprising of i) traffic count survey at 7 locations and ii) origin-destination interview survey at 4 locations were carried out in this Survey. Also, previous traffic survey results carried out by TANROADS' feasibility studies for Inner Ring Road, Middle Ring Road and Outer Ring Road were reviewed. Based on these available traffic survey results, the current traffic volume along the four (4) radial arterial roads are summarized as follows:

- Dar es Salaam Road: about 17,000 – 19,000 PCU/day
- Arusha Road: about 13,000 – 15,000 PCU/day
- Singida Road: about 6,000 – 10,000 PCU/day
- Iringa Road: about 3,000 – 5,000 PCU/day

During site visit and the traffic survey, many heavy vehicles were observed in city centre. According to the result of the origin-destination interview survey, the majority of the heavy vehicles traffic are through-traffic over the east-west direction (via Dar es Salaam Road, School Avenue and Singida Road). Due to such traffic situation, there are freight facilities in city centre such as the parking space on Arusha Road between Airport Roundabout and Bahi Roundabout, and truck terminal on Singida Road at about 2.5 km away from Bahi Roundabout. Influx of heavy vehicle into city centre would make traffic safety worse and therefore, diversion of heavy vehicle traffic from city centre would be urgently necessary in order to make the city centre more livable.



School Avenue in City Centre



Truck Parking along Arusha Road

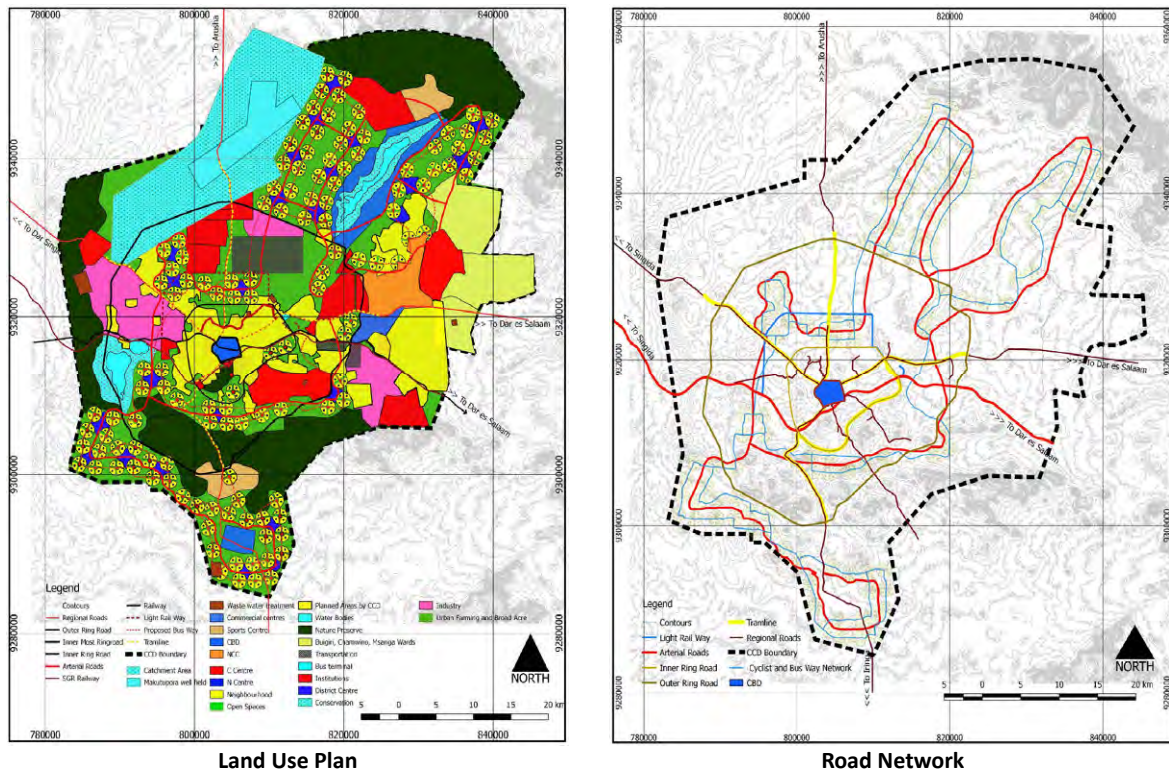
Source: JICA Study Team

Figure 6 Heavy Vehicles in City Centre

(3) Development Master Plan

The first comprehensive development master plan of Dodoma was developed in 1976. A linear city form extending from central business district (CBD) eastwards along Dar es Salaam Road was recommended. Due to economic crises in 1980s and 90s, the planned capital projects in Dodoma have been underfinanced and/or suspended for a long time. In the absence of the planned development, large scale of informal settlements emerged along major trunk roads and spread and consolidated in the unplanned area located in the outskirts of Dodoma.

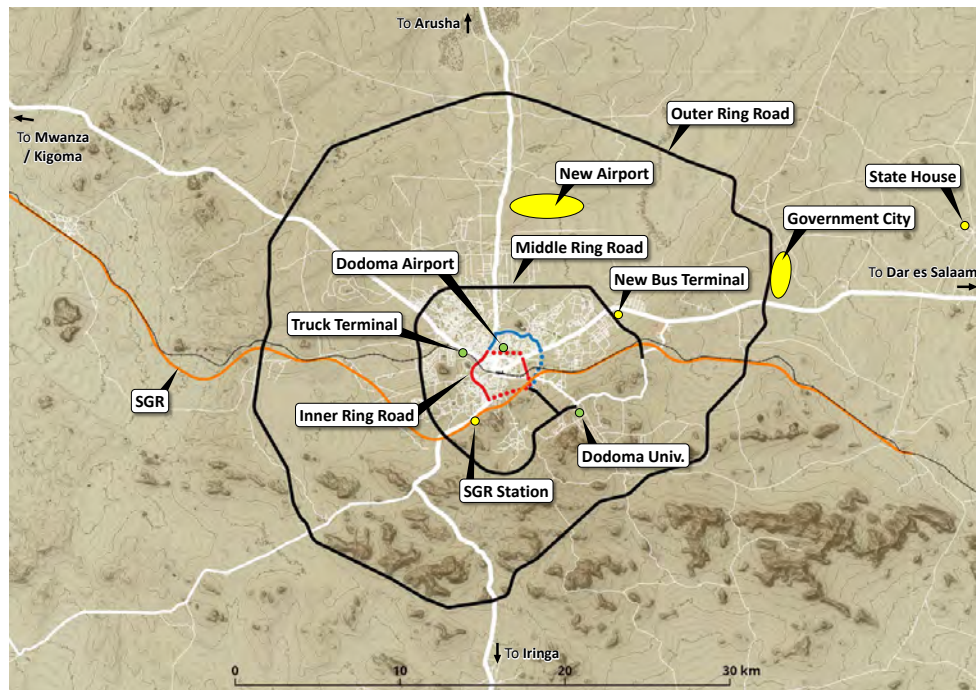
In 2017, following the government decision to materialize a shift of the national capital function to Dodoma City, GOT assigned a task to the Ministry of Lands, Housing and Human Settlements Development (MOLHHSD) to review previous master plans and develop a new master plan for Dodoma National Capital City. In December 2018, MOLHHSD submitted the first draft of the master plan for relevant institutions' review.



Source: Dodoma National Capital City Master Plan (2019-2039)

Figure 7 2019 Master Plan

The Master Plan also promote mega development projects in order to accelerate and expand the reginal development and part of which, currently undergoing, include Government City, Industrial Area, Sport Centre, EPZ as well as New Airport. In order to ensure the mobility in/to these mega development project and control the reginal development, the Master Plan also suggest to form several ring roads: Outer Ring Road, Middle Ring Road and Inner Ring Road.



Source: JICA Study Team

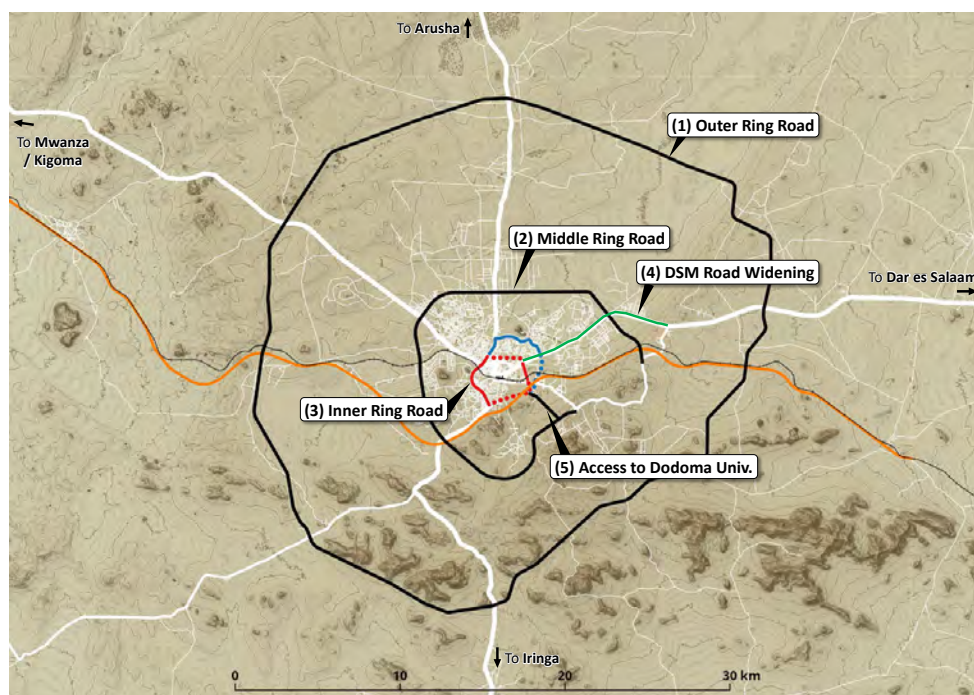
Figure 8 Ongoing and Planned Projects

(4) Evaluation of Proposed Road Projects

Figure 9 shows the proposed five (5) road projects under TANROADS. These road projects were analysed and prioritized based on a multi-criteria analysis with four (4) evaluation criteria, namely: urgency, efficiency, relevance with the Master Plan and social environmental impact and in conclusion, the result of prioritization on these projects justifies urgency and necessity of widening of Dar es Salaam Road and the Inner Ring Road Project.

- Widening of Dar es Salaam Road was evaluated as the most urgent and necessary project among the long-listed projects, considering that the future traffic demand observed along the said road will exceed the existing 2-lane road capacity within 10 years and the project is expected to derive limited adverse environment impacts.
- Inner Ring Road Project was evaluated as the second most necessary project among the long-listed projects. Considering the distribution of the future traffic among proposed three ring roads, the Inner Ring Road is still expected to carry more traffic than other ring roads due to the traffic characteristics in the city that the destination of nearly half of the traffic generated to/from the CBD.

As the result of discussions on the above study result with TANROADS and other relevant institutions, TANROADS expressed their intention that the construction of Inner Ring Road should be the first priority in order to decongest traffic in the city centre by diverting traffic especially heavy vehicle traffic. However TANROADS also recognized the urgency of the widening of Dar es Salaam Road. Therefore, TANROADS is preparing the feasibility study on widening of Morogoro – Dodoma Road in order to look for the financial source of the construction works.



Source: JICA Study Team

Figure 9 Proposed Road Projects in Dodoma City

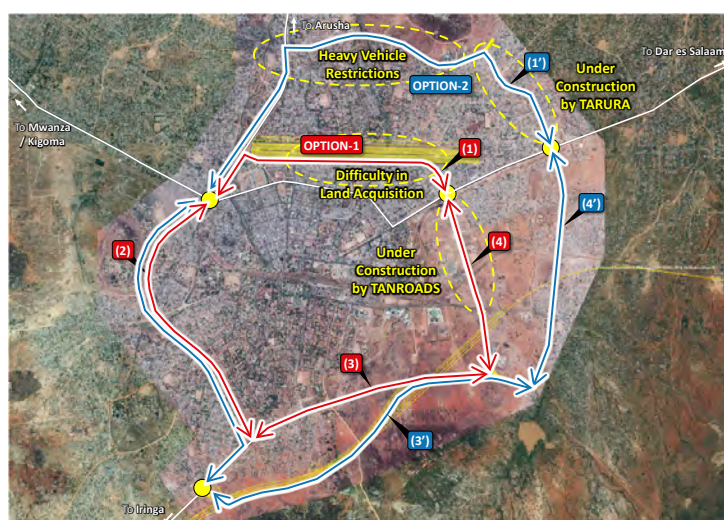
(5) Evaluation and Prioritization of Segments of Inner Ring Road

Figure 10 shows two (2) candidate alignments for the Inner Ring Road.

- Option-1 (the original alignment of the Inner Ring Road proposed by 1976 Master Plan): The Segments (1) and (3) are the missing link sections. TANROAD is currently constructing a 4-lane road along the Segment (4) connecting Shabiby Roundabout and Kikuyu Avenue.
- Option-2 (the alternative alignment proposed by TANROADS): The Segment (3') and (4') are the missing link sections. The section of Segment (1') excluding Arusha Road is under jurisdiction of TARURA and construction of sidewalk and street lightings, which would need to be removed for widening from 2-lane to 4-lane, are underway by TARURA.

As the result of the series of discussions with TANROADS, TANROADS expressed their preference of the alignment of Option-2 due to the following reasons:

- There is a difficulty in acquiring land along the Segment (1). Negotiation with the residents have not been solved over 10 years. Transfer of land title of the airport land from Tanzania Civil Aviation Authority (TCAA) to TANROADS would also be difficult. And construction of a road in parallel with the runway near the airport would not be approved by TCAA.
- Widening of the Segment (1') would not be difficult because the existing ROW would be good enough to accommodate 4-lane road. Partial land acquisition would be necessary for the widening but the scale of the impact would be minimal. Although the sidewalks and street lightings, which are currently under construction by TARURA, as well as utilities (water piles) and street trees need to be relocated for widening of the Segment (1'), this would not be a critical issue and would be manageable.
- However, there is a section in the Segment (1') having restriction of the influx of heavy vehicle (over 10 ton). According to TARURA, this restriction is due to the pavement strength of the existing road but the entry of many heavy vehicle into this road section would not be preferable because the surrounding area of the road is planned for residential purpose.
- The construction of new road sections to complete the “ring” represents the utmost priority for stakeholders involved.



Source: JICA Study Team

Figure 10 Possible Two Alignments for Inner Ring Road

5. Recommendations for Project Implementation

(1) Scope of the Project

As a result of discussions with TANROADS and other relevant institutions, the overall scope of the Project was determined as shown in Table 1 and 2 as well as Figure 11. It was also confirmed that the urgency of the southern part section of the Inner Ring Road (namely, Segment (3) and (4')) has higher priority, taking into account the following reasonings.

- There is a large number of traffic observed, particularly those of heavy trucks, passing through the commercial and institutional area in the city centre. A number of these heavy trucks derive a negative environmental impact, such as increased risks in traffic accidents, air pollution and vibration. Also there would be a rapid increase in traffic demand estimated in 10 years time in the city centre and traffic congestion and adverse environmental impacts would reach to the critical level, if there is no road improvement in the city centre.
- Accordingly, there are two options studied to ease the traffic demand in the city centre: (i) widening of existing northern part of the Inner Ring Road and (ii) improving of missing link in the southern part of the Inner Ring Road. As a result of discussion with local institutions, second option: (ii) improving of missing link in the southern part of the Inner Ring Road, is highly appreciated, since the northern part of the Inner Ring Road functions as a good community access road and the surrounding area of which is acknowledged as a well planned residential area, following the Master Plan.

The discussions of local institutions also confirmed that the segment(s) to be financed by Japan's Grant Aid need to be finalized at the next stage, considering the following conditions.

- The Study Team identified existence of the underground utilities (water pipes and electric poles) along the alignment of the proposed project segments, particularly those along the Segment (3). There would be an adjustment of the alignment or re-alignment required when the relocation of these underground utilities costs extraordinarily.
- The Study Team also identified a certain number of involuntary resettlement required for improvement of Segment (3) and Segment (4'). Both alignment and cross section should be carefully studied during the further JICA's study in order to mitigate the involuntary resettlements.
- The Study Team also recommend cost reduction measures in order to improve the efficiency of the Project. Taking an example of widening of Segment (2), additional 2 lanes could be added adjacent to the existing road with minor pavement improvement in the existing road, when durability of the existing road pertains its design standards. Another example is cross section and number of lanes of Segment (3) and (4'). Considering the future traffic demand, both segments could be first improved with a 2-lane road in order to open up and function as the Ring Road then be widened when/before the traffic demand is saturated.

In order to smoothly implement this Project, it is recommended that the following arrangements or coordination should be considered:

- **Storm water drainage:** There are several crossing seasonal channels along the alignment of the Inner Ring Road. Capacity of drainage of the channels and discharge points should be carefully examined in order not to cause any partial flooding.
- **Coordination with SGR project:** The planned alignment of Standard Gauge Railway (SGR) passes through the CBD of Dodoma City and crosses with the planned alignment of the Inner Ring Road twice. Depending on the possibility of design change of SGR project, shifting of SGR alignment into outside of the Inner Ring Road or harmonization of land use plan (including alignment of the Inner Ring Road) with SGR project should be considered. Moreover, the existing ground elevation at the project site is gradually increasing towards south and difference in height at Segment (4') and Segment (3) would be at least 20-30 m. Considering that the maximum gradient of railway alignment would be maximum 0.5% and the SGR will be constructed with embankment structure, the elevation of SGR at the crossing with Segment (3) would be almost equal to the existing ground level. Therefore, the railway crossing at Segment (3) may need grade separation such as flyover or underpass.
- **River training along the seasonal channel:** The Segment (4') will be constructed beside a seasonal channel. The channel is currently not protected and prone to be eroded by flash flood after heavy rain. Therefore, river training (slope protection) should be considered as a scope of the works of the Segment.

Table 1 Overall Project Scope

	Segment (1')	Segment (2)	Segment (3)	Segment (4')
Section	Emmaus Ya Pili - Wajenzi	Wajenzi – Imagi RA	Imagi RA – New RC Office	New RC Office – Emmaus Yapili
Length	3.9 km	5.5 km	2.9 km	3.2 km
Jurisdiction	TARURA	TANROADS	TARURA (existing road section only)	No existing road
Type of Works	Widening of existing road from 2-lane to 4-lane	Widening of existing road from 2-lane to 4-lane	Construction of new road	Construction of new road
Priority	No Improvement	2nd Priority	1st Priority	3rd Priority

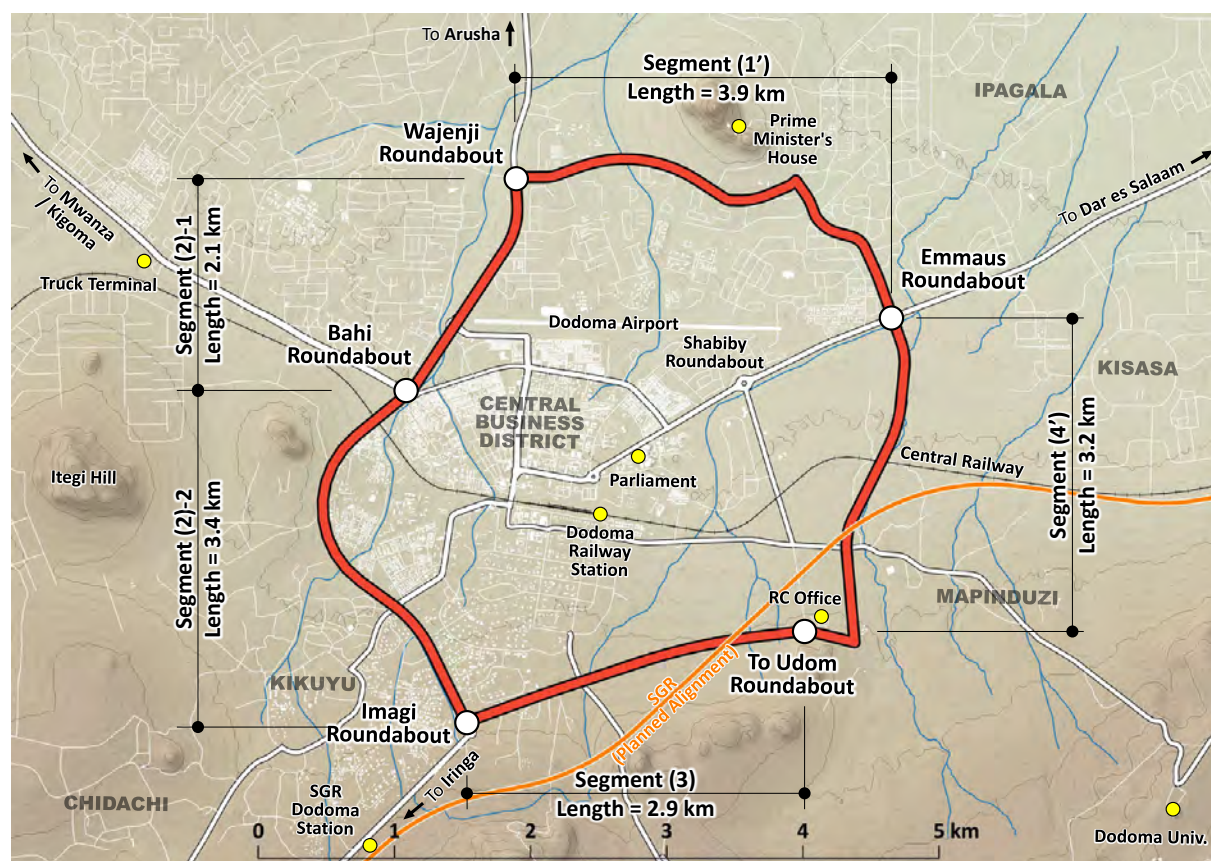
Source: JICA Study Team

Table 2 Summary of Evaluation Indicators of With and Without Project

Year/Case	Route	Route Length (km)	Traffic Volume (‘00 PCU)	Heavy Vehicle Ratio (%)	Travel Speed (km/hour)	Travel Time (min)	Volume/ Capacity Ratio
2019 (Base Case)	Emmaus-Bahi RA (thru City Centre)	4.3	77	34%	13.8	18.8	0.75
2029 Without Project		4.3	126	20%	6.0	43.1	1.22
		4.3	129	1%	14.7	17.6	0.61
2029 With Project	Emmaus-Bahi RA (thru Inner Ring Road)	11.3	62	64%	54.5	12.4	0.11

Note: i) With Project case include improvement of (a) Inner Ring Road (southern ring), (b) Outer Ring Road and widening of (c) Dar es Salaam Road and (d) Iringa/Arusha Road, ii) Current 10 ton restriction is applied to city centre including (1').

Source: JICA Study Team



Source: JICA Study Team

Figure 11 Proposed Road Alignment of Inner Ring Road

(2) Tentative Implementation Schedule

The Preparatory Survey (necessary for determination of the scope of the Project) would require 9 months including natural condition survey, outline design, cost estimate and natural/social environmental considerations. This survey period can be shortened if the basic data (such as the topographic survey data and geotechnical investigation result carried out by the feasibility study under TANROADS) would be provided to JICA Study Team.

	1	2	3	4	5	6	7	8	9
Review of Previous Studies									
Natural Condition Survey									
Traffic Demand Analysis									
Outline Design									
Construction Planning & Cost Estimate									
Natural & Social Environmental Considerations									
Discussion on Project Scope									
Report Preparation									
Inception Report									
Draft Final Report									
Final Report									

Source: JICA Study Team

Figure 9 Preparatory Survey Schedule

Assuming that the Project scope will be construction of 4-lane road at the 12 km-long section of the Segment (2), (3) and (4'), following the Preparatory Survey, the required project period after the Cabinet approval is estimated as 52 months including the detailed design and construction stages.

- E/N, G/A & Consultant Contract: 2 months
- Detailed Design: 4 months
- Procurement of Contractor: 4 months
- Construction Works: 42 months

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
E/N & G/A																																																				
Banking Arrangement																																																				
Consultant Contract																																																				
Verification																																																				
Issuance of A/P																																																				
Detailed Design																																																				
Detailed Design																																																				
Preparation of Tender Documents																																																				
Preparation for Tender																																																				
Tendering & Evaluation																																																				
Procurement / Construction Contract																																																				
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Issuance of A/P																																																				
Construction																																																				
Mobilization and Preparatory Works																																																				
Road Works																																																				
Drainage Works																																																				
Bridge / Structural Works																																																				
River Training Works																																																				
Miscellaneous Works																																																				
Demobilization																																																				

Source: JICA Study Team

Figure 10 Implementation Schedule after Cabinet Approval

(3) Relevance

In order to justify the relevance of implementing the Project under Japan's Grant Aid, it is necessary to evaluate the following points:

- Beneficial Effects of the Project
- Urgency of the Project
- Consistency with Medium to Long Term Development Programs of Tanzania
- Consistency with Japan's Development Cooperation Policy for Tanzania

Beneficial Effects of the Project

It is expected that the Project would derive the following beneficial effects:

- Mitigation of traffic congestion and decentralization of traffic flows by reinforcement of road network and connecting a missing link.
- Smoothing of traffic flow by widening of existing road (expansion of road capacity) whereas the significant traffic volume increase is expected.
- Improvement of living environment in city centre by eliminating heavy vehicle traffic.

Urgency of the Project

Because of the following reasons, the urgency of the Project is very high:

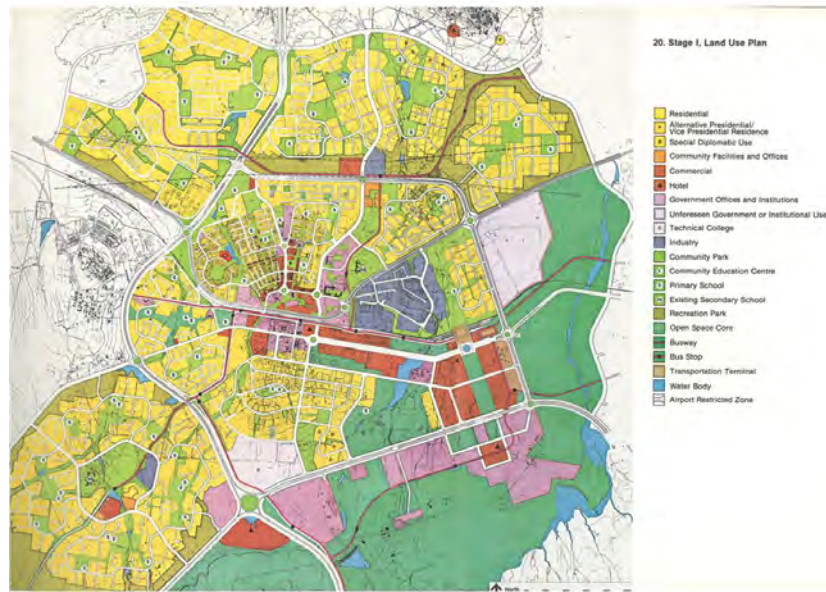
- Development of urban structure for diverting through-traffic into Outer Ring Road would take time and traffic congestion in city centre would be worse over the short/medium term. Thus, road network within city centre is necessary to be improved.
- Informal settlement is one of the biggest issues on urban development. The 2019 Master Plan emphasizes that importance of prevention of informal development and one of the solution is to demarcate boundary of development by road network development. Inner Ring Road will form a framework of urban structure of the city centre of Dodoma City whereas Dodoma City is expecting rapid urban growth in near future.

Consistency with Medium to Long Term Development Programs of Tanzania

Strengthening of strategic development corridors (such as the Central Corridor passing through the city centre of Dodoma City) and mitigation of traffic congestion in major cities (such as Dar es Salaam and Dodoma) are the important strategic plans under the Second National Five Year Development Plan (FYDP II) 2016/2017- 2020/2021. It is expected that the construction of the Inner Ring Road in Dodoma City will contribute to smoothen the traffic on the Central Corridor (through Dar es Salaam Road and Singida Road) and mitigate traffic congestion in city centre of Dodoma City. Therefore, this Project has strong consistency with the medium to long term national-level development plan of Tanzania.

Moreover, construction of Inner Ring Road was initially planned by 1976 Master Plan as an arterial road to form a framework of urban structure of the city centre in Dodoma City. Some part of the road sections have already been constructed but the construction of the missing link sections is

long-awaited. Therefore, this Project also has strong consistency with the medium to long term development plan of Dodoma City.

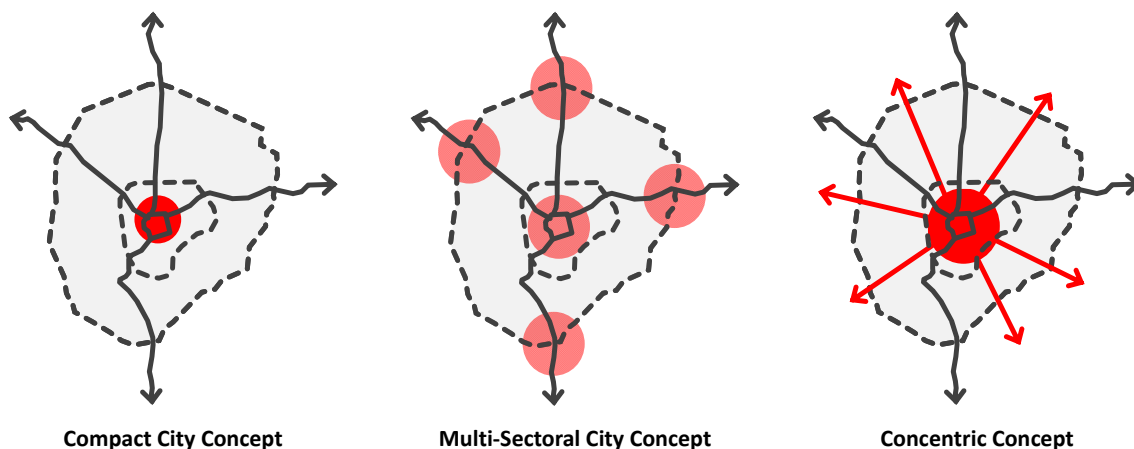


Source: 1976 Master Plan

Figure 11 Inner Ring Road Plan in 1976 Master Plan

The 2019 Master Plan proposes phased development where the Outer Ring Road will mark the boundary of city expansion within 20 years. The proposed three-layered ring roads and the existing four (4) radial arterial roads (Dar es Salaam Road, Arusha Road, Singida Road and Iringa Road) are essential elements in the designation of the various land uses and functions.

The development concepts of 2019 Master Plan are i) compact city concept that presumes confinement of city development within the Inner Ring Road, ii) multi-sectoral city concept that assumes concentration of development in multi centres located at junction nodes of the Outer Ring Road and the four radial arterial roads, and iii) concentric concept that assumes development to radiate from the present CBD outward to the borders of the capital city district.



Source: In reference to 2019 Master Plan, JICA Study Team prepared.

Figure 12 Development Concepts of 2019 Master Plan

Considering the above, the expected functions or roles of the three-layered ring roads are as follows:

- Inner Ring Road: i) formulation of basic framework of urban structure in city centre, ii) diversion of through-traffic in the short and medium term and iii) decentralization of traffic within city centre.
- Middle and Outer Ring Roads: i) formulation of development boundaries for new urban developments and ii) diversion of through-traffic in the long-term.

Consistency with Japan's Development Cooperation Policy for Tanzania

In line with the national strategy of Tanzania to be a middle-income country, the Government of Japan has assisted Tanzania in creating and promoting a virtuous circle of comprehensive, sustainable and stable economic growth and poverty reduction. The three (3) priority areas of Japan's development cooperation are i) nurturing driving forces of economic growth, ii) infrastructure development conducive to economic and social development, and iii) improvement of governance and the public service delivery.

In order to facilitate the basis of the socio-economic development, the Government of Japan has supported basic infrastructure improvement in transportation and traffic as well as electricity and energy by employing Japan's high quality infrastructures, which were well emphasized in the Sixth Tokyo International Conference on African Development (TICAD VI). Regarding transportation and traffic, the improvement of arterial traffics and urban transportation is focused.

The requested Inner Ring Road in Dodoma City will be one of the most important roads in Dodoma City Development and therefore, the Project has a strong consistency with Japan's development cooperation policy for Tanzania.

(4) Effectiveness

Effectiveness of the Project can be evaluated by quantitative and qualitative effects. The following are the possible indicators for the Project and the detailed target values will be determined after finalization of the scope of the Project.

Quantitative Effects

It is expected that the Project would derive the following quantitative effects:

- Reduction of travel time
- Mitigation of traffic congestion in city centre
- Elimination of heavy vehicle traffic from city centre
- Improvement of air quality/noise/vibration

Qualitative Effects

It is expected that the Project would derive the following qualitative effects:

- Navigating concentric urban development in city centre
- Improving quality of life in city centre
- Enhancing confidence between Tanzania and Japan

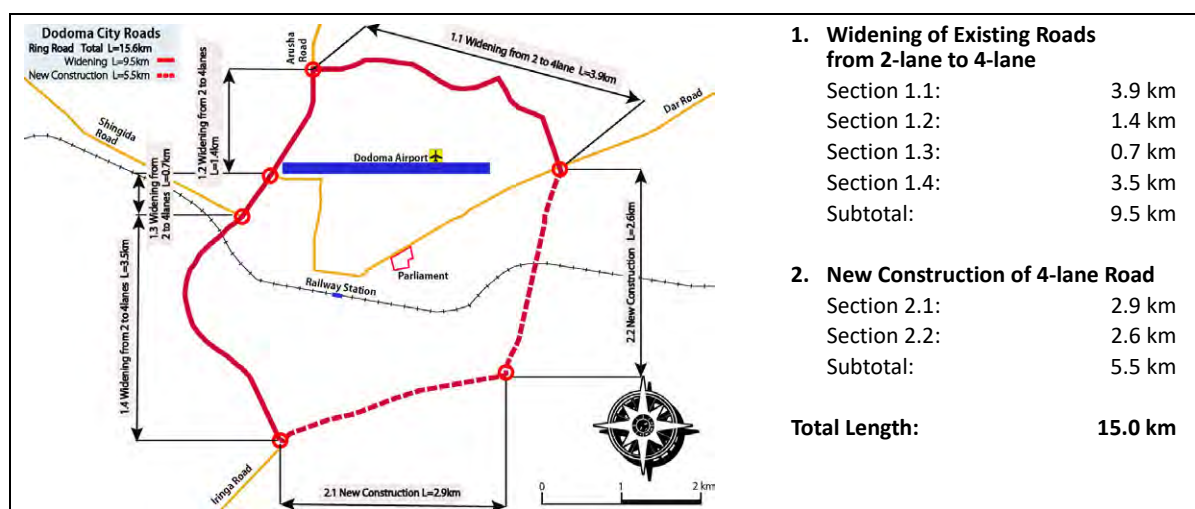
1. Introduction

1.1 Background of Survey

Located in the central part of the United Republic of Tanzania (hereinafter referred to as Tanzania), and with a population of about 400,000 people (in 2012), Dodoma City is the country's capital. Dodoma City was declared the capital city of Tanzania on 1st of October 1973 with the objectives of centralizing the capital within the country and attracting social and economic advancements to the country's central regions. The capital city was previously in Dar es Salaam, located in the coast of the Indian Ocean. Dar es Salaam has since remained the commercial centre of the country and a home to many government agencies head offices. The Government of Tanzania has declared to completely move the capital function to Dodoma City by 2020. As a result, it is expected that the population of Dodoma City will increase significantly. This increase in population will subsequently result in a demand for large-scale infrastructure development in the city. For this reason, the Government of Tanzania is reviewing the 2010 Dodoma Capital City Master Plan to come up with a more effective action plan.

Dodoma City is a hub of road transport intersecting the Central Corridor (extending from Dar es Salaam Port, the main unloading port of Tanzania, to Kigoma in the west and Mwanza in the north) and the Great North Corridor (connecting the northern city Arusha to southern cities: Songea and Iringa). Therefore, there is concern that severe congestion will occur as the traffic volume increases given the convergence of the roads serving the Central and Great North Corridors.

In the vicinity of Dodoma City, road improvement projects under the support of the European Union (EU) and the African Development Bank (AfDB) are currently being implemented. In addition to this, the Government of Tanzania has requested to the Government of Japan for Grant Aid to finance the construction of the Inner Ring Road in Dodoma City. This shall include the upgrading and widening of an existing 9.5 km road from 2-lane to 4-lane, and the construction of a 5.5 km 4-lane new road.



Source: TANROADS

Figure 1.1.1 Layout Plan of the Requested Road Sections

1.2 Outline of Survey

This survey was aimed at collecting information on the conditions of the proposed road section of the “Dodoma City Roads Improvement Project”, analyzing the issues and challenges to the project implementation and examining the eligibility of the proposed projects to receive Japan’s Official Development Assistance (ODA).

The survey was commenced from December 2018 and the first assignment in Tanzania was carried out in January 2019. Based on the information and data given by the Government of Tanzania, Study Team prepared the Draft Final Report. The content of the report was discussed with the Government of Tanzania at the second assignment in Tanzania carried out in February 2019. This Final Report was finalized incorporating the result of discussions.

Detailed Tasks	2018	2019		
	Dec	Jan	Feb	Mar
Data Collection and Analysis of Related Documents	□			
Preparation of Draft Inception Report	□			
Discussion and Finalization of Draft Inception Report	△			
Explanation of Inception Report to Tanzania Government		▲		
Data Collection on Road Development Plans/Projects in Dodoma City and its Surroundings		■		
Confirmation of Executing Agency		■		
Road Condition Survey		■		
Data Collection and Analysis on Traffic Data		■		
Data Collection of Topographic and Geotechnical Conditions		■		
Study on Overall Project Scope, Segmentation and Prioritization		□		
Study on Possible Project Scope under Japanese ODA		□		
Preparation of Draft Final Report		△		
Explanation and Discussion on Draft Final Report			■	
Interview to Japanese Contractors			□	
Preparation of Final Report			□	
Submission of Reports		◎ICR	◎DFR	◎FR

□: Work in Japan, ■: Works in Tanzania, △: Meeting in Japan, ▲: Meeting in Tanzania, ◎: Report Submission
ICR: Inception Report, DFR: Draft Final Report, FR: Final Report

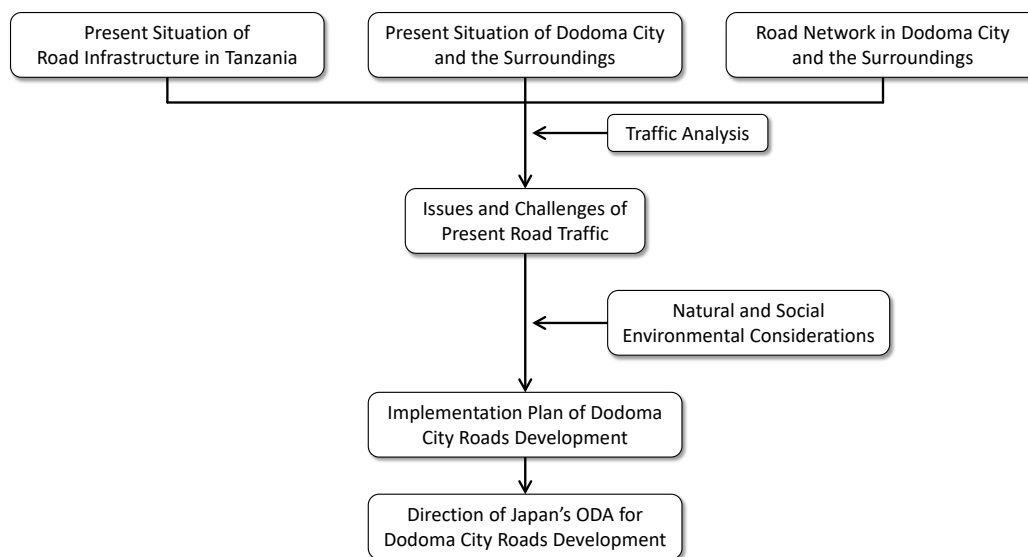
Figure 1.2.1 Survey Schedule

This survey started from analysis of the present situation and development plans of the road network in Dodoma City by reviewing: i) the first draft of Dodoma National Capital City Master Plan (2019-2039), which is currently under study by the Ministry of Lands, Housing and Human Settlements Development (MOLHSD), ii) strategic plans of TANROADS and TARURA and iii) the study reports of the proposed road projects in Dodoma City.

Traffic analysis was also undertaken by carrying out traffic surveys (count survey and origin-destination interview survey) for 4 consecutive days from January 8th (Tuesday) to 11th (Friday), 2019 as well as reviewing the traffic survey results of on-going TANROADS’ feasibility studies for two Inner Ring Roads, namely: i) Shabiby Roundabout – Arusha Road Roundabout (5.0 km) and Chimwaga Roundabout – Chinyoya – Kikuyu Road (11.0 km) and ii) Nanenane – Miyuji – Arusha Road – Mkonze Road (23.0 km).

Based on the analysis of the above information and data, issues and challenges facing the present roads traffic were identified. Also, the proposed road development projects as well as the each section of the proposed Inner Ring Road were evaluated and prioritized respectively. These results were shared with stakeholders in Tanzania, and an implementation plan for road developments in Dodoma City was discussed.

As a result of the above examinations and discussions, urgency and efficiency of the project implementation of the Inner Ring Road was confirmed.



Source: JICA Study Team

Figure 1.2.2 Survey Flow

2. Present Situation of Road Infrastructure in Tanzania

2.1 Road Administration

Tanzania's road administration is undertaken by the Tanzania National Roads Agency (TANROADS) under the Ministry of Works, Transport and Communication (MOWTC) for the National Roads (Trunk and Regional Roads) and by the Tanzania Rural and Urban Roads Agency (TARURA) under the President's Office – Regional Administration and Local Government (PO-RALG) for District Roads (Collector Roads, Feeder Roads, and Community Roads) respectively. TARURA is relatively a new organization established in July 2017 and bears the role that was previously carried out by the Local Government Agencies under PO-RALG. The road sections proposed as the Dodoma City Inner Ring Road that were investigated in this survey comprise of sections under the jurisdiction of TANROADS and TARURA. It was therefore necessary to confirm the involvement of TARURA in this project.

(1) Tanzania National Roads Agency (TANROADS)

TANROADS was established in July 2000 and is responsible for the management of 36,258 km of National Roads made up of 12,176 km of Trunk Roads and 24,082 km of Regional Roads as of June 2018. It is also responsible for designing and construction of airports, following the shift from Tanzania Civil Aviation Authority (TCAA) to TANROADS in August 2016.

There was an increase in length of paved road network for National Roads from 9,206 km in June 2017 to 9,951 km in June 2018, equivalent to 27.4% of the National Road Network. There was also an improvement in budget set for roads whereby total expenditure for Road Sector increased from TZS 1,309.7 billion in June 2017 to TZS 2,151.5 billion in June 2018. This amount includes both Consolidated Budget and Road Fund for maintenance programme.

Inadequate funding is a major challenge facing TANROADS in implementing its road projects. This challenge has a negative impact on projects such as delayed completion, cost overruns and outstanding debts, which attract interest particularly for development projects.

Table 2.1.1 TANROAD's Road Network (as of June 2018)

Road Type		Length (km)	Total Length (km)
Trunk Roads	Paved	8,264	12,176
	Unpaved	3,912	
Regional Roads	Paved	1,687	24,082
	Unpaved	22,395	
Total		36,258	36,258

Source: TANROADS, 12th Joint Transport Sector Review 2018

The major sources of funds for roads sector have continued to be the Government of Tanzania, financial support by donor agencies and Road Fund Board.

Table 2.1.2 TANROADS' Budget Performance (FY 2015/16 – 2017/18)

Unit: TZS Billion

Source of Budget	FY 2015/16		FY 2016/17		FY 2017/18	
	Approved Budget	Actual Release	Approved Budget	Actual Release	Approved Budget	Actual Release
Road Fund – Maintenance	541.30	409.30	519.90	441.80	573.08	508.86
Road Fund – Development	45.64	26.73	42.96	32.29	43.86	46.85
MOWTC – Consolidated Funds for Development	187.10	704.40	1,222.11	532.88	582.02	1,217.48
Other Income	4.10	4.70	2.66	0.00	21.00	14.75
Direct Donor Funding	85.00	271.00	344.80	273.10	545.58	348.48
Personal Emolument	15.91	16.12	16.29	15.38	14.38	15.05
Total	879.61	1,432.25	2,148.70	1,309.70	1,761.00	2,151.50

Source: TANROADS, Quarterly Progress Reports

More than 99% of maintenance works under TANROADS are contracted out to the private sector. The TANROADS Road Maintenance Management System (RMMS) is used for road asset management. The system is equipped with a database for storing network data for planning purposes. Such data is used to estimate annual budget needs for routine maintenance, periodic maintenance and spot improvements. It is also used to prioritize the road network needs under budgetary constraints for road maintenance activities, contract management, and preparation of quarterly progress reports.

Road condition surveys of paved roads under TANROADS jurisdiction carried out once a year by the RMMS Team based at TANROADS HQ while that of unpaved roads is undertaken twice a year by regional offices. The survey results are reported in the quarterly progress reports of the respective financial year.

Table 2.1.3 TANROADS' Maintenance Performance (FY 2015/16 – 2017/18)

	FY 2015/16		FY 2016/17		FY 2017/18	
	Planned	Achieved	Planned	Achieved	Planned	Achieved
Routine Maintenance (km)	32,743	32,608	24,169	22,357	31,167	29,085
Periodic Maintenance (km)	4,379	4,245	3,975	3,579	5,231	4,833
Spot Improvement (km)	1,061	1,074	894	776	1,031	972
Total (km)	38,183	37,927	29,039	26,712	37,430	34,890
Bridge Numbers	3,101	3,096	3,130	2,735	2,899	2,679

Source: TANROADS, Quarterly Progress Reports

TANROADS recognized the importance of axle load control on their road network and there has been improvement in operations by constructing more weighbridges. As of June 2018, there were 48 operational permanent weighbridges, 22 mobile weighbridges and 2 weigh in motion (WIM) stations at Vigwaza and Mikese.

(2) Tanzania Rural and Urban Roads Agency (TARURA)

TARURA is responsible for the maintenance and development of Rural and Urban Roads. Road maintenance and development operations are performed by the Councils through the respective Council Managers. Regional Coordinators are responsible for monitoring all works done by Councils and are also the delegated Accounting Officers in all procurement issues in their respective regions. Currently, TARURA operates in 26 Regions and 184 Councils.

The road network handed over from PO-RALG to TARURA covers a total length of 108,946 km consisting of Collector, Feeder and Community Roads. This network is exclusive of unclassified network of community roads which comprise of undesignated village roads, tracks and paths that connect farms and communities to the classified road network.

Table 2.1.4 TARURA's Road Network (as of June 2018)

Road Type	Road Condition			Total	Percentage (%)
	Good	Fair	Poor		
Paved (km)	1,026	283	140	1,450	1.3
Gravel (km)	9,732	9,597	5,076	24,405	22.4
Earth (km)	13,853	27,375	41,863	83,091	76.3
Total (km)	24,612	37,255	47,078	108,946	100.0
Percentage (%)	22.5	34.2	43.3	100.0	

Source: TARURA, 12th Joint Transport Sector Review 2018

The maintenance programme of TARURA is wholly financed by the Road Fund Board. The Directorates of Rural and Urban Roads are responsible for the implementation of this programme. Activities undertaken under this programme include routine maintenance (patch works, desalting of culverts, vegetation control etc.), spot improvement (light reshaping, spot gravelling, etc.), periodic maintenance (regravelling, resurfacing, heavy grading, replacement of culverts, etc.) and bridge/culverts maintenance works.

Table 2.1.5 TARURA's Maintenance Programme during FY 2017/18

	Planned	Achievement	%
Routine Maintenance (km)	24,675	23,441	95%
Spot Improvement (km)	7,477	7,224	97%
Periodic Maintenance (km)	6,814	6,814	99%
Total Length (km)	38,966	37,480	96%
Total Budget (TZS million)	247,743.6	179,374.7	72%

Source: TARURA, 12th Joint Transport Sector Review 2018

TARURA will continue implementing maintenance and development programmes funded by the Road Fund Board and ongoing development projects financed by donor agencies. During FY 2018/19, the approved budget for maintenance work and development works are TZS 243 billion and TZS 24 billion respectively.

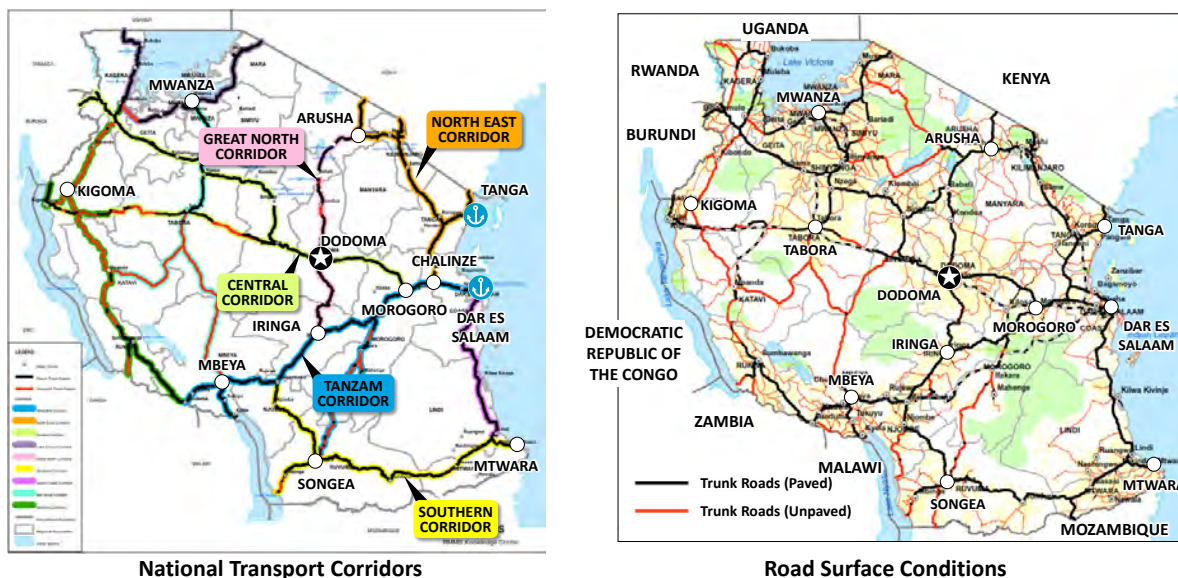
According to TARURA Dodoma Region, the annual budget for development works in Dodoma Region and Dodoma City are currently TZS 20 billion and TZS 5 billion respectively.

2.2 Road Sector Development Plan

Tanzania's long-term national development plan "The Tanzania Development Vision 2025" advances guidelines for joining middle-income countries by 2025, which include i) high quality livelihood, ii) peace, stability and unity, iii) good governance, iv) a well-educated and learning society, v) a strong and competitive economy. It is therefore essential to develop infrastructure to support socioeconomic activities in order to achieve these growth targets. The necessity of developments of roads, electricity, water, and telecommunications is further emphasized in the vision.

The Second National Five Year Development Plan (FYDP II) 2016/2017- 2020/2021 is a strategic action plan for achieving the Vision 2025 above. It targets increasing the proportion of paved roads in

total road network from 6.8% to 10%, and includes construction of Dar es Salaam - Chalinze - Morogoro Expressway (200 km), pavement of the main roads (unpaved sections), strengthening of strategic development corridors such as the Central Corridor (originating from Dar es Salaam Port), the North East Corridor (originating from Tanga Port) and the Southern Corridor (see Figure 2.2.1 on the left).



Source: TANROADS (Oct 10, 2018)

Figure 2.2.1 Tanzania's National Roads Network

In addition, the Transport Sector Investment Programme (TSIP) guides the development of the transport sector. TSIP Phase III is under preparation with the support of World Bank and is expected to be completed by the end of April 2019. TSIP III will be implemented as a short term programme of 3 years (2018/19 – 2020/21) to be aligned with FYDP II.

Table 2.2.1 Development Budget for Transport, Works & PO-RALG

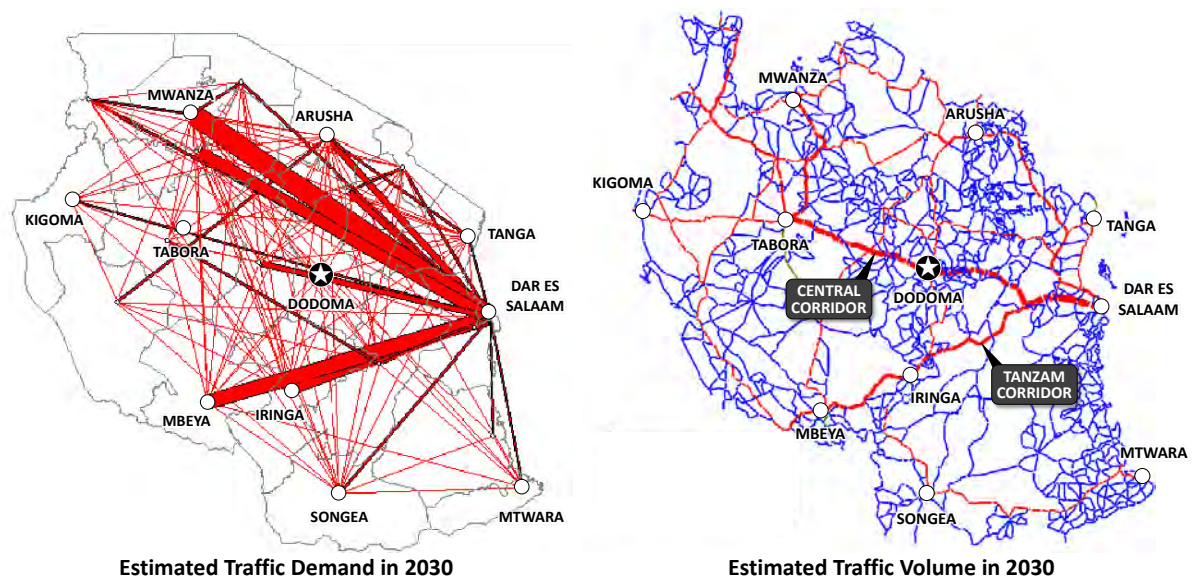
Unit: TZS Billion

Year	Transport		Works		PO-RALG		Total		% Released
	Budget	Release	Budget	Release	Budget	Release	Budget	Release	
2013/14	421	233	854	593	15	15	1,289	841	65%
2014/15	449	95	1,042	905	23	23	1,513	1,023	68%
2015/16	276	183	1,455	1,250	16	16	1,748	1,449	83%
2016/17	2,496	1,920	2,176	1,389	25	25	4,697	3,333	71%
2017/18	2,478	1,787	2,465	2,221	26	24	4,969	4,033	81%
2018/19	2,301		1,822		27		4,150		

Source: MOWTC and PO-RALG (12th Joint Transport Sector Review 2018)

2.3 Inter-Regional Traffic Demand and Formation of Road Network

According to the “Comprehensive Transport and Trade System Development Master Plan in the United Republic of Tanzania” that was conducted by JICA, the demand for the Central Corridor and the TANZAM Corridor is prominent, indicating that the importance of these corridors is high (see Figure 2.3.1 on the right). Generally, Tanzania’s road network has been developed in a form that connects the major regional centres in the vast expanse of the country with the Trunk Roads that run at the centre of the regional cities. This also applies to Dodoma City where the Central Corridor (the east-west trunk road extending from Dar es Salaam to Kigoma or Mwanza) and the Great North Corridor (the north-south Trunk Road connecting Arusha and Iringa) intersect at the central area of Dodoma City. In the future, it is expected that the traffic volume on the Central Corridor (mainly through-traffic) will increase, and with it, an increase in traffic problems such as degradation of living environment along residential roads due to heavy traffic inflows, increase in traffic pollution (exhaust gas, etc.) and traffic accidents. Therefore, construction of a ring road with a bypass road function would be needed before such problems occur.



Source: Comprehensive Transport and Trade System Development Master Plan in the United Republic of Tanzania (JICA)

Figure 2.3.1 Inter-Regional Traffic Demand

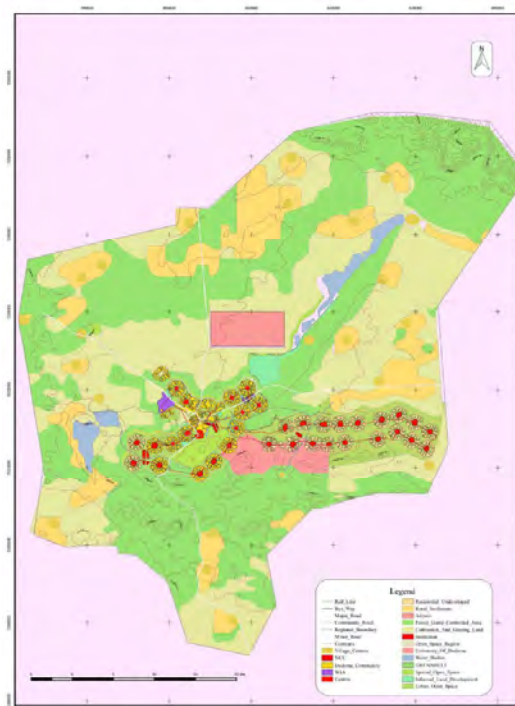
3. Present Situation of Developments in Dodoma City

3.1 Historical Background of Dodoma City Development

Historically, Dodoma City was considered a strategic city, located at the heart of Tanzania main land where international and domestic trunk routes converge, connecting between inland countries and all major cities in Tanzania. In 1973, Dodoma with a population of 40,000, was officially inaugurated as a new capital city of Tanzania. Following the official inauguration, the Government of Tanzania (GOT) established Capital Development Authority (CDA) and developed first comprehensive development master plan in 1976.

With a view of Dodoma as a capital city with a population of 1 million, the 1976 Master Plan recommended the development of a linear city form extending from the CBD eastwards along Dar es Salaam Road. The following are the major components listed in the Master Plan.

- A systematic urban growth with modular communities each with 28,000 populations. These communities are designed to link with exclusive busways linking to the city centre and/or major employment destination such as commercial and industrial zones.
- Major forest and controlled open spaces surrounding the built-up area were zoned, functioning as a buffer zone. An air strip was proposed to be shifted to 15 km north of the city along Arusha Road. Water retention ponds were also proposed along seasonal water courses.



Source: Dodoma National Capital City Master Plan (2019-2039)

Figure 3.1.1 1976 Dodoma Master Plan

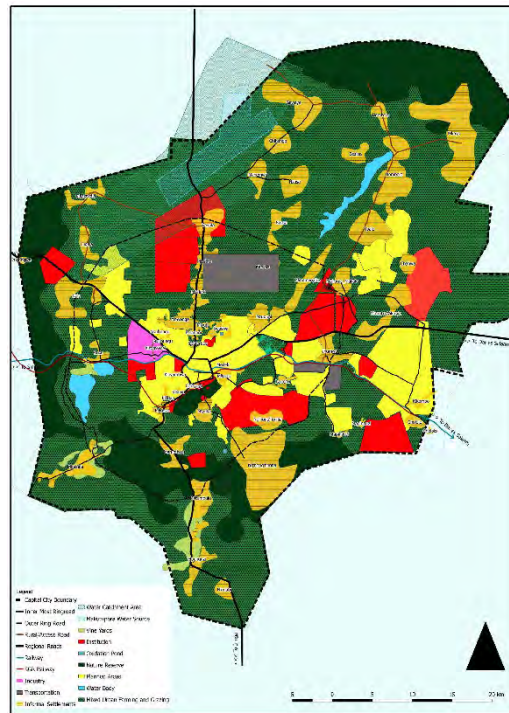
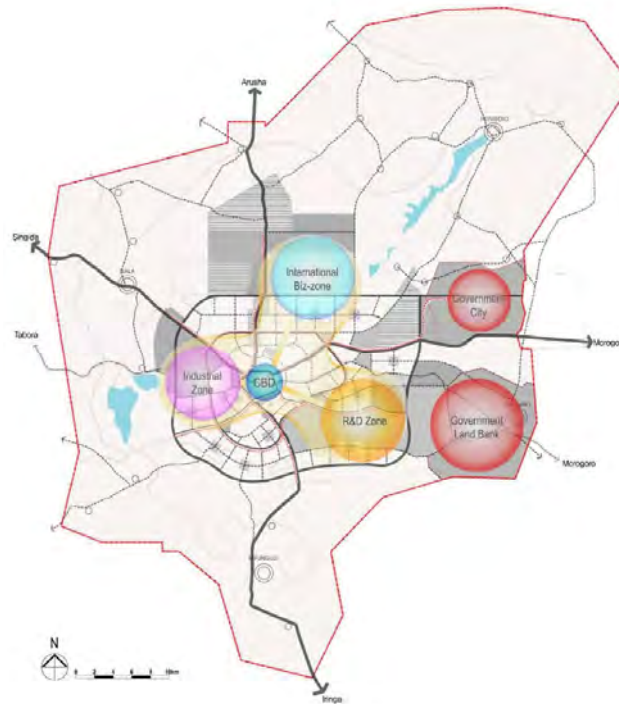


Figure 3.1.2 Existing Land Use of Dodoma City



Source: Dodoma National Capital City Master Plan (2019-2039)

Figure 3.1.3 2010 Dodoma National Capital City Master Plan

3.2 2019 Dodoma National Capital City Master Plan

(1) Vision, Mission and Goals

The Vision of the 2019 Master Plan is to develop Dodoma City as a National Capital that embraces economic competitiveness, social inclusion, good and safe city, and national identity for sustainable development. In realizing this vision, the missions guiding the 2019 Master Plan include:

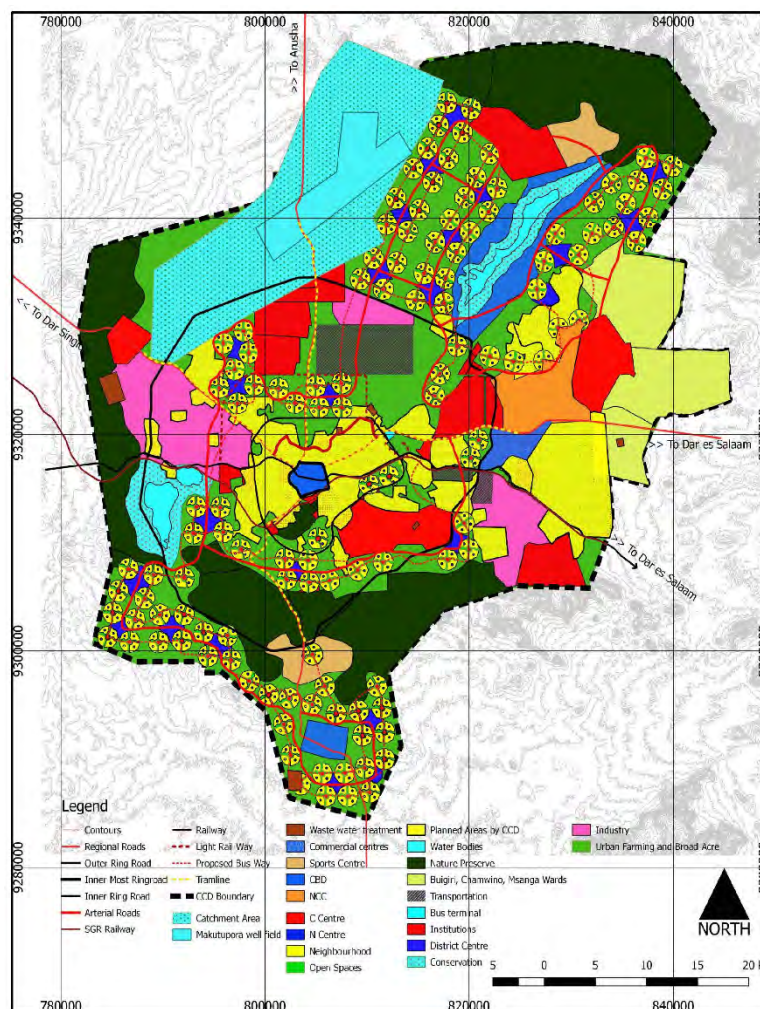
- Dodoma as a regional economic hub, developing industrial zones, dry ports and urban agriculture.
- Dodoma as an academic city, expanding existing Dodoma University, Teachers' Colleges as well as other educational and research institutes
- Dodoma as a sport/recreational city, developing a new National Stadium, funded by Qatar Foundations.

Other than these missions, the Master Plan also suggests 'tourist destination', 'smart', 'TOD (Transit Oriented Development)' as well as 'Green and Eco-friendly' city as part of the mission to achieve the above vision. Following these vision and missions, and on the basis of the ongoing analysis and inventories, the 2019 Master Plan sets a number of goals, stipulating development of efficient and convenient transportation infrastructure and service for the next twenty years as part of the development goals.

(2) Proposed Development Patterns and Adopted Master Plan Concept

With a view of the success of the modular community development, proposed and implemented, following the 1976 Master Plan, the 2019 Master Plan basically adopts the same development concept, expanding the cells of community in the designated planned area. The 2019 Master Plan suggests the

phased development where the Outer Ring Road marks the boundary for city expansion within 20 years, where the project population of 1.7 million is allocated and major city development projects are promoted within the Outer Ring Road.

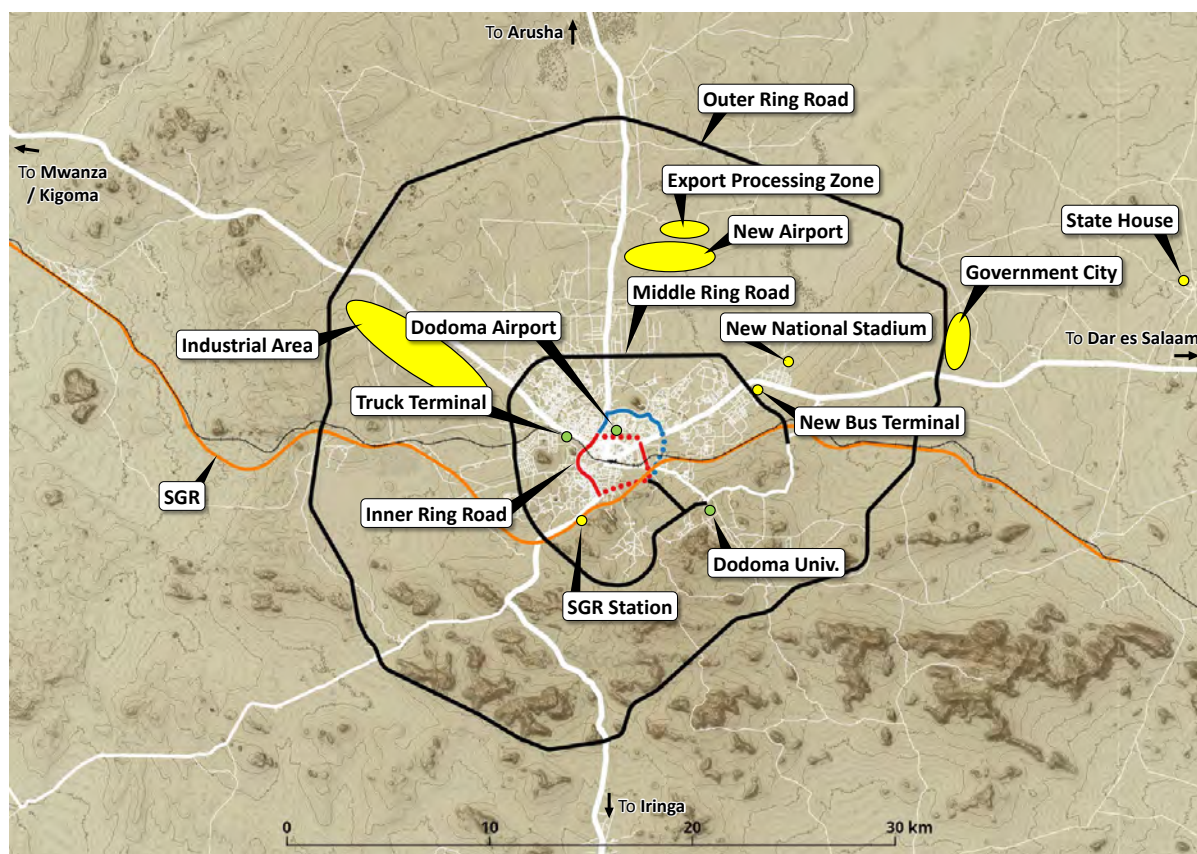


Source: Dodoma National Capital City Master Plan (2019-2039)

Figure 3.2.1 2019 Dodoma National Capital City Master Plan (Draft)

Part of notable city projects are undergoing:

- **Government City:** the site is located at 17 km from the CBD along Dar es Salaam Road and covers 650 ha of land and planned to accommodate offices of government ministries, diplomatic missions and other government institutions.
- **Industrial Area:** the current Industrial Area located adjacent to the CBD along Singida Road is planned to expand, covering 3,500 ha.
- **Sports Centre:** the National Stadium is under construction adjacent to the Government City along Dar es Salaam Road, concerning 4,500 ha in total.
- **EPZ:** the Export Processing Zone is located adjacent to the new Dodoma Airport, covering 1,700 ha.
- **New Airport:** New Dodoma Airport is located at 15 km from the CBD along Arusha Road covering 4,400 ha and functions as an international airport allowing all sizes of aircrafts.



Source: JICA Study Team

Figure 3.2.2 Proposed and Ongoing Projects

(3) Socio-economic Framework

Presently in 2018, the Dodoma City has a population of 580,000. According to the Population Census (2012), the population of Dodoma City rapidly increased at 4.9% per annum between 2002 and 2012. Considering the increased investment and employment opportunities due to the recent attempt to shift the function of the National Capital to Dodoma, the 2019 Master Plan sets a population growth rate of 5.5% per annum, and projected to have a population of 1,690,000 by 2039.

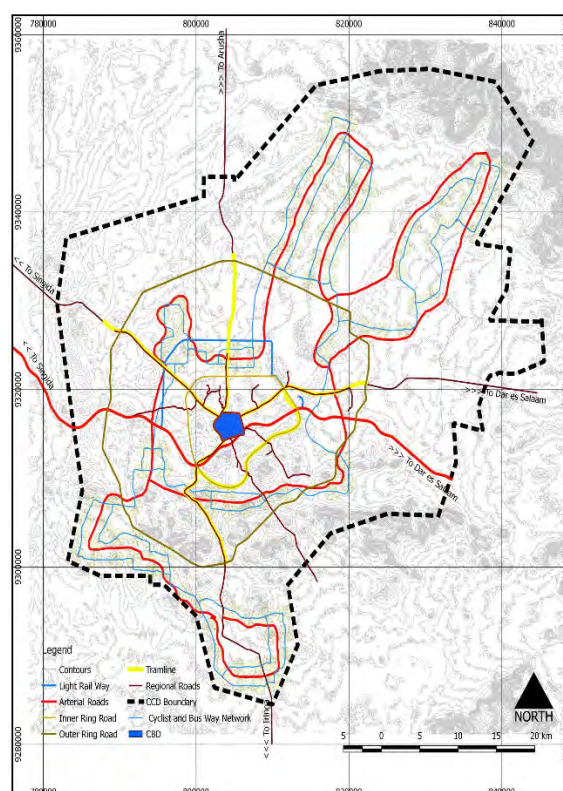
(4) Proposed Road and Transport Network

Though there is no numerical studies, the 2019 Master Plan analyses the future traffic demand, considering on-going and committed projects, and proposes 2019 Dodoma Transport System Plan with the target years of 2039 and 2069. The transport modes discussed and suggested in 2019 Dodoma Transport System Plan varies from road to commuter railways.

- Road sector: the Dodoma Transport System Plan identifies three ring roads: (i) Outer Ring Road (with a radius of 15 km from the CBD), (ii) Middle Ring Road (10 km radius from the CBD) and (iii) Inner Ring Road (2-3 km radius from the CBD). The Plan also identifies flyovers and interchanges where the ring roads and radial trunk roads intersect.
- Public transport sector: the same plan identifies (i) busway and (ii) tram line as the main public transport modes in the future city. A bus way is proposed, connecting all existing and planned modular communities, and expanding the network to more than 200 km. The designated BRT-type bus lane is proposed to allow the bus way in order to maintain the service level. A tram line, on the other hand, is proposed along the trunk roads, including Dar es Salaam Road, Arusha Road, Singida Road, Iringa Road and Middle Ring Road. In order to encourage future

car users to use the public transport system, the Plan also proposes Park and Ride facilities adjacent to the tram lines. Apart from busway and tram line, which cater commuter passengers in Dodoma, the Plan also proposes intercity bus terminals in the outskirts of the city. The intercity bus terminals is designed to control inflow of the large intercity buses into the CBD and reduce the traffic volume and congestion.

- NMT: the Plan also identifies (i) pedestrian and (ii) bicycle networks. Similar to the busway, both networks is proposed, connecting all existing and planned modular communities, and expanding the networks covering whole Dodoma City.



Source: Dodoma National Capital City Master Plan (2019-2039)

Figure 3.2.3 2019 Dodoma Transport System Plan (Draft)

(5) Status of 2019 Master Plan and Way Forward

Through a review work on the previous master plans, data collection and analysis including site reconnaissance and a series of consultative meetings which involved all government agencies, the first draft of 2019 Master Plan was released in December 2018 by the MOLHSD. This draft Master Plan was circulated among government agencies and will be fine-tuned and approved through the following procedures.

- Public hearing and integration of citizens' comments (within 90 days)
- Submission of proposed Master Plan to City Authority/Regional Administration for hearing and further integration
- Submission of proposed Master Plan to Planning Director of RAS-Dodoma for approval
- Gazetting of the Master Plan for public awareness

4. Road Network in Dodoma City and the Surroundings

4.1 Present Road Situation

The form of the present road network in Dodoma City is generally based on the 1976 Master Plan and is composed of the east-west and north-south Trunk Roads (Central Corridor, Great North Corridor) which are under the administration of TANROADS and local roads (District Road: 413.74 km, Feeder Road: 555.70 km, Community Road: 116.35 km) which are under TARURA.

Whereas TANROADS' Trunk Roads in Dodoma City are all paved and its pavement conditions are good, TARURA's local roads are poor as the capital's road network, while 133 km (12.3%) of the total local roads are paved leaving 952.79 km (87.7%) of the local roads as either gravel or earth roads.¹

The majority of roads in Dodoma City are 2 lanes and few sections of the roads such as 1.6 km section in city centre (from Kimbinyiko Roundabout through Central Roundabout to the corner of Dodoma Airport) and 2.5 km section of Singida Road in city centre are 4 lanes. However, 4-lane ROW has already been secured along the Trunk Roads outside of the proposed Inner Ring Road and widening works can be implemented anytime if the funding for the works would be secured.



(1) Dar es Salaam Road



(2) Arusha Road



(3) Singida Road

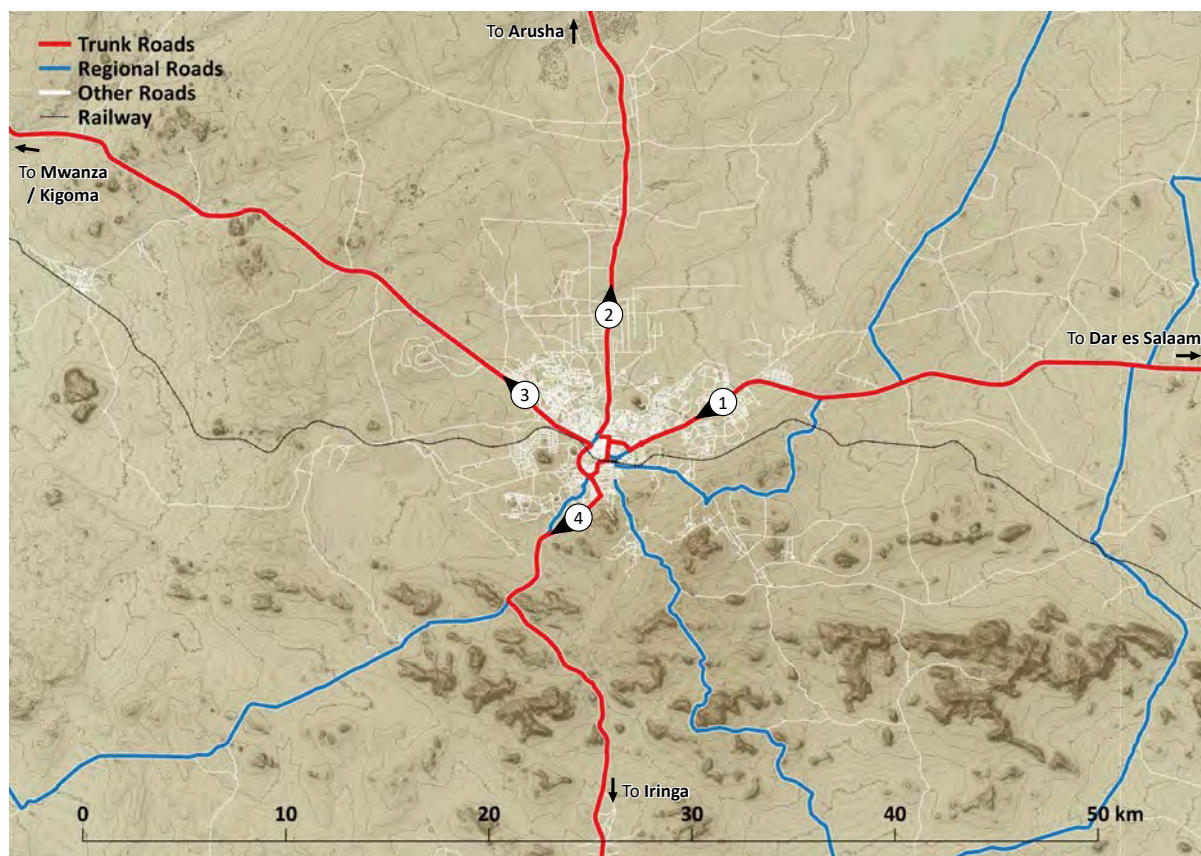


(4) Iringa Road

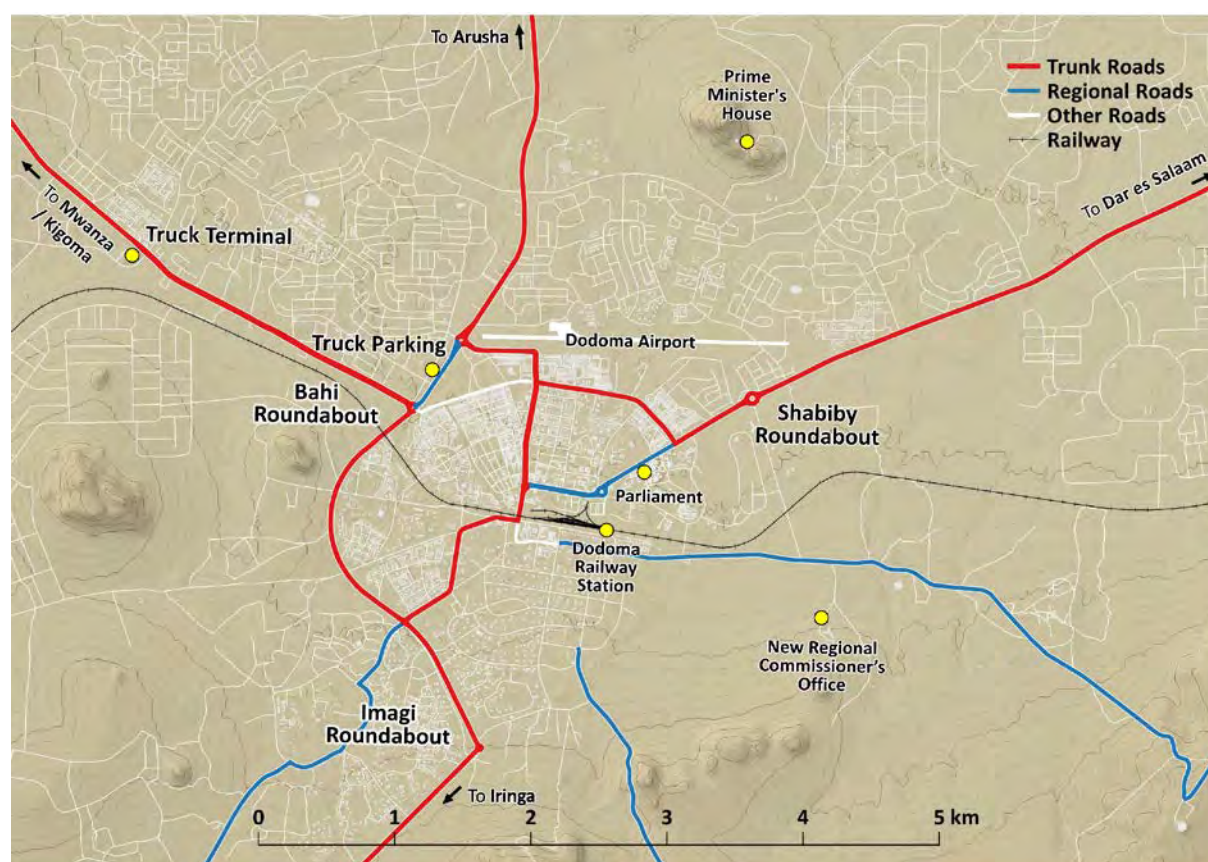
Source: JICA Study Team

Figure 4.1.1 Trunk Roads in Dodoma City

¹ TARURA, Proposal for Improving the Road Network in Dodoma City



Note: The numbers on the above figure shows the locations of photos of Figure 4.1.1 taken at.



Source: JICA Study Team

Figure 4.1.2 Existing Road Network in Dodoma City

4.2 Road Development Plans

In order to meet the booming traffic demand in Dodoma City caused by the government decision to shift the capital city function from Dar es Salaam to Dodoma, TANROADS and TARURA are planning to improve the road network in Dodoma City. The following table shows the proposed road improvement projects by these agencies.

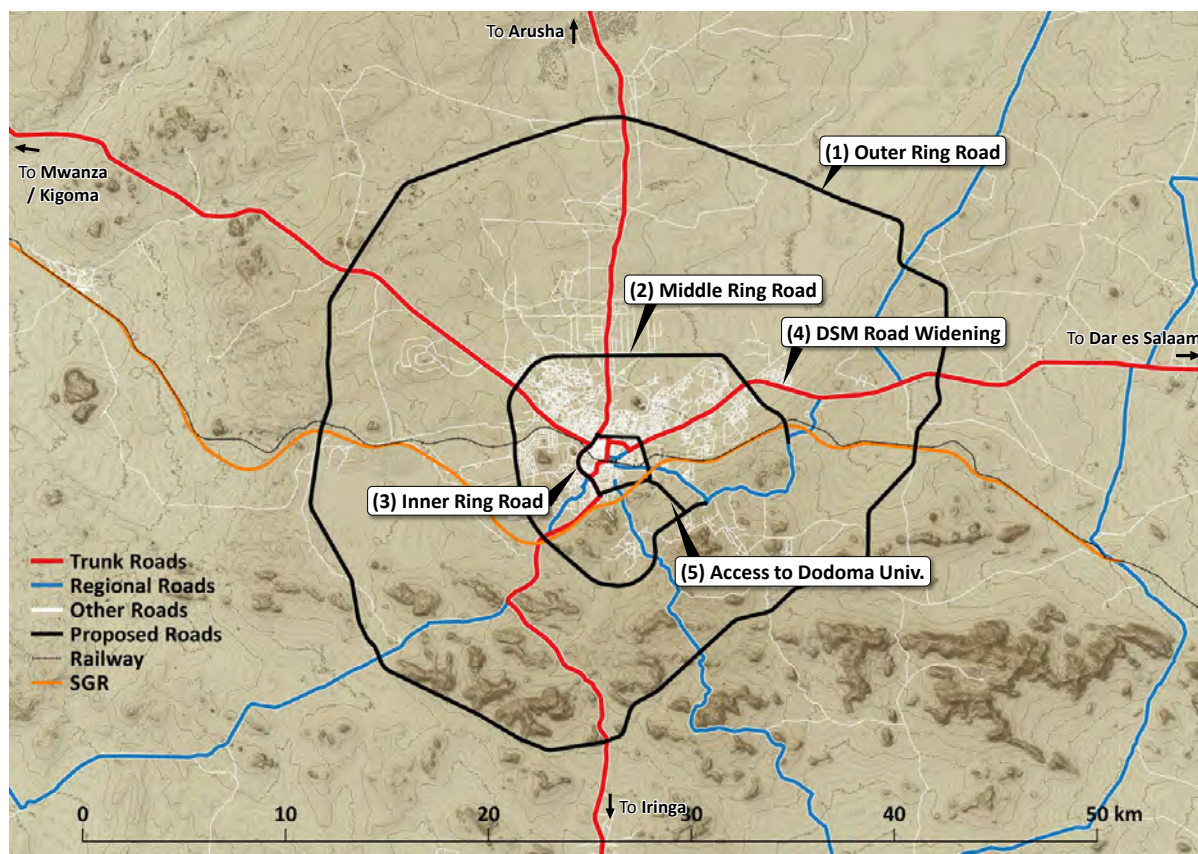
Table 4.2.1 List of Proposed Road Project under TANROADS and TARURA

No.	Name of Project	Length (km)	Type of Works	Executing Agency
1-01	Outer Ring Road	110.2	New construction	TANROADS
1-02	Middle Ring Road	40.0	New construction	TANROADS
1-03	Inner Ring Road	11.6/15.5	Widening and new construction	TANROADS
1-04	Widening of Dar es Salaam Road	10.0	Widening of existing road	TANROADS
1-05	Access from Univ. Road to Inner Ring Road	4.2	New construction	TANROADS
2-01	Upgrading of Government City Roads	39.0	Upgrading of roads into DBST	TARURA
2-02	Rehabilitation of Mwangaza – Kisasa – Medelii Road	13.1	Upgrading of roads into DBST	TARURA
2-03	Rehabilitation of Swaswa – Mpamaa – Arusha Road	8.2	Upgrading of roads into DBST	TARURA
2-04	Rehabilitation of Mlimwa Ring Road	5.8	Upgrading of roads into DBST	TARURA
2-05	Rehabilitation of Kizota – Zuzu Road	15.3	Upgrading of roads into DBST	TARURA
2-06	Rehabilitation of Chidachi Community Roads	27.3	Upgrading of roads into DBST	TARURA
2-07	Rehabilitation of Ilazo Community Roads	14.4	Upgrading of roads into DBST	TARURA
2-08	Upgrading of Ntyuka Road to University of Dodoma	3.1	Upgrading of roads into DBST	TARURA
2-09	Rehabilitation of Makole Roads	6.0	Upgrading of roads into DBST	TARURA
2-10	Rehabilitation of Iringa Road – Michese - Chidimo	14.1	Upgrading of roads into DBST	TARURA
2-11	Upgrading of Miganga Community Roads	30.5	Upgrading of roads into DBST	TARURA
2-12	Upgrading of Mkonze Community Roads	15.4	Upgrading of roads into DBST	TARURA
2-13	Upgrading of Ndachi Community Roads	30.0	Upgrading of roads into DBST	TARURA

Source: TANROADS, TARURA

TANROADS is currently planning to develop three-layered ring roads in Dodoma City in accordance with the 2019 Master Plan, in order to mitigate traffic congestion in city centre as well as eliminate heavy vehicle traffic from city centre by diverting through-traffic into such ring roads. The feasibility study and detailed design for the Outer Ring Road have been completed and African Development Bank (AfDB) is currently considering financial support for the Outer Ring Road. Also, TANROADS is currently undertaking two feasibility studies for Middle Ring Road (Nanenane – Miyuji – Arusha Road – Mkonze Road: 23.0 km) and Inner Ring Road (Shabiby Roundabout – Arusha Road Roundabout: 5.0 km and Chimwaga Roundabout – Chinyoya – Kikuyu Road: 11.0 km). TANROADS simultaneously requested the Government of Japan for Grant Aid for the Inner Ring Road Project.

In addition to the ring roads, TANROADS is planning to improve radial roads as well. One of the most important projects for the radial roads in Dodoma City is widening of Dar es Salaam Road from city centre at least up to the intersection with Dodoma Univ. Road. Another proposed road is the access to Dodoma Univ. Road from Inner Ring Road.



Source: JICA Study Team

Figure 4.2.1 Proposed Road Network

(1) Outer Ring Road

The proposed Outer Ring Road is a new 110 km-long dual-carriageway circumferential road with a radius of approximately 15 km. The road aims to improve connectivity and decongest traffic flow on the existing major roads in city centre by diverting the heavy vehicles entering Dodoma City from the four main Trunk Roads into the Outer Ring Road either to bypass Dodoma City completely or to transfer to another radial route to suit their eventual destination and in so doing avoid the city centre.

TANROADS undertook feasibility study on the Outer Ring Road Project commenced from 5th June, 2017 and completed on 5th June 2018.

The total project cost is estimated at USD 220 million of which the AfDB will finance up to USD 120 million, government of Tanzania contribution is estimated at USD 22 million whereas the balance of USD 78 million is expected from other donors.

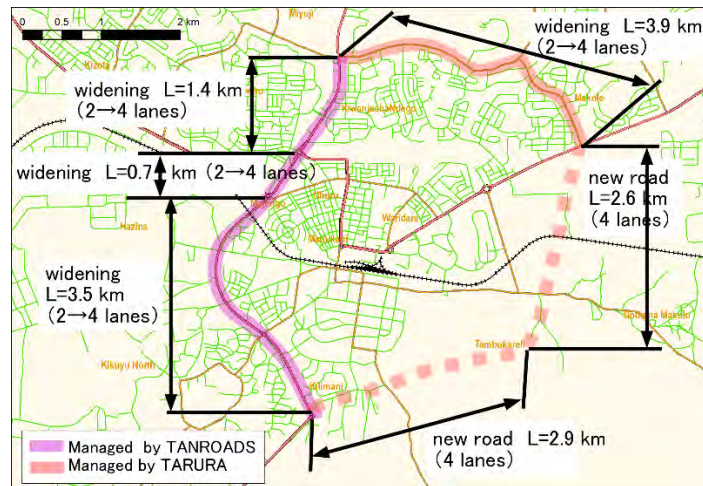
(2) Middle Ring Road

The proposed Middle Ring Road is another new circumferential road with a radius of approximately 7.5 km. The Middle Ring Road will traverse the outer boundary of the existing settled area in city centre and expected to improve mobility in city centre.

TANROADS is currently undertaking feasibility study on the Middle Ring Road Project (northern section from Nanenane (Dar es Salaam Road) – Miyuji – Arusha Road – Mkonze Road (Singida Road): 23 km).

(3) Inner Ring Road

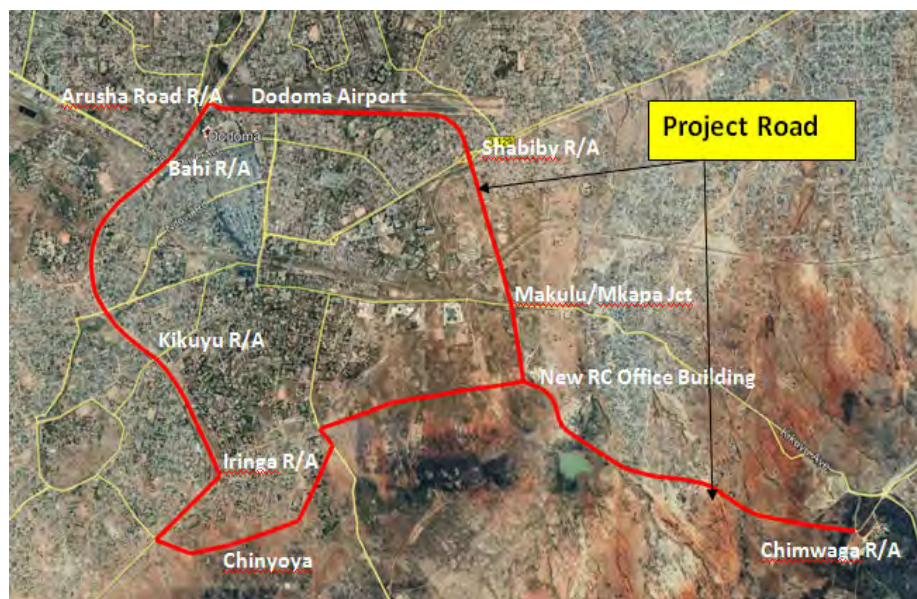
The application form for Japan's Grant Aid for the inner ring road describes that the proposed scope of works of the Project will include widening of the 9.5 km-long existing road and the construction of a new 5.5 km-long road as shown in the figure below. The proposed alignment includes the sections managed by TANROADS and TARURA as shown in the figure below.



Source: JICA Study Team in reference to the application form

Figure 4.2.2 Project Scope proposed by TANROADS

According to TANROADS Dodoma Regional Office, there were two candidate routes for the Inner Ring Road. One is the alignment shown in the application form and another is the alignment shown in the figure below, which is the extraction of the Inception Report of the TANROADS' feasibility study on the Inner Ring Road. The intersecting point with Iringa Road was tentatively shifted from the original plan which was expected to be connected to Imagi Roundabout in order to avoid resettlement of houses near the roundabout.



Source: Inception Report, TANROADS' Feasibility Study

Figure 4.2.3 Study Target under TANROADS' Feasibility Study

Tanzania Railway Corporation (TRC) is planning to construct new Standard Gauge Railway (SGR) line from Dar es Salaam to Mwanza with its total length of 1,219 km. The SGR construction project will be implemented in five (5) lots as follows:

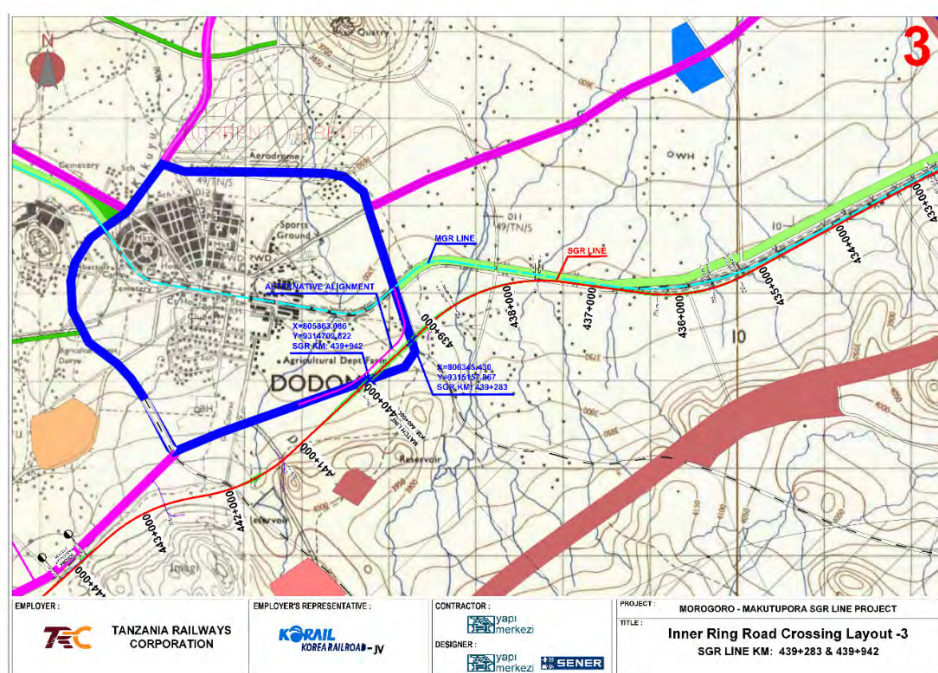
- Lot 1: Dar es Salaam – Morogoro (300 km)
- Lot 2: Morogoro – Makutupora (422 km)
- Lot 3: Makutupora – Tabora (249 km)
- Lot 4: Tabora – Isaka (133 km)
- Lot 5: Isaka – Mwanza (249 km)

Construction of Lot 1 (Dar es Salaam – Morogoro) is under way and is expected to be completed in November 2019 and construction of Lot 2 (Morogoro – Makutupora) is ongoing and is expected to be completed in February 2021.

A stakeholders' meeting for the SGR Lot 2 was held at Dodoma on 10th January 2019 and the crossing structures of SGR over existing and proposed roads were discussed with relevant agencies such as TANROADS and TARURA.

The SGR will be constructed mainly as embankment with a 60m ROW. It is planned that all road crossings will be grade separated and the SGR will cross over the roads. The type of the crossing structure will depend on the size of crossing roads. Overpass bridges, underpass culverts are proposed as typical crossing structures.

According to the original proposal, the alignment of the SGR will cross with the originally proposed alignment of the Inner Ring Road twice. Therefore, a counter proposal was made by the SGR Project to divert the alignment of the Inner Ring Road not to cross with the SGR. However, due to the two reasons that: i) the Inner Ring Road should be constructed in front of the new Regional Commissioner's Office (under construction) and ii) the proposed access from Univ. Road to the Inner Ring Road will start from the corner of the new Regional Commissioner's Office, the counter proposal was rejected by the other stakeholders and it was confirmed that the original proposal will stand and SGR Project will provide two railway bridges over the Inner Ring Road.

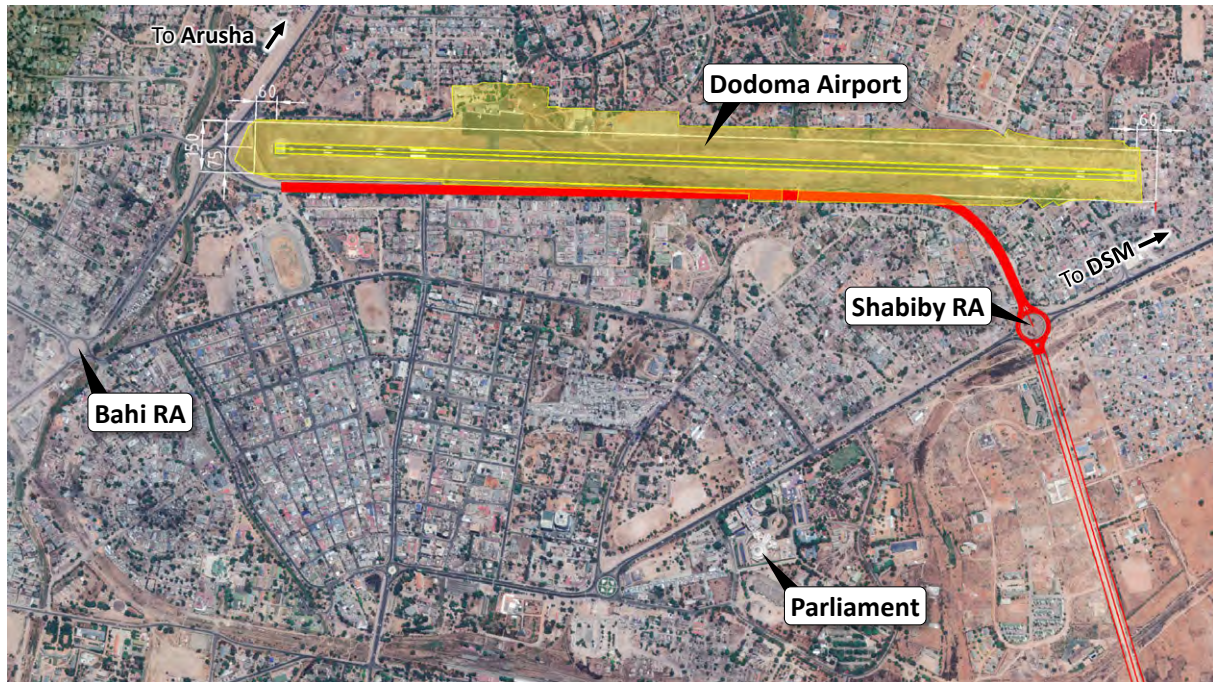


Source: TRC

Figure 4.2.4 SGR Crossing (Proposed Inner Ring Road)

Moreover, it should be noted that the Right of Way (ROW) of the missing link section of the Inner Ring Road (north section) has not been secured by TANROADS due to the existence of Dodoma Airport fence. According to the Aerodrome Design Manual of International Civil Aviation Organization (ICAO), runway strip width of Dodoma Airport shall be at least 75 m on each side of the centre line of the runway throughout the length of the strip.

According to Tanzania Civil Aviation Authority (TCAA) and TANROADS, the transfer of the land outside of the runway strip from TCAA to TANROADS would be technically possible but this would require the approval of the Permanent Secretary of Ministry of Works, Transport and Communication (MOWTC).



Source: JICA Study Team

Figure 4.2.5 Property of Dodoma Airport

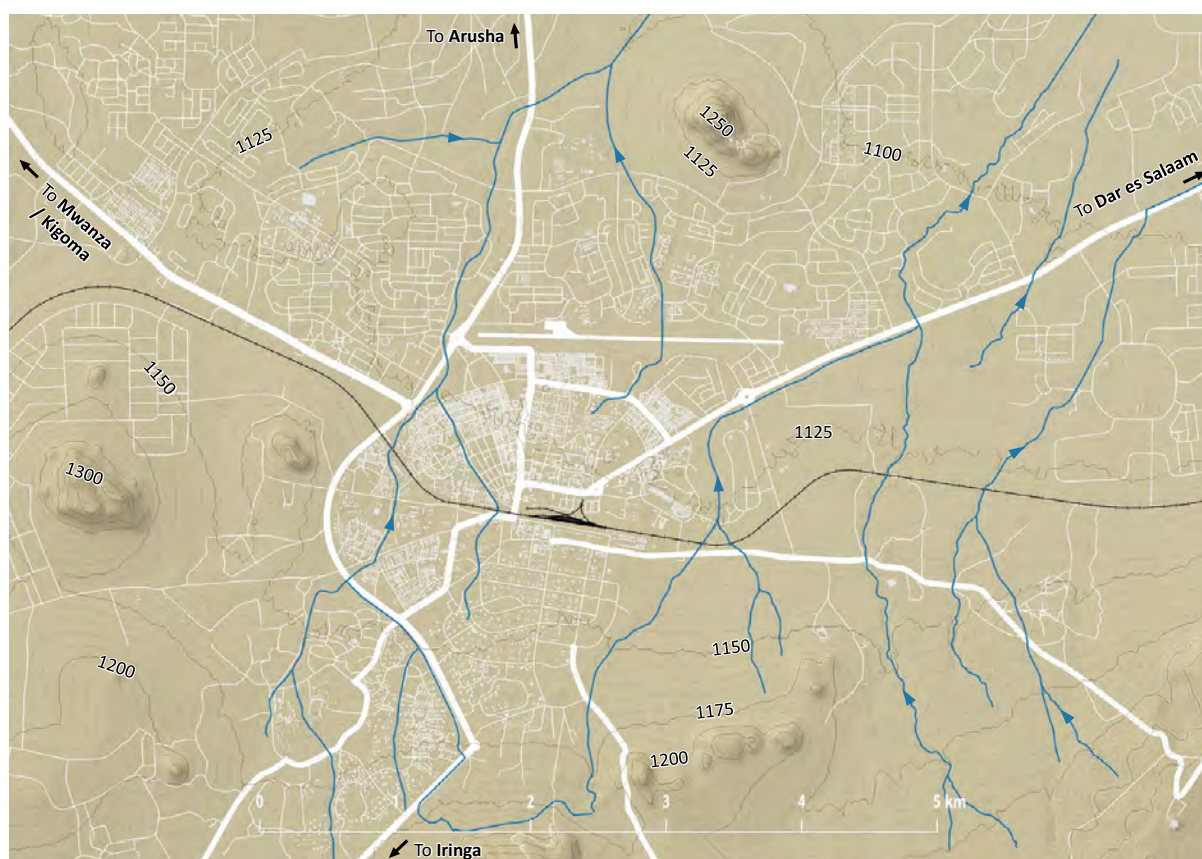
4.3 Topographic and Geotechnical Conditions

Dodoma City stands on a broad upland plateau with an altitude ranging from 1050 to 1468m above sea level. Topography of Dodoma City is generally flat or rolling terrain. At the city centre of Dodoma City, the elevation gradually incline from the south to the north.

Soil in Dodoma is considered to be of relatively low fertility, deficient in organic matter, moderate to poor permeability with shallow soil depth. The soils are sandy clay, sandy loam and clay which are reddish-brown or dark loam.

Storm water drainage in Dodoma City is controlled through the main storm water channel which was constructed in earlier 1980's. Dodoma City has no permanent rivers but gullies and seasonal streams. During the rainy seasons, these gullies and seasonal streams collect water from surrounding areas and discharge them into swampy areas located in the north-east of Dodoma City. Most of the storm water channels constructed along the access and main roads in the city discharge their flows in the main city storm water drain or streams as shown in the figure below (blue lines and arrows show the direction of water flow).

Storm water in Dodoma City is mainly controlled by a combination of five rivers cross the city, the largest storm water drain is the Kikuyu River which collects the storm water from Kikuyu Creek in Kikuyu Ward and traverses through Hazina and Chinangali east wards, discharging its contents in the wetland located on the north west of Mlimwa area.



Source: JICA Study Team

Figure 4.3.1 Topographic Condition

5. Traffic Situation in Dodoma City

5.1 Traffic Survey

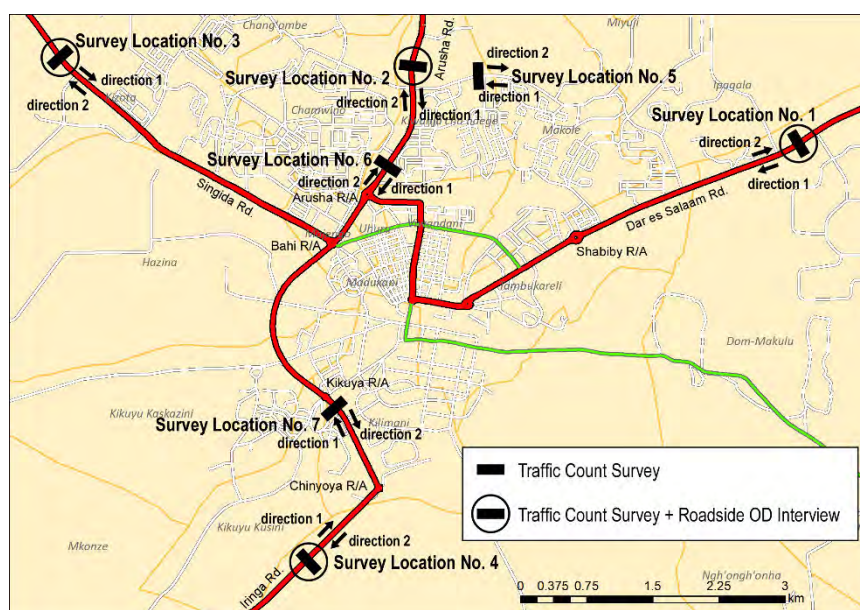
5.1.1 Outline of Traffic Survey

Traffic survey consists of traffic count survey at road sections and roadside origin-destination interview survey was conducted at seven (7) locations shown in following table and figure in order to understand current traffic volume and characteristics of arterial roads relevant to project road.

Table 5.1.1 Traffic Survey Schedule

No	Location	Traffic Count	Roadside Interview	Survey Date	Note
1	DSM Road (Alfa Supermarket)	12hours (6:00-18:00)	12hours (6:00-18:00)	11 th Jan 2019	
2	Arusha Road (Mwenyeheri Maria Theresa Ledochowska)	12hours (6:00-18:00)	12hours (6:00-18:00)	8 th Jan 2019	
3	Singida Road (Western side of the end of dual carriageway)	12hours (6:00-18:00)	12hours (6:00-18:00)	9 th Jan 2019	rain showers
4	Iringa Road (Southern side of Chinyoya Roundabout)	12hours (6:00-18:00)	12hours (6:00-18:00)	10 th Jan 2019	
5	Prime Minister Road (Mlimwa B Primary School)	12hours (6:00-18:00)	-	8 th Jan 2019	
6	Arusha Road (Lake Oil)	12hours (6:00-18:00)	-	9 th Jan 2019	rain showers
7	Iringa Road (Southern side of Kikuya Roundabout)	12hours (6:00-18:00)	-	10 th Jan 2019	

Source: JICA Study Team



Source: JICA Study Team

Figure 5.1.1 Traffic Survey Locations

5.1.2 Results of Traffic Survey

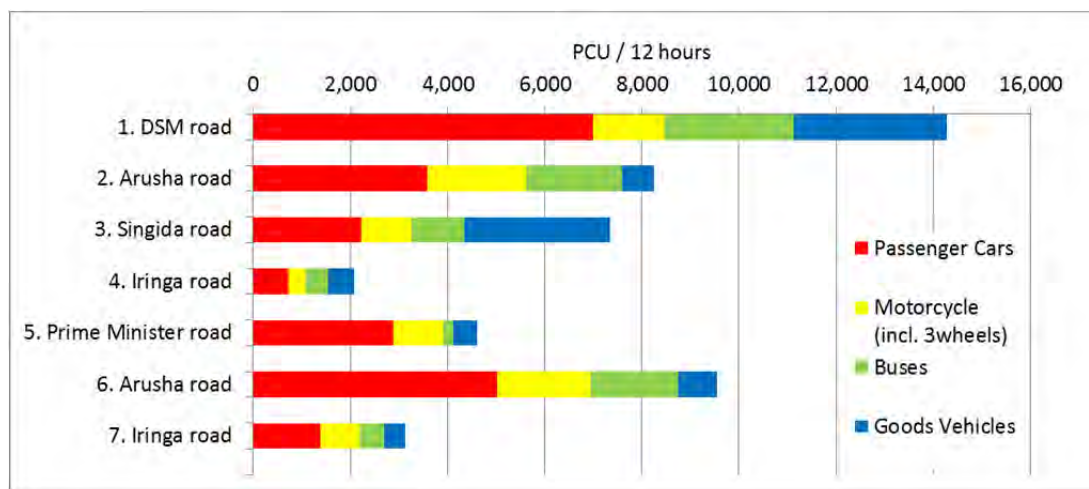
(1) Traffic Count Survey Results

Following table shows the results of traffic count survey for 12 hours. Dar es Salaam Road is the busiest road in the seven survey locations, and contributes to cargo transport by Heavy Goods Vehicle (HGV) and passenger vehicles such as passenger cars and motorcycles. Arusha Road is also a busy road, however, its share of HGV is lower than Dar es Salaam Road and Singida Road. The survey location on Singida Road was almost on the edge of urban area of Dodoma City, therefore, its share of passenger vehicle traffic for daily Dodoma city intra-traffic is lower than that on Dar es Salaam Road and Arusha Road. Traffic volume on Iringa Road is lower than other three radial roads.

Table 5.1.2 12 Hours Traffic Volume

No.	Road	Direction	Passenger Cars	Pickup / Van	Small Bus	Large Bus	3 Wheelers	Motorcycle	2axles Truck (L.T. 5 ton)	2axles Truck (5 ton and more)	3-4axles Rigid Truck	Semi-Trailer	Full-Trailer	Other motorized	Total (veh./12h)
1	DSM road	1	2,207	1,596	791	194	329	1,530	20	178	114	301	24	1	7,285
		2	1,713	1,479	836	146	499	2,003	76	241	108	353	26	3	7,483
		Both	3,920	3,075	1,627	340	828	3,533	96	419	222	654	50	4	14,768
2	Arusha road	1	869	1,106	708	63	325	2,713	50	35	23	20	2	0	5,914
		2	1,005	601	680	40	312	3,040	76	100	24	21	8	0	5,907
		Both	1,874	1,707	1,388	103	637	5,753	126	135	47	41	10	0	11,821
3	Singida road	1	558	612	310	64	152	1,312	32	243	57	288	23	1	3,652
		2	568	480	336	94	179	1,586	76	276	78	310	23	0	4,006
		Both	1,126	1,092	646	158	331	2,898	108	519	135	598	46	1	7,658
4	Iringa road	1	200	164	125	28	59	486	6	41	7	39	3	0	1,158
		2	214	156	168	28	76	453	21	92	14	38	0	0	1,260
		Both	414	320	293	56	135	939	27	133	21	77	3	0	2,418
5	Prime Minister road	1	963	645	55	17	194	1,592	140	24	18	0	0	0	3,648
		2	709	566	67	18	149	1,242	108	16	9	0	0	0	2,884
		Both	1,672	1,211	122	35	343	2,834	248	40	27	0	0	0	6,532
6	Arusha road	1	1,792	1,212	649	66	570	3,229	161	55	32	27	1	0	7,794
		2	1,124	898	613	39	283	1,711	134	14	30	14	1	1	4,862
		Both	2,916	2,110	1,262	105	853	4,940	295	69	62	41	2	1	12,656
7	Iringa road	1	469	257	174	28	288	992	36	22	5	38	4	0	2,313
		2	401	260	134	41	199	853	44	32	14	27	1	0	2,006
		Both	870	517	308	69	487	1,845	80	54	19	65	5	0	4,319

Source: JICA Study Team



Note: Passenger Car Units (PCUs) are passenger car, pickup/van (1.0), small bus (1.3), large bus (1.6), 3 wheelers (0.5), motorcycle (0.3), 2 axles truck less than 5 ton (1.5), 2 axles truck 5 ton and more (1.8), 3-4 axles truck (2.2) and trailers (2.5).

Source: JICA Study Team

Figure 5.1.2 12 Hours Traffic Volume in PCU

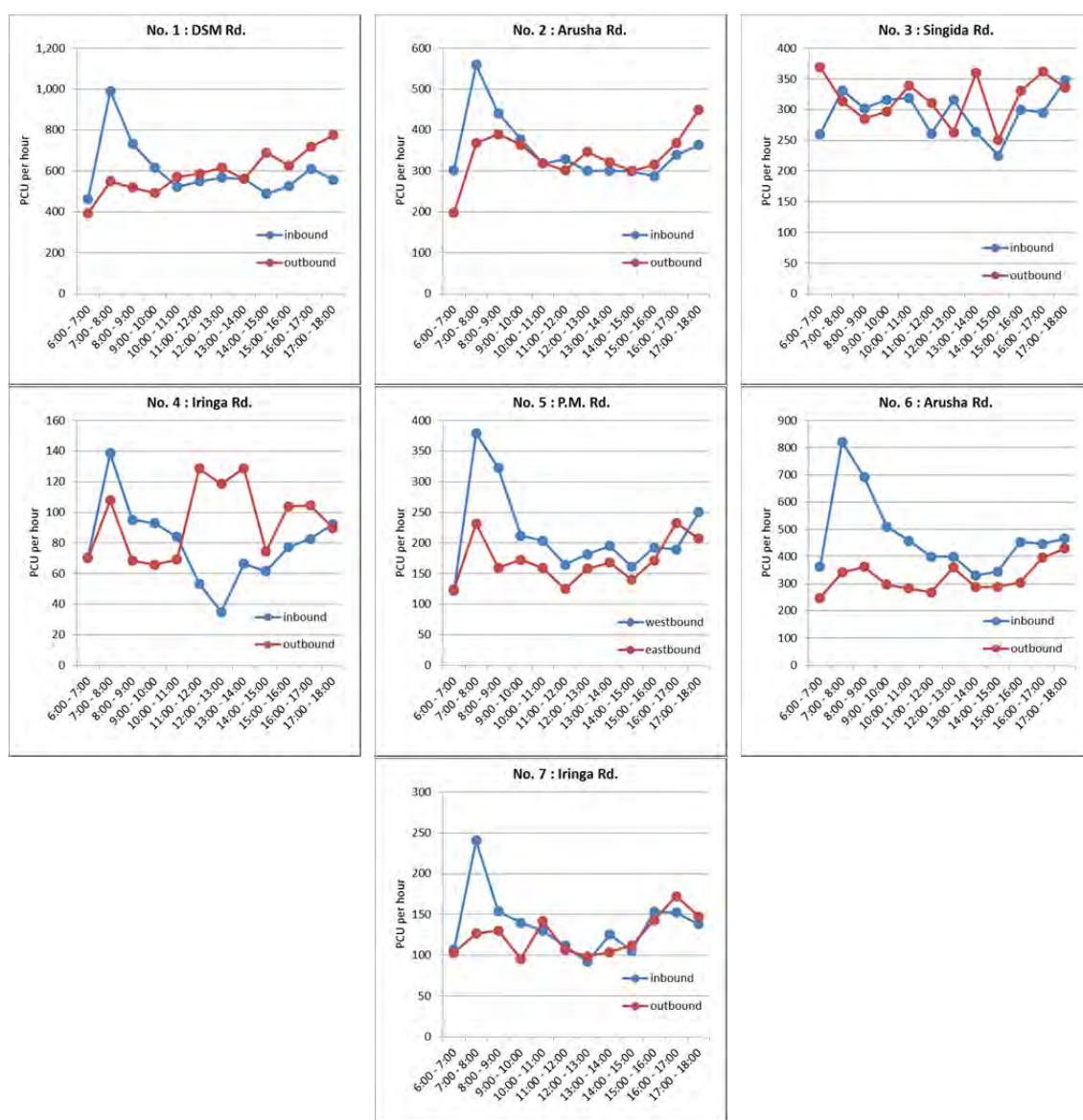
Table 5.1.3 Heavy Vehicle Ratio

No.	Road	Traffic Volume (veh./12h)	Heavy Vehicle (veh./12h)	Ratio of Heavy Vehicle
1	DSM road	10,403	1,685	16%
2	Arusha road	5,431	336	6%
3	Singida road	4,428	1,456	33%
4	Iringa road	1,344	290	22%
5	Prime Minister road	3,355	102	3%
6	Arusha road	6,862	279	4%
7	Iringa road	1,987	212	11%

Note: Heavy vehicle ratio is the share of heavy vehicles (large bus, 2 axles (5 ton-) and more) to total traffic volume (excl. motorcycle and 3 wheelers).

Source: JICA Study Team

The following figures show hourly fluctuation of observed traffic by survey location and direction. Morning peak hour is observed at most of all survey location between 7:00 – 9:00 except Singida Road (No.3) because the survey location is on the edge of the urban area. Evening peak hour is indefinite but starts around 17:00 – 18:00.



Source: JICA Study Team

Figure 5.1.3 Hourly Fluctuation of Traffic Volume

(2) Roadside OD Interview Survey Results

2,692 samples were collected by roadside OD interviews as shown in following table. Less samples were obtained from Singida Road (No.3) because of rain showers during the survey.

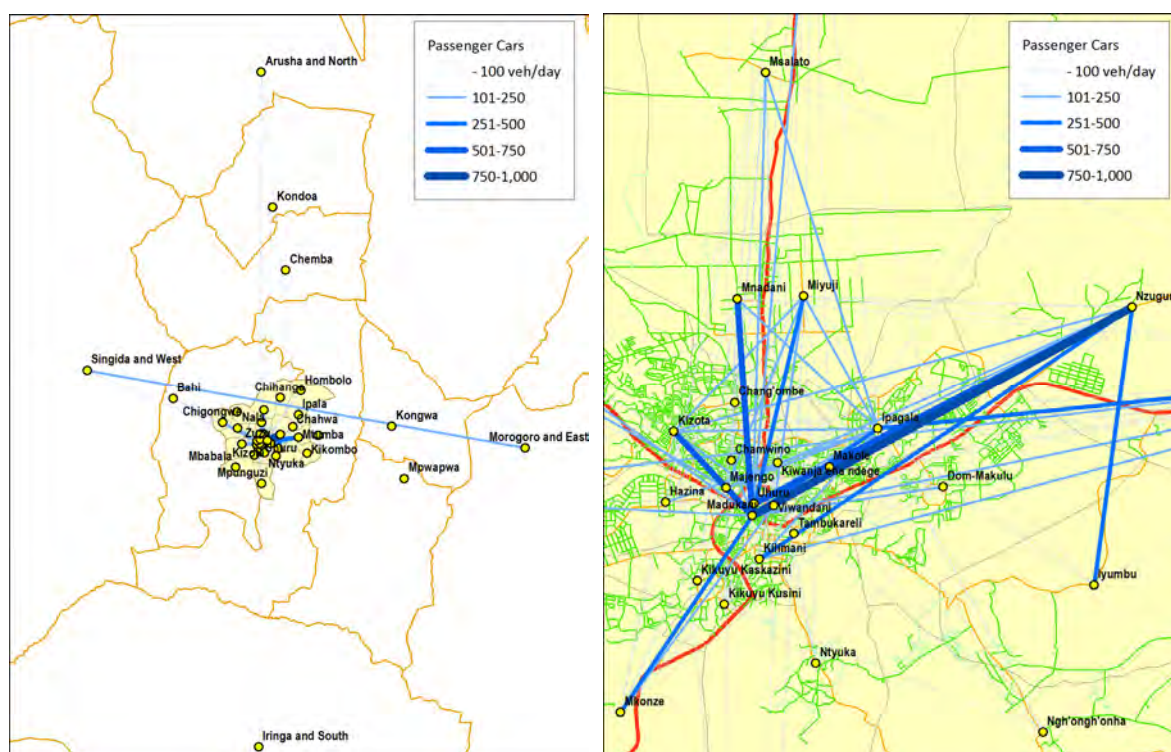
Table 5.1.4 Number of Samples and Sample Ratio

No.	Dir	Passenger Cars, Pickup / Van	Small Bus	Large Bus	3 Wheelers	Motor-cycle	2axles Truck	3-4axles Rigid Truck	Trailers
1 DSM Rd.	1	189 (5.0%)	144 (18.2%)	72 (37.1%)	79 (24.0%)	94 (6.1%)	69 (34.8%)	22 (19.3%)	71 (21.8%)
	2	233 (7.3%)	175 (20.9%)	49 (33.6%)	56 (11.2%)	66 (3.3%)	52 (16.4%)	0 (0.0%)	113 (29.8%)
2 Arusha Rd.	1	199 (10.1%)	60 (8.5%)	15 (23.8%)	53 (16.3%)	39 (1.4%)	26 (30.6%)	3 (13.0%)	5 (22.7%)
	2	96 (6.0%)	100 (14.7%)	38 (95.0%)	44 (14.1%)	33 (1.1%)	61 (34.7%)	11 (45.8%)	16 (55.2%)
3 Singida Rd.	1	28 (2.4%)	7 (2.3%)	12 (18.8%)	9 (5.9%)	15 (1.1%)	13 (4.7%)	0 (0.0%)	15 (4.8%)
	2	25 (2.4%)	19 (5.7%)	12 (12.8%)	11 (6.1%)	11 (0.7%)	9 (2.6%)	2 (2.6%)	10 (3.0%)
4 Iringa Rd.	1	35 (9.6%)	22 (17.6%)	6 (21.4%)	12 (20.3%)	8 (1.6%)	11 (23.4%)	0 (0.0%)	11 (26.2%)
	2	28 (7.6%)	20 (11.9%)	7 (25.0%)	16 (21.1%)	12 (2.6%)	16 (14.2%)	3 (21.4%)	3 (7.9%)

Note: Sample ratio shows the rate of the sample number collected to the counted traffic volume

Source: JICA Study Team

Based on the results of the OD interviews and traffic count survey, vehicular OD matrices were formulated as shown in following figures. Expansion ratio to daily (24 hours) traffic is prepared by F/S on Inner Ring Road (TANROADS).



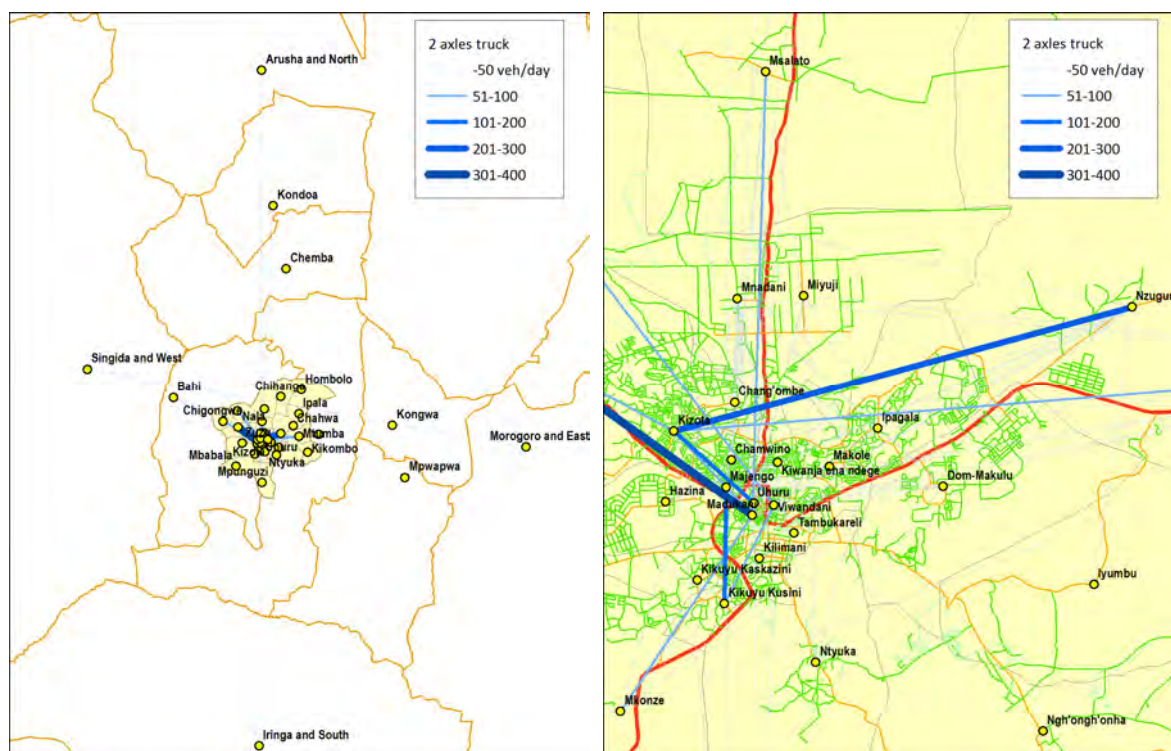
Passenger Cars

Source: JICA Study Team

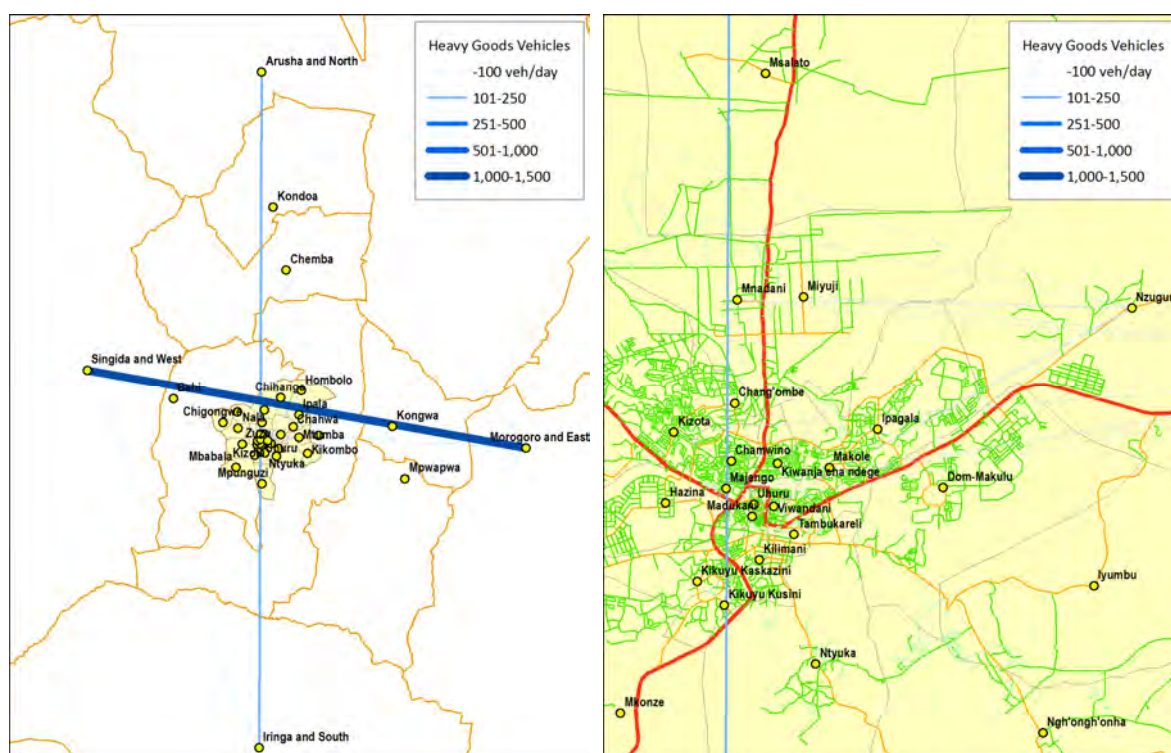
Figure 5.1.4 Desire Line by Roadside Interview Survey



Figure 5.1.5 Desire Line by Roadside Interview Survey (cont'd)



2 Axles Trucks



Heavy Goods Vehicles

Source: JICA Study Team

Figure 5.1.6 Desire Line by Roadside Interview Survey (cont'd)

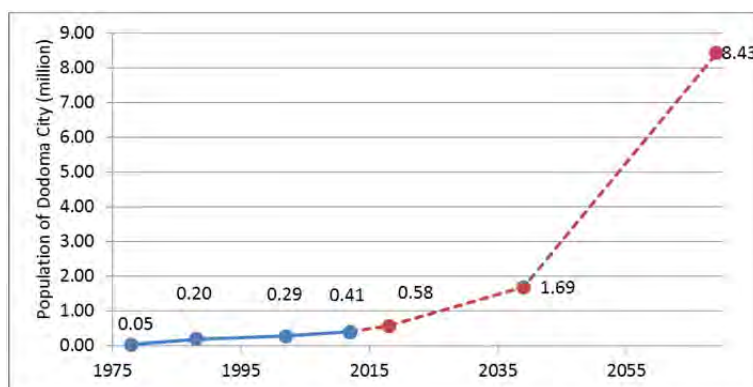
5.2 Traffic Analysis

5.2.1 Assumption of Traffic Analysis

Future traffic volume is required in the consideration of design and priority of project roads. However, at present, there is neither an urban transport master plan involving various traffic surveys such as person trip survey, nor a detail urban planning master plan involving detail socio-economic framework and quantitative future public transport services plan. Thus, future traffic demand is estimated based on following assumptions.

(1) Population Growth

Based on the Population Censuses in 2002 and 2012, annual population growth rate of Dodoma City is 5.8% p.a. However, In the Dodoma National Capital City Master Plan, a population growth of 5.5% p.a. was used to estimate future residential area in 2018-2069. Therefore, based on the Dodoma National Capital City Master Plan, annual population growth rate in this Study is defined at the rate of 5.5% p.a.



Source: Based on the Dodoma National Capital City Master Plan (1st Draft), JICA Study Team prepared.

Figure 5.2.1 Future Population in Dodoma City

(2) Elasticity of traffic demand to population growth

In this Study, future traffic demand is calculated by population growth rate and the elasticity of traffic demand to population growth. Elasticity of traffic demand to population growth was calculated based on the results of cordon line traffic count survey in Dar es Salaam Transport Policy and System Development Master Plan (2007, JICA) and The Project for Revision of Dar es Salaam Urban Transport Master Plan (2018, JICA).

Table 5.2.1 Elasticities of Traffic Demand to Population Growth Rate

	Passenger Cars	Buses	Goods Vehicles
Elasticity	1.58	1.06	1.18

Source: Based on the Dar es Salaam Transport Master Plan Studies, JICA Study Team prepared.

As for the results, future traffic demand in 2029 was found to be: 2.79 times of that in 2019 for passenger car demand, 1.81 times for buses, and 2.02 times for goods vehicles.

Table 5.2.2 Expansion Ratio of Traffic Demand

	2019	2029f	2039f
Population Growth (5.5% p.a.)	1	1.71	2.92
Traffic Growth (Passenger Cars)	1	2.70	4.61
Traffic Growth (Buses)	1	1.81	3.09
Traffic Growth (Goods Vehicles)	1	2.02	3.44

Source: JICA Study Team

5.2.2 Results of Traffic Analysis

The calculated future traffic demand was assigned on a simplified road network for Dodoma City to obtain future traffic demand on the project road section. Road network for traffic assignment was built based on GIS data with the following QV conditions.

Table 5.2.3 QV Condition of Road Network for Assignment

Road Type	Area	Num. of Lanes	Assignment Capacity (pcu/day)	Free Flow Speed (km/h)
Trunk Road	Urban	2	12,000	60
		4	43,300	60
	Rural	2	15,000	80
		4	62,600	80
Other Road	Urban	2	8,400	35
		4	24,400	35
	Rural	2	12,700	40
		4	44,800	40
	Unpaved	2	3,800	15

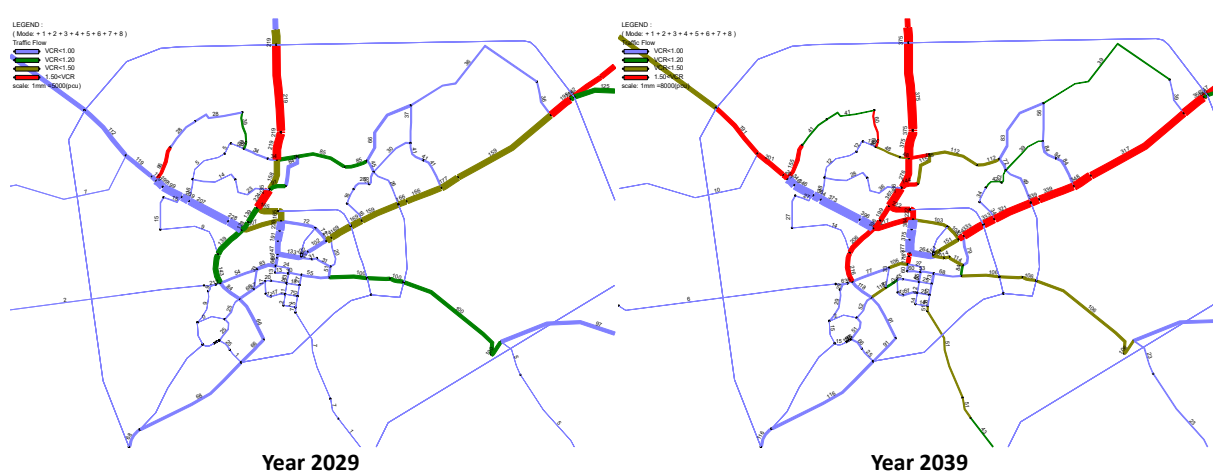
Source: Based on the QV condition prepared by DSM M/P in 2007, JICA Study Team prepared.

In order to consider future road projects, the following four assignment cases and a control project case (case 0) were prepared, and results are as indicated in the following figures.

Table 5.2.4 Future Network for Assignment Case

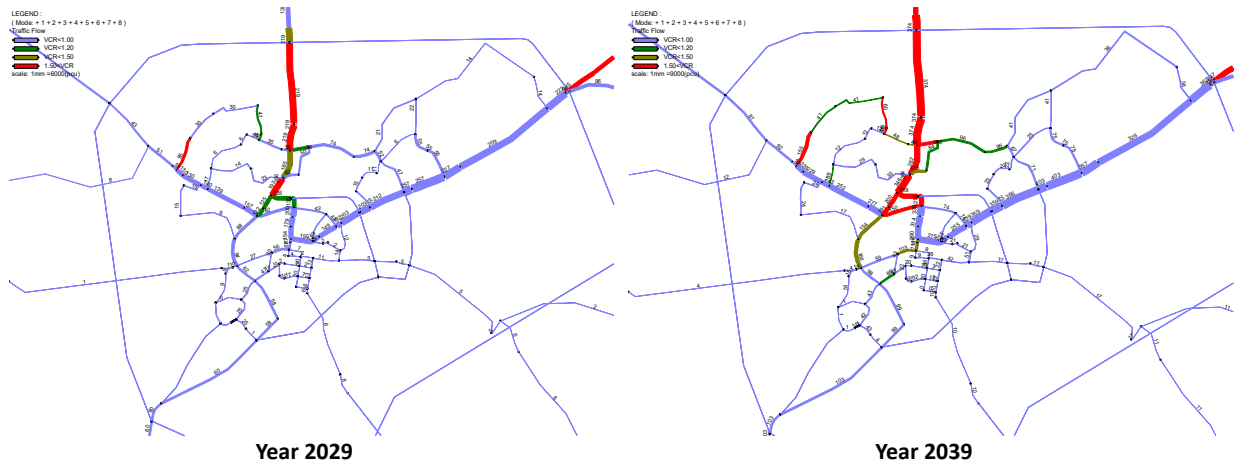
Case	Outer Ring Road	Dual Carriageway for DSM Rd.	Inner Ring Road	Middle Ring Road
0	None	None	None	None
1	Open	Open	None	None
2	Open	Open	Open (North Section)	None
3	Open	Open	Open (All Section)	None
4	Open	Open	Open (All Section)	Open

Source: JICA Study Team



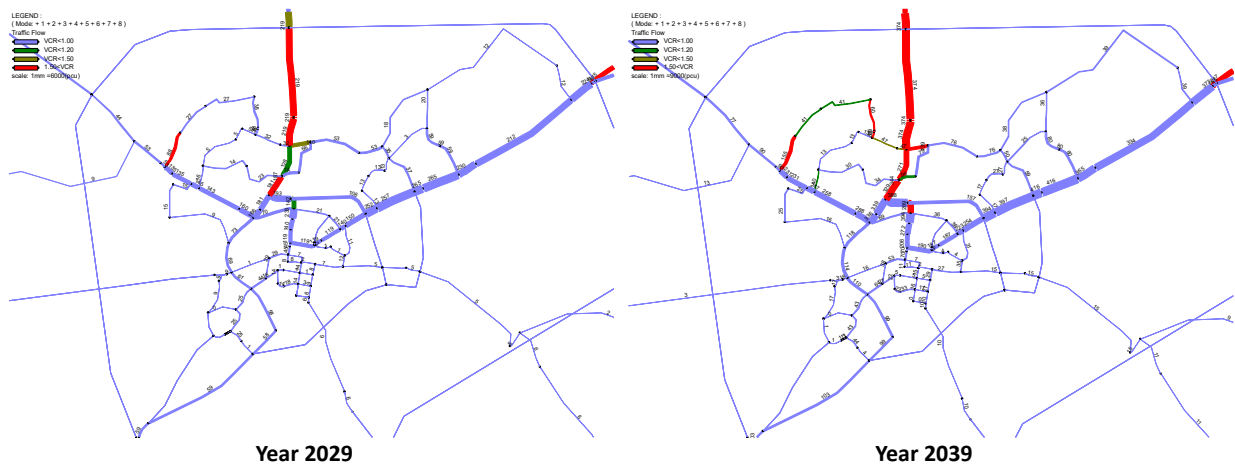
Source: JICA Study Team

Figure 5.2.2 Case 0: Future Traffic Demand on 2019 Network



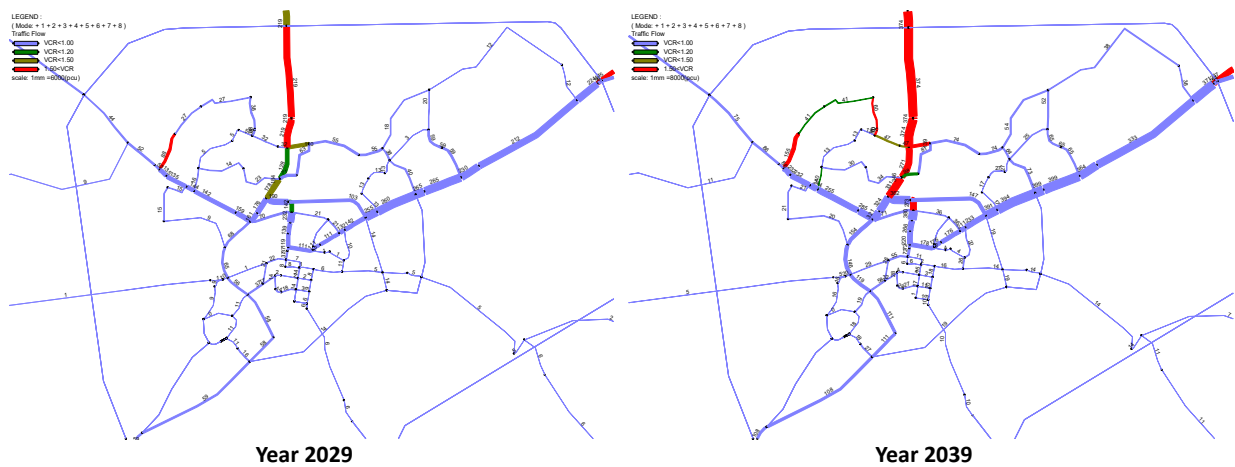
Source: JICA Study Team

Figure 5.2.3 Case 1: Dual Carriageway for DSM Road



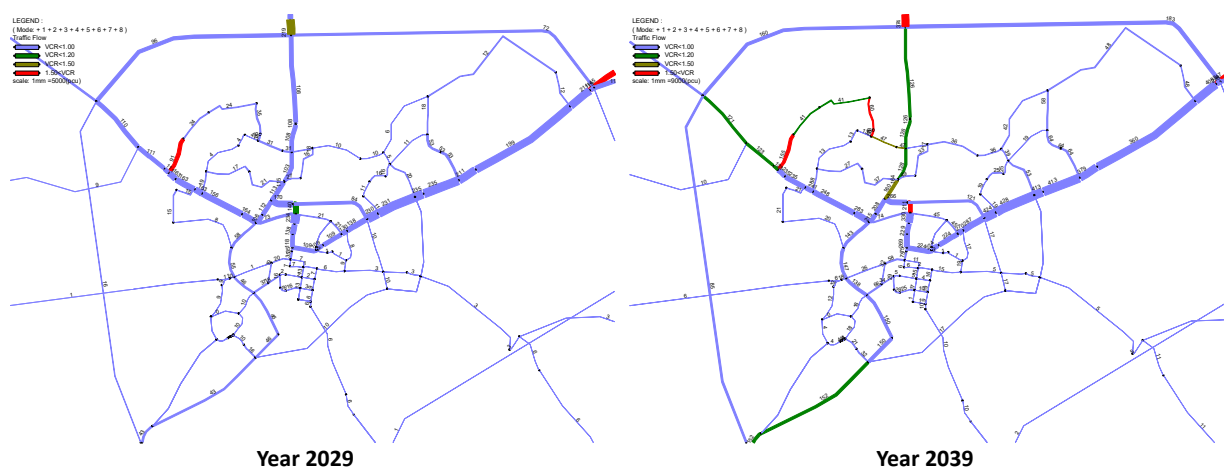
Source: JICA Study Team

Figure 5.2.4 Case 2: 4 lanes for DSM Road and IRR North Section



Source: JICA Study Team

Figure 5.2.5 Case 3: 4 lanes for DSM Road and IRR All Section



Source: JICA Study Team

Figure 5.2.6 Case 4: 4 lanes for DSM Road and All Ring Road

Following table shows the summary of assigned traffic volume by case and road sections.

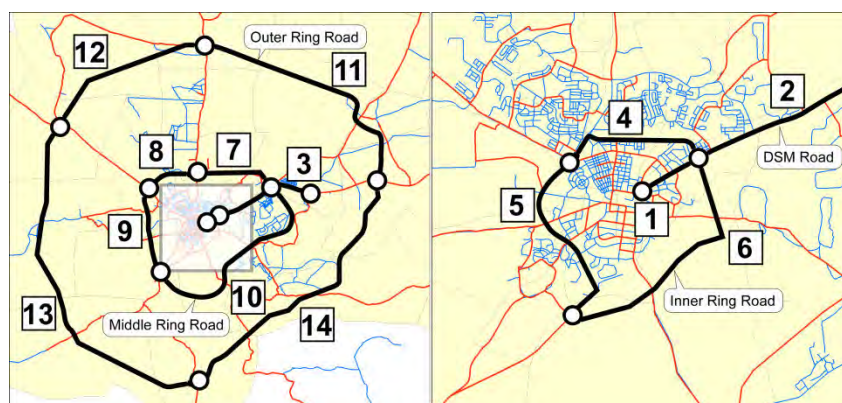


Table 5.2.5 Future Traffic Demand at Major Sections

Road	Section	Ref. No	2029				2039			
			Case 1 (pcu/day)	Case 2 (pcu/day)	Case 3 (pcu/day)	Case 4 (pcu/day)	Case 1 (pcu/day)	Case 2 (pcu/day)	Case 3 (pcu/day)	Case 4 (pcu/day)
DSM Rd	CBD-IRR	1	17,300	13,300	12,400	12,200	30,200	21,600	20,100	25,300
DSM Rd	IRR-MRR	2	21,800	23,100	23,100	21,200	35,000	36,400	35,900	38,700
DSM Rd	MRR-UNIV	3	9,600	9,600	9,600	11,100	15,000	15,500	15,400	16,700
IRR	North	4	4,900	13,500	13,200	10,500	7,800	23,400	22,100	16,500
IRR	South East	5	0	0	1,400	1,000	0	0	1,900	1,700
IRR	South West	6	7,200	6,300	6,100	5,000	12,300	10,700	12,800	14,600
MRR	North East	7	0	0	0	7,200	0	0	0	18,300
MRR	North West	8	0	0	0	9,600	0	0	0	16,000
MRR	South East	9	0	0	0	100	0	0	0	200
MRR	South West	10	0	0	0	1,600	0	0	0	8,500
ORR	North East	11	6,400	6,300	6,300	5,000	11,700	11,000	10,700	8,600
ORR	North West	12	6,400	6,300	6,300	5,000	11,700	11,000	10,700	8,600
ORR	South East	13	500	400	400	400	900	800	1,300	3,000
ORR	South West	14	500	500	500	500	1,000	900	900	900

Source: JICA Study Team

6. Issues and Challenges of Present Road Traffic

6.1 Issues of Road Traffic

As discussed in the previous chapters, Dodoma City is facing challenges such as an increasing infrastructure development demand and increasing traffic against a low-level of road network (both road network density and road surface conditions). The issues facing the present road network in Dodoma City are summarized as follows:

(1) Road Network Issues

The arterial roads developed in Dodoma City are the only four (4) radial Trunk Roads, namely; Dar es Salaam Road, Arusha Road, Singida Road and Iringa Road, and there is no subsidiary arterial road to offset demand. Therefore, the dependency on these arterial roads is extremely high. Looking at the present road network in Dodoma City, the following problems can be observed:

- **Low capacity of arterial roads:** Due to increasing traffic volume in and through Dodoma City, the arterial roads, particularly Dar es Salaam Road, oversaturate and the service level of these arterial roads will only worsen.
- **Low linkage of roads with many missing links:** Dodoma City historically developed its modular communities, particularly those along Dar es Salaam Road, and these communities were not well connected each other. TARURA Dodoma is currently making an effort to improve the local road networks connecting these modular communities, and linking these local networks to the arterial roads.
- **Low density of roads:** The four radial trunk roads in Dodoma City have for a long time served to assist the development of the City. Due to continuous expansion of planned and unplanned development in Dodoma City, the road network is becoming scarce in terms of density, and needs to be maintained to ensure accessibility and mobility around the City.
- **Low level of surface condition:** The majority of the road network in Dodoma, particularly that of local roads, still remain in unpaved condition which adversely affects accessibility and mobility around the City during the rainy season.

The absence of secondary arterial roads increases dependency on the arterial roads and thus the traffic volume on the arterial roads is reaching its capacity. Provision of redundancy in the road network is urgently necessary.

(2) Traffic Management Issues

The abovementioned road network also has the problem of traffic management. All the inter-regional and intra-regional traffic passes through the same corridor, for example, an influx of heavy vehicles into city centre or mixed traffic of long-distance high-speed traffic and short-distance slow-moving traffic, and such traffic conditions adversely affect traffic safety.

As discussed in Chapter 5, the majority of traffic demand of the freight traffic is not destined for the city centre of Dodoma City and thus it is expected that such freight traffic will divert to the proposed

ring roads. However, it should be noted that such a positive effect shall not be immediate because of the following reasons:

- There are freight facilities in city centre (parking space on Arusha Road and truck terminal on Singida Road) and there are needs to stop over at the city centre of Dodoma City;
- The distances from the nearest cities or towns to Dodoma City are too far and truck drivers would prefer to stop at Dodoma for rest and sleep breaks.

Therefore, positive impact should only be expected upon shifting freight related facilities from the city centre to the outside of the ring roads in order to divert freight traffic into the proposed ring roads.



Truck Parking Space beside Arusha Road



Truck Terminal beside Singida Road

Source: JICA Study Team

Figure 6.1.1 Trucks in City Centre

(3) Linkage Issues

As discussed in Chapter 3, several development plans have been proposed or are under construction. However the linkage between such development plans has not been fully considered. This includes:

- Linkage between sub-centres (Government City, State House, CBD)
- Linkage at transport hub between different modes of transport (SGR, new airport)

The central stations of SGR for both passenger and freight would attract more traffic. And as such, smooth linkage between SGR and road traffic should be provided.

6.2 Required Developments

In order to cope with the situation discussed in part 6.1 above, the following measures should be undertaken immediately:

- Reinforcement of the existing road network with a multi-layered network form in accordance with the land use plan of the master plan.
- Expansion of road capacity by widening the existing trunk roads
- Creation of ring roads or bypass roads in order to divert heavy traffic from the city centre.

7. Environmental Social Considerations

7.1 Natural and Social Environment Features

Based on the existing information, environmental and social conditions around the project site is reviewed in the following sections.

7.1.1 Socio-economic features

Dodoma Region, the 12th largest in Tanzania with a population of about 2,083,588 people (2012), in which the Capital City District is located, is geographically located in the middle of Tanzania. It lies at an average altitude of 1,100 meters above mean sea level and spans over an area of about 41,311 km². The region is divided into 7 districts: Kondoa, Mpwapwa, Kongwa, Bahi, Chamwino, Chemba and Dodoma City. The Dodoma Region administrative map is as shown in Figure 7.1.1.



Source: 2012 Census

Figure 7.1.1 Administrative boundary of Dodoma region

According to the population and housing census in 2012, the population of Dodoma Municipality was 410,958; the distribution ratios of male, female, and rural, urban are shown in the Table below.

Table 7.1.1 Population and its distribution by Male-Female and Rural-Urban

Region/ Districts	Total Population	Male	Female	Rural	Urban
Dodoma Municipality	410,956	199,487	211,469	197,320	213,636

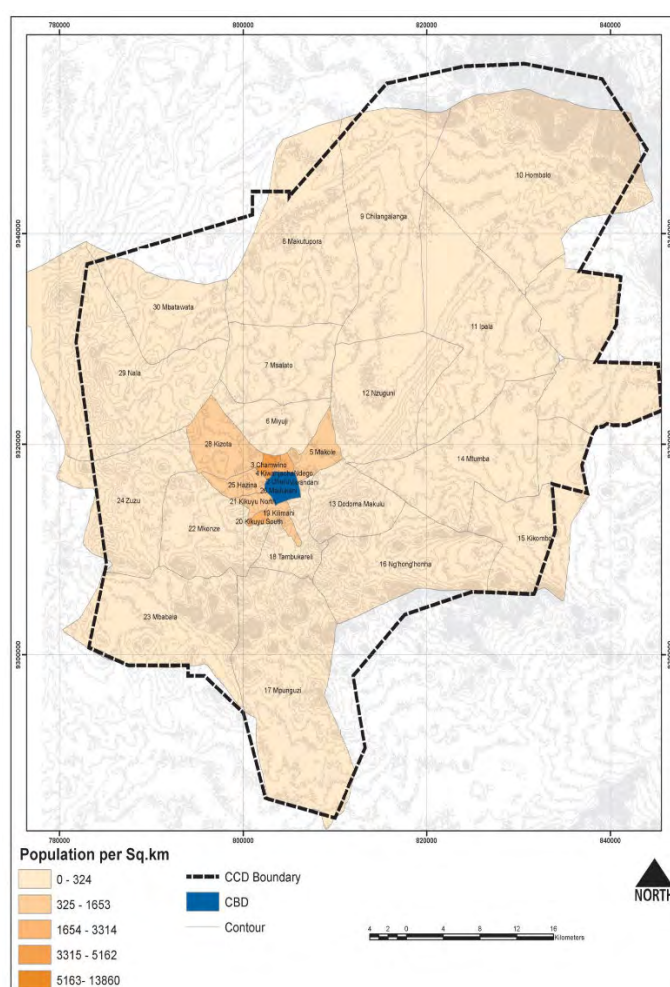
Source: Census 2012

Table 7.1.2 Number of Households and its distribution by Rural- Urban and gender of HH head and the average size of HH

Region/Districts	HH Number	Rural	Urban	Male headed HH	Female headed HH	Average HH size
Dodoma Municipality	92,978	44,076	48,902	63,815	29,163	4.3

Source: Census 2012

Figure 7.1.2 shows the population density of Dodoma Municipality in 2012. It shows that the overall population density of Dodoma City is still low but relatively concentrated at the city centre, the CBD and surrounding areas.



Source: First Draft of Dodoma Capital City Master Plan (2019-2039) (2018)

Figure 7.1.2 Population Density of Dodoma Municipality by Ward

7.1.2 Land use and Protected Areas in Dodoma City

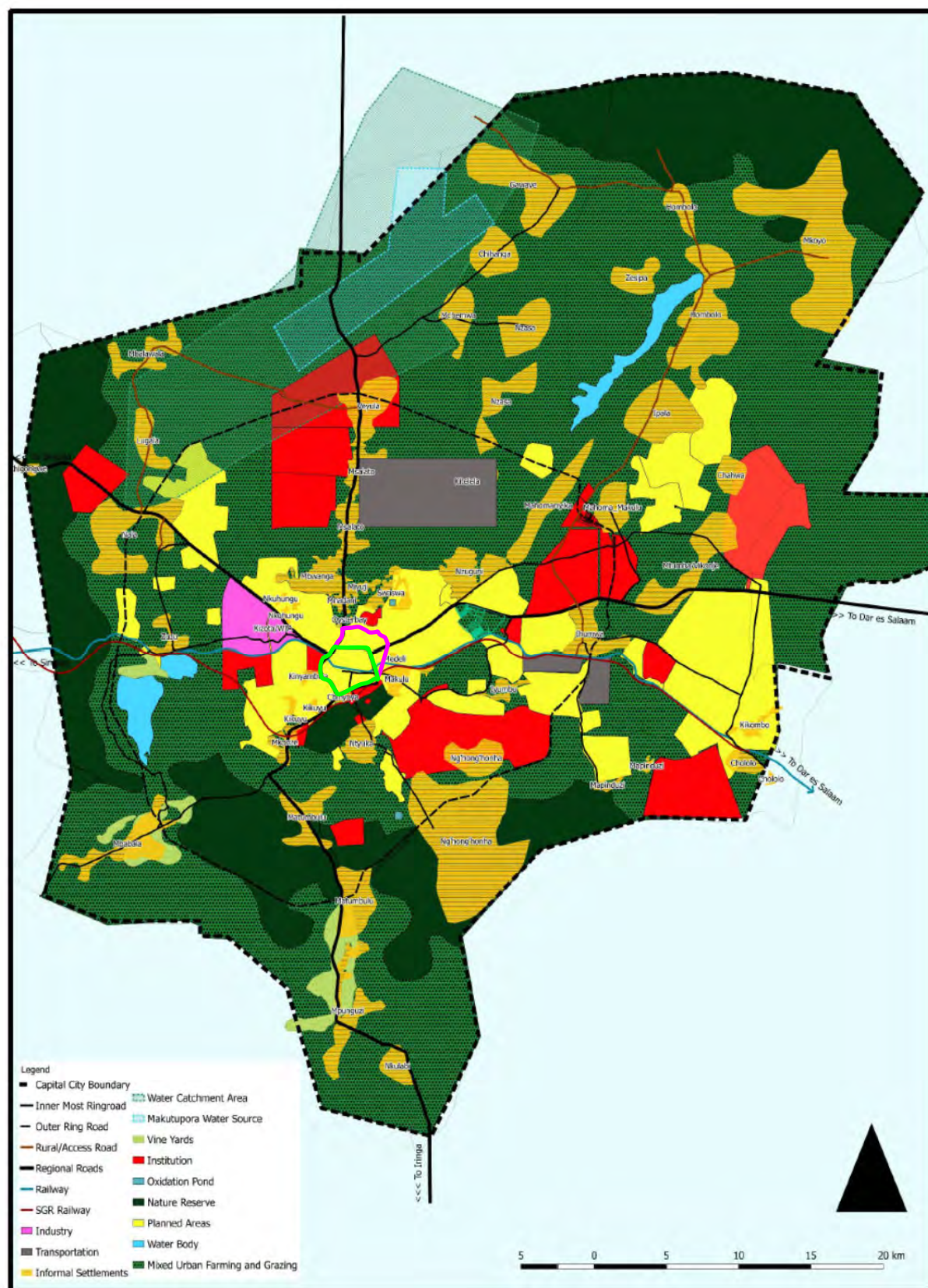
The Table 7.1.3 and Figure 7.1.3 shows the existing land use in Dodoma city and the breakdown of the land use area respectively.

The main land use categories include residential, institutional, nature reserves and recreation, and the Mzakwe water source field. The planned project concerned area mainly lies within the residential area, and commercial area where development has already progressed.

Table 7.1.3 Area of Existing Land Uses of Dodoma City

No.	Land Use Category	Area (ha)	% of Total Area
1	Residential	34,072.97	13.03
2	Commercial and CBD	887.15	0.34
3	Institutional	34460.14	13.18
4	Industrial	333.34	0.13
5	Nature Reserve and Recreation	47,775.68	18.27
6	Scattered Settlements and Farming	204,240.90	35.95
7	Mzakwe Water Source Field	34,505.74	13.19
8	Catchment Area for Well Fields	6,411.26	2.45
9	Dry Port	536.37	0.21
10	Marshalling Yard	499.68	0.19
11	Airport	4,429.68	1.69
12	Government City	742.17	0.28
13	Water Bodies	2,868.29	1.10
	Total	261,529.96	100.00

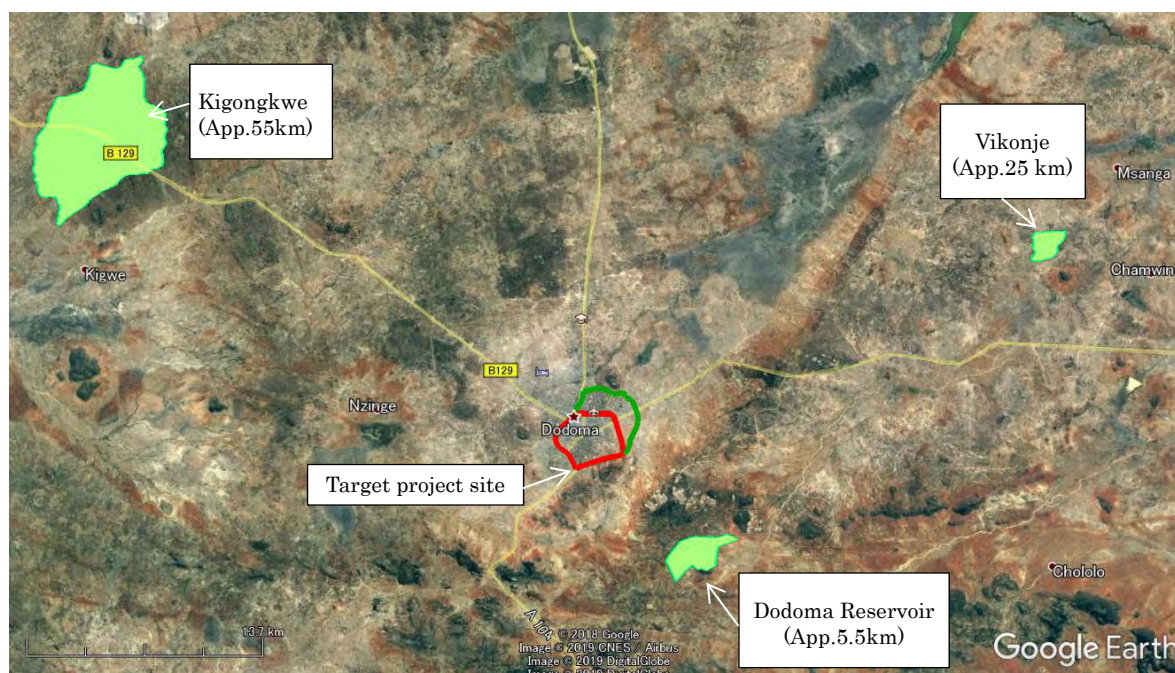
Source: First Draft of Dodoma Capital City Master Plan (2019-2039) (2018)



Source: Prepared by JICA Study Team based on First Draft of Dodoma Capital City Master Plan (2019-2039) (2018)

Figure 7.1.3 The Land use map and the proposed project site in Dodoma city

According to the collected information, there is no protected areas, or natural environmentally sensitive areas in the target project area. The nearest such designated area is Dodoma Reservoir which is a Forest Reserve approximately 5.5 km away from the proposed project site. The project location map showing the protected area is shown in the figure and table below.



Source: JICA Study Team

Figure 7.1.4 Natural Protected Area Map in the Project Area and Distance from Project Area

Table 7.1.4 List of Natural Protected area and the information

Name of Protected Area (distance from the site to project area)	Basic Information
Dodoma Reservoir (app. 5.5km)	Forest Reserve Area: 5.49 km ² Management Authority: Tanzania Forest Services (TFS) Agency International Criteria: Not applicable
Vikonje (App. 25km)	Forest Reserve Area: 2.51 km ² Management Authority: Tanzania Forest Services (TFS) Agency International Criteria: Not applicable
Kigongkwe (App.55km)	Forest Reserve Area: 45.35 km ² Management Authority: Tanzania Forest Services (TFS) Agency International Criteria: Not applicable

Source: JICA Study Team

7.2 Relevant Laws and legislation on Environmental Impact Assessment (EIA)

7.2.1 Laws and legislation relevant to EIA

In Tanzania, the major relevant laws and regulations on EIA procedure are: National Environment Policy, (1997), Environmental Management Act (2004), and Environmental Impact Assessment and Audit Regulations (2005). These core policies and laws are described below. Other relevant policies, laws and regulations are summarized in Table 7.2.1.

(1) National Environment Policy, 1997

The National Environment Policy (NEP, 1997) is the main policy governing environmental management in the country. The policy addresses both natural and socio-environmental issues, and adopts the key principle of sustainable development. This policy requires EIA to be mandatory for all development projects likely to have significant environmental impacts. The intention is to ensure that the development projects are implemented in an economically sustainable manner while safeguarding environmental and social issues for the benefit of the present and future generations.

(2) Environmental Management Act, 2004

The Environmental Management Act (EMA) No 20, enacted in 2004, governs environmental management issues including EIA requirements in the country. The Act stipulates that any developers of projects requiring EIA by law shall undertake EIA at their own cost before commencing the Project. The Act also defines a general scope of environmental management tools to facilitate consistent policing and enforcement, such as: (i) Environmental Impact Assessment (EIA), which helps to identify and minimize possible impacts from a proposed development before commencement, (ii) Environmental Monitoring for compliance with set standards, and (iii) Environmental auditing, which evaluates how well environmental organizations, management and equipment are working.

(3) Environmental Impact Assessment and Audit Regulations, 2005

Environmental Impact Assessment and Audit Regulations provide rules relative to procedures for and carrying out of environmental impact studies and environmental audits as provided for under the Environmental Management Act (2004). They prohibit the carrying out of projects without an environmental impact assessment required under the Environmental Management Act and define the contents and form of an environmental impact assessment and the basic principles of an environmental audit. A developer shall apply for an environmental impact assessment certificate in the form prescribed by these Regulations. The final decision on an environmental impact assessment shall be taken by the Minister. The Regulations also provide for public hearings in relation to environmental impact assessments and appeal against decisions of the Minister.

Table 7.2.1 List of Relevant Policies, Laws and Regulations on EIA

No.	Name of the Legislation (year issued)	Authority
(Natural environment and social environment)		
1	National Environmental Policy (1997)	Department of Environment (in the Vice President's Office) and National Environmental Management Council (NEMC)
2	Environmental Management Act, Cap. 191 (2004)	
3	Environmental Impact Assessment and Audit Regulations (2005)	NEMC
4	Environmental Management (Air Quality Standards) Regulations (2007)	
5	Environmental Management (Hazardous Waste Control and Management) Regulations (2009)	
6	Environmental (Solid Waste Management) Regulations, (2009)	
7	Environmental management (Quality Standards for Control of Noise and Vibration Pollution) Regulations (2011)	
8	Environmental management (Quality Standards for Control of Noise and Vibration Pollution) Regulations (2011)	

Source: JICA Study Team

7.2.2 Procedure of EIA

Tanzanian environmental matters are governed by the Environmental Management Act (Act No. 20, 2004), (hereinafter referred to as “the Act”), and its implementation is regulated by the Environmental Impact Assessment and Audit Regulations, 2005 (the Regulation).

In the Regulation, projects are classified into category “A: Mandatory Projects”, “B1: Borderline Project”, “B2: Non- Mandatory” or Special Category.

Regarding the road project, it falls under either category A or B1 as shown in the table below.

Table 7.2.2 Possible project categories for road projects

Project Category	Project activity
A	9. TRANSPORT AND INFRASTRUCTURE (a) construction and/or expansion of trunk roads;
B1	8. TRANSPORT AND INFRASTRUCTURE (a) rehabilitation of trunk roads and airports / airport strips and their ancillary facilities;

Source: Environmental Impact Assessment and Audit Regulations, 2005

The project involving widening of the existing road or development of a new road is highly expected to fall under category A.

According the Regulation, category A project takes following steps.

- (a) Submission of Application form and Scoping report to the Council
- (b) Conducting Environmental Impact Assessment (EIA) and preparation of Environmental Impact Statement (EIS)
- (c) Review of the EIS by the Council
- (d) Approval of the EIS and Issuance of certificate by the Minister

7.3 Relevant Laws and Legislation on Land Acquisition and Resettlement

7.3.1 Laws and Legislation Relevant to Land Acquisition and Resettlement

The relevant legislation on land acquisition and resettlement in Tanzania is set out in the following laws. Other relevant laws and regulations are summarized in Table 7.3.1.

(1) The Constitution of Tanzania, 1977

The Policy, legal framework to address the social dimensions, impacts and implications of the Project is based on the following articles of the Constitution of the United Republic of Tanzania of 1977:

- Article 24 (1): Subject to provisions of the relevant laws of the land, every person is entitled to own property, and has a right to the protection of his property held in accordance with law.
- Article 24 (2): It shall be unlawful for any person to be deprived of property for the purposes of nationalization or any other purposes without the authority of law which makes provision for fair and adequate compensation.

Therefore, compensation is both a legal and constitutional right under Article 24 of the Constitution of the United Republic of Tanzania of 1977.

(2) Land Act of 1999

This Act regulates land allocation excluding village lands. For village land management, the Village Land Act (No. 7), 1999 is the law to be referred. The Land Act specifies that all land continues to be public property. Land is vested in the President as Trustee for and on behalf of all the citizens of Tanzania. The Act also recognizes land as a property and has value.

Section 156 of the Land Act 1999 requires compensation to all persons for the use of land to which they have a lawful claim or actual occupation as a communal right. This includes: (i) any damages suffered with respect to trees, crops, and buildings as result of road construction, and (ii) damage due to surveying or determining the project route. It is the responsibility of governmental bodies such as Ministries, Local Government Authorities or corporate bodies that apply for right of way to compensate the respective land owners.

(3) The Land Acquisition Act, 1967

The Land Acquisition Act, 1967 is still the principal legislation for land acquisition. Under the Land Acquisition Act, 1967, the President may, subject to the provisions of this Act, acquire any land for any estate or term where such land is required for any public purpose.

Land shall be deemed to be acquired for a public purpose where it is required, for example, for exclusive Government use, for general public use, for any Government scheme, for the development of agricultural land or for the provision of sites for industrial, agricultural or commercial development, social services, or housing or; where the President is satisfied that a corporation requires any land for the purposes of construction of any work which in his opinion would be of public utility or in the public interest or in the interest of the national economy, he may, with the approval, to be signified by resolution of the National Assembly and by the order published in the Gazette, declare the purpose for which such land is required to be a public purpose and upon such order being made such purpose shall be deemed to be a public purpose; or in connection with the laying out of any new city, municipality, township or minor settlement or the extension or improvement of any existing city, municipality, township or minor settlement; etc.

Upon such acquisition of any lands, the President is compelled on behalf of the Government in respect thereof, out of monies provided for that purpose by Parliament, to compensate the land owner, as may be agreed upon or determined in accordance with the provisions of the Land Acquisition Act, 1967.

The President may also revoke a right of occupancy if in his opinion it is in public interest to do so. Accordingly, the land for which a right of the occupancy has been revoked reverts back to the Government for re-allocation pursuant to the existing needs. Although the land belongs to the government, some changes on the land may have taken place. Therefore, each land has its value to the owner; requiring compensation to land owners who have had their lands taken away. Based on this act the villagers affected by the Project are claiming that they ought to be compensated for the lost farms and land used for residential purposes.

(4) The Land (Assessment of the Value of Land for Compensation) Regulations, 2001

According to the regulation outlines that the basis for assessment of the value of any land and un-exhausted improvement for the purpose of compensation shall be its market value:

According to the regulation, the following are eligible for compensation/resettlement:

- Holder of right of occupancy (Section 22 of the Land Act of 1999);
- Urban or suburban land acquired by the President under Section 60 of the Land Act, 1999.

The regulation also states that, “the basis for assessment of the value of any land and un-exhausted improvement shall be the market value of such land”. The market value is arrived at by the use of comparative method proven by actual recent, sales of similar properties or by the use of the income approach or replacement cost method, in case the property is of special nature and not saleable. According to the regulation an assessment of the value of land and un-exhausted improvements is done by a qualified valuer and verified by the Chief Valuer of the Government or their representative. Compensation issues include: (i) the value of un-exhausted improvement, (ii) the disturbance allowance; transport allowance; accommodation allowance, and, (iii) the loss of profits. In addition, if compensation is not paid promptly, interest may be additionally paid.

Table 7.3.1 List of Relevant Policies, Laws and Regulations on Land Acquisition and Resettlement

No.	Name of the Legislation (year issued)	Authority
	(Land acquisition and resettlement)	
1	Constitution of the United Republic of Tanzania, Cap. 2 (1977)	Ministry of Justice and Constitutional Affairs
2	National Land Policy (1997)	Ministry of Lands, Housing and Human Settlements Development
3	Land Act, Cap. 113 (1999)	
4	The Land (Amendment) Act (2004)	
5	The Village Land Act (1999)	
6	Land Use Planning Act, No. 6 (2007)	
7	Land Acquisition Act (1967)	
8	The Valuation and Valuers Registration Act (2016)	
9	The National Land Use Planning Commission Act (No. 3) (1984)	
10	Land (Forms) Regulations, 2001	
11	Land (Assessment of the Value of Land for Compensation) Regulations, 2001	
12	Land (Compensation Claims) Regulations, 2001	
13	Land (Management of the Land Compensation Fund) Regulations, 2001	
14	The Village Land Regulations, 2001	Village Administration; Ministry of Land Housing and Human Settlements Development

Source: JICA Study Team

7.3.2 Procedure of land acquisition and resettlement

Regarding land acquisition and resettlement in Tanzania, MOLHSD is the responsible ministry for approval of Compensation and Resettlement Plan (CRP) also referred to as Resettlement Action Plan (RAP) in JICA guideline.

According to the Road Sector's Compensation and Resettlement Guideline (2009) and the interview with a social officer from TANROADS, the following steps are to be taken.

- (a) Initial (Reconnaissance) Survey
- (b) Consultation with Authorities and the PAPs before Census and Socio-Economic Survey
- (c) Census and Socio-Economic Survey
- (d) Land/ Property Assessment Survey
- (e) Consultations with the Authorities and the PAPs
- (f) Preparation of the CRP/RAP and Valuation report
- (g) Obtaining approval from Chief Government Valuer of MOLHSD

7.4 Result of Site Survey

7.4.1 Surrounding environmental and social situation on the proposed route

Two (2) proposed routes for the Inner Ring Road were divided into seven (7) sections as show in Figure 7.4.1. Site reconnaissance was conducted and the surrounding environment of each section was surveyed. The description and photos of land use and surrounding environment which represents the each proposed route are shown in Table 7.4.1.







Source: JICA Study Team

Figure 7.4.1 Target Routes of the Project

Table 7.4.1 Surrounding Environment of the Proposed Route

Section	Major Land use	Photos representing the target routes	
(1)	Residential/ commercial area	 <p>Runway of the airport and the land located in the South of the current airport</p>	 <p>Residence located in the south of the airport</p>
(1')	Residential/ commercial area	 <p>Residence and commercial facilities existing on the (1')</p>	 <p>Residence and commercial facilities existing on the (1')</p>
(2)	Residential/ commercial area	 <p>ROW seems to be widely secured but many trucks are parking alongside of the part of the route (2)</p>	 <p>Some residence and buildings locates along the route (2) but the ROW seems to be widely secured</p>
(3)	Residential area/ Scrubland	 <p>Residential community is existing on the route (3)</p>	 <p>No road is existing on the part of the route (3) and surrounded by scrubland</p>
(3')	Residential area/ Scrubland	 <p>Scrubland and some residences on the route (3)</p>	 <p>No road is existing on the part of the route (3) and surrounded by scrubland</p>

Section	Major Land use	Photos representing the target routes	
(4)	Commercial area/ Scrubland	 <p>Some hotels are existing along the route (4)</p>	 <p>No road is existing on the part of the route (4) and surrounded by scrubland</p>
(4')	Residential area/ Scrubland	 <p>Residences community is spread on the route (4')</p>	 <p>Part of the route (4') is scrubland</p>

Source: JICA Study Team

7.4.2 Key items to be surveyed

Several key items were selected as indicators for the proposed route on the natural and social environment features through preliminary environmental survey as shown in Table 7.4.2.

Considering that all the candidate routes are located in the surrounding environment of residential and commercial area, some impact may be expected in pollution and social environment. With regards to natural environment, proposed project routes are located in developed areas of the centre of the city and no natural protected areas exist nearby. Therefore, natural environment factors are considered to have no impact for all the proposed routes and thus not included in evaluation.

Table 7.4.2 Selected Key Items and Reasons on Environmental evaluation

Type	Key item	Reasons	Detailed item	Proposed Rating Criteria		
				A	B	C
I. Pollution	1. Noise and air pollution	Construction works for new road or widening of the road may give negative impact to residential area	Distance from the nearest residential area	$D \leq 50m$	$50 < D < 100m$	$100m \leq D$
II. Social	1. Involuntary Resettlement	Construction activities may cause land acquisition and resettlement and give impact to dwellings and sensitive receptor	Number of affected dwellings (structures) and expected displaced persons (DP)	$200 \leq \text{No.}$	$50 < \text{No.} < 200$	$\text{No.} \leq 50$
	2. Culture (sensitive receptor)	such as religious facility, hospital and school.	Number of affected sensitive receptor (religion facility and school)	1&more (not movable)	1&more (movable)	No.=0

Source: JICA Study Team

7.4.3 Summary of Preliminary Environmental Evaluation

A summary of environmental evaluation for candidate sections of the project is shown in the table below. The proposed projects are construction activity of totally 2-6 km length road including widening of the existing roads and new road construction. In accordance with interviews with the NEMC and the Environmental officer from TANROADS, all the proposed sections fall under EIA-mandatory projects and thus it is necessary to obtain the Environmental certificate.

Table 7.4.3 Summary of Preliminary Environmental survey result

Section	Project Activity and condition	Pollution		Social Environment				Culture (sensitive receptor)	
		Noise and air pollution		Involuntary Resettlement				Description	
		Rating	Description	Rating	Expected volume of DP	Description	Rating	Description	Description
(1)	Shabiby RA – Babi RA Total length: 3.3km • Widening (1.3km) • Construction of New Road (2.0km)	A	Target project area is mainly residential and commercial area and some dwellings are closely located. Therefore some impact is expected.	B	Less than 200 resettlements	Developing new road avoiding the land of airport may cause approximately 100 DP as well as some land acquisition.	A	Church is existing and may be affected.	
(1')	Emmaus Ya Pili – Watenzi Total length: 3.9km • Widening of existing road from 2-lane to 4-lane (3.9km)	A	Target project area is mainly residential and commercial area and some dwellings are closely located. Therefore some impact is expected.	B	Less than 200 resettlements	There is residential and commercial area along the target route and the expected number of DP may be below 100.	C	Primary School is existing along the route but not affected	
(2)	Watenzi – Imagi RA Total length: 5.5km • Widening of existing road from 2-lane to 4-lane (5.5km)	A	Target project area is mainly residential and commercial area and some dwellings are closely located. Therefore some impact is expected.	C	Less than 50 resettlements	ROW seems to be widely secured therefore limited land acquisition and resettlement is expected.	C	Church and School are existing along the route but not affected.	
(3)	Imagi RA – New RC Office Total length: 2.9km • Construction of New Road (2.9km)	A	Surrounding environment is residential area and scrubland and some dwellings are closely located. Therefore some impact is expected.	B	Less than 200 resettlements	The route is construction of new road and it is partly passing residential area. The expected No. of DP may not exceed 200, but moderate scale of land acquisition and resettlement is expected.	C	Regional commissioner's (RC) office is under construction along the route but not affected.	
(3')	Imagi RA – New RC Office Total length: 3.9km • Construction of New Road (3.9km)	A	Surrounding environment is residential area and scrubland and some dwellings are closely located. Therefore some impact is expected.	B	Less than 200 resettlements	The route is construction of new road and it is partly passing residential area. The expected No. of DP may not exceed 200, but moderate scale of land acquisition and resettlement is expected.	C	Regional commissioner's office is under construction along the route but not affected.	
(4)	New RC Office – Shabiby RA Total length: 2.1km • Widening (1.4km) • Construction of New Road (0.7km)	C	The nearby land use is mainly scrubland and commercial area and the distance from nearest residential area is more than 100m. Therefore few impacts is expected.	C	Less than 50 resettlements	Although construction of new road is included, structures existing along the route are limited. Therefore, minimum land acquisition and resettlement is expected.	C	Regional commissioner's office is under construction along the route but not affected.	
(4')	New RC Office – Emmaus Yapi Total length: 3.2km • Construction of New Road (3.2km)	A	Surrounding environment is residential area and scrubland and the route it passing residential community therefore some impact is expected.	B	Less than 200 resettlements	The route is construction of new road and it passes residential community. However, the expected no. of DP does not exceed 200. Therefore moderate scale of land acquisition and Resettlement is expected.	C	Any sensitive receptor was not identified on the route.	

* No. of displaced persons are estimated based on household size of 4.3 persons per household referring to mean household size of Dodoma Municipal in Census 2012
Source: JICA Study Team

8. Implementation Plan of Dodoma City Roads Development

8.1 Methodology for Prioritizing Road Improvement Projects

As discussed in Chapter 4, there are a number of on-going and planned road improvement projects in Dodoma City listed in the pipeline projects under TANROADS and TARURA. These road improvement projects under TANROADS include three ring roads and widening of Dar es Salaam Road, and the progress of these projects will all affect urgency and necessity as well as the scope of the Inner Ring Road Project requiring Japanese assistance. Accordingly, this Chapter will identify justification of the Inner Ring Road Project, following the steps described below:

- The first step of this Study was to identify the priority of the on-going and planned projects long-listed under TANROADS. The priority analysis included (i) Outer Ring Road, (ii) Middle Ring Road (or Inner Ring Road), (iii) Inner Ring Road (or Most Inner Ring Road), (iv) Widening of Dar es Salaam Road and (v) Access Road from Dodoma University.
- Once the first step justified necessity of the proposed Inner Ring Road Project, the second step was to identify the priority alignment and segment and potential scope of works of the Inner Ring Road Project.

A multi-criteria analysis was applied to identify the priority of the Project through these two steps and the evaluation criteria applied to the multi-criteria analysis included: (i) urgency (e.g., volume capacity ratio), (ii) efficiency (e.g., project cost against traffic volume), (iii) relevance with Master Plan and (iv) social environment impact caused by the Project.

- Urgency: Importance of the Project requiring swift road improvement, say within 10 years. 2029 future traffic volume and volume capacity ratio (V/C) used as an evaluation factor.
- Efficiency: Investment amount of the Project and economic return against the investment. Generally, economic analysis was widely applied to justify efficiency of the infrastructure project with the project cost against traffic volume being applied as an alternative evaluation indicator in this Study.
- Relevance with Master Plan: Following the GOT's strong initiatives to develop Dodoma City as National Capital and GOT recently reviews and revises to the Master Plan of Dodoma City, relevance with the Master Plan was added as one of the evaluation criteria.
- Social environment impact: The Project may cause adverse environment impacts, particularly those on resettlement and land acquisition, and these are applied as evaluation indicators of the Project.

The following table summarizes evaluation criteria and factors, applied to this Study.

Table 8.1.1 Evaluation Criteria for Prioritizing Road Improvement Projects

Criteria	Evaluation Factors	Evaluation Result
Urgency	<p>Traffic volume: YR 2029 projected traffic volume under the assumption that the city development is well progressing as planned in the Master Plan and all candidate road projects are implemented.</p> <p>Volume Capacity Ratio (V/C): YR 2029 projected traffic volume against the 2 lane road capacity (Urban Road: 12,000 pcu/day, Rural Road: 15,000 pcu/day)</p>	<p>V/C>1.0: High 0.5<V/C<1.0: Middle 0.5>V/C: Low</p>
Efficiency	<p>Project Cost: Total project cost of 4 lane road improvement estimated at 2 M USD/km for Outer Ring Road and 4 M USD/km for other roads.</p> <p>Cost against traffic volume: Project cost divided by 2029 traffic volume</p>	<p>V/C>1.0: High 0.5<V/C<1.0: Middle 0.5>V/C: Low</p>
Relevance with M/P	Pipeline projects proposed in the 2019 Dodoma City Development Master Plan	<p>Listed as pipeline projects: High Not listed: Low</p>
Social Environmental Impact	Land Acquisition and Resettlement: The number of people required for resettlement and the area required for land acquisition due to implementation of the Project	<p>No. of resettlement (N) N>200: High 100<N<200: Middle N<100: Low</p>

Note: Total project cost of 4 lane road improvement is estimated at USD 2 million per km for Outer Ring Road, referring to F/S and D/D study by TANROADS. Total project cost other roads including Inner Ring Road is estimated at USD 4 million per km, referring to New Bagamoyo Widening Project (Phase-1) by JICA (See the following table).

Items	Amount	Note
Project Cost in E/N (A)	5.1 billion yen	
Road length (B)	12.9 km	
Unit cost in 2012 (A/B)	0.39 billion yen	
Unit cost in 2019	0.44 billion yen	Price escalation: 1.7% p.a.
Unit cost in 2019 in USD	4.04 M USD/km	110 yen/USD

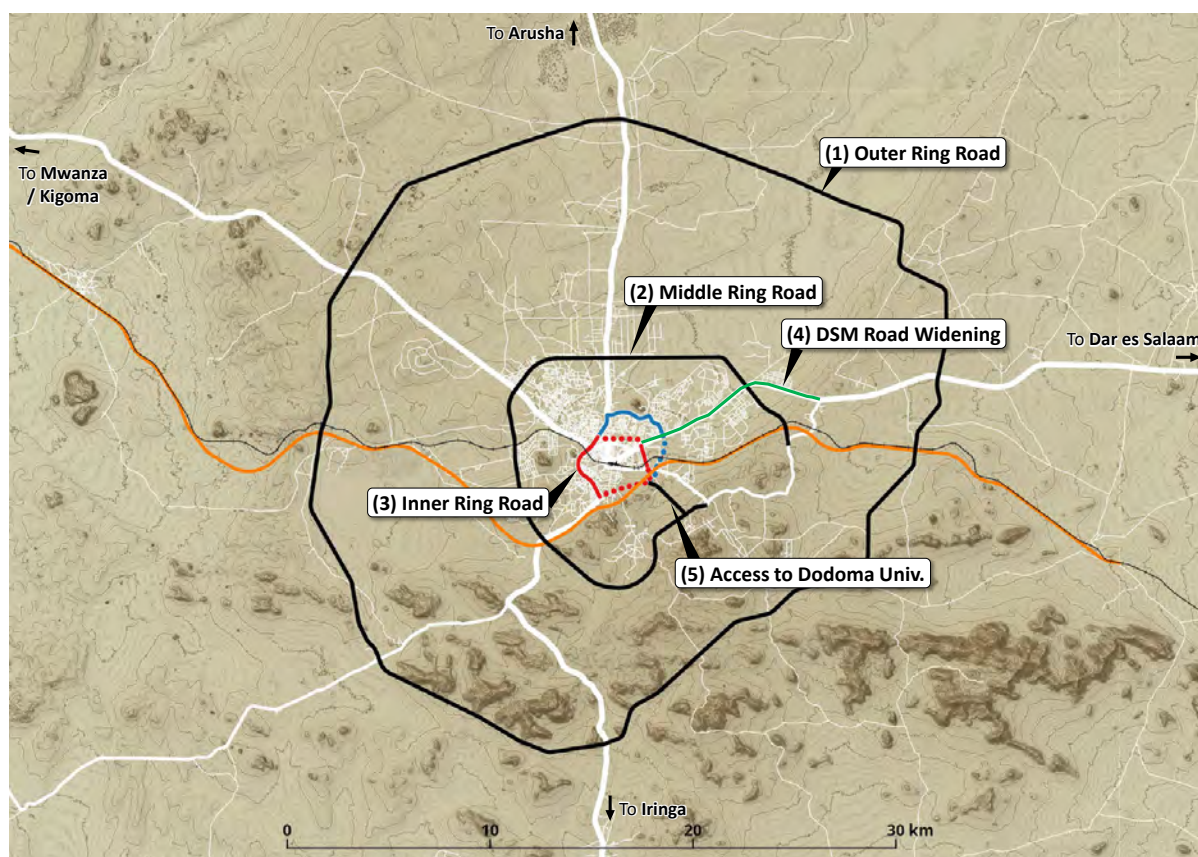
Source: JICA Study Team

8.2 Segmentation and Prioritization of Road Improvement Project

8.2.1 First Step: Prioritization of Road Improvement Projects

The location and scope of the long-listed road improvement projects under the TANROADS are summarized in the following figure and table. Following the methodology described above, each long-listed project was analysed and prioritized based on the evaluation criteria and in conclusion the result of prioritization on these projects justifies urgency and necessity of the Inner Ring Road Project.

- Widening of Dar es Salaam Road was evaluated as the most urgent and necessary project among the long-listed projects, considering that future traffic demand observed along the said road will exceed the existing 2-lane road capacity within 10 years, coupled with the expectation that the project should derive limited adverse environment impacts.
- Inner Road Project was evaluated as the second most necessary project among the long-listed projects. Considering the distribution of the future traffic among proposed three ring roads, the Inner Ring Road is still expected to carry more traffic than other ring roads due to the traffic characteristics in the city that the destination of nearly half of the traffic generated to/from the CBD.



Source: JICA Study Team

Figure 8.2.1 Location of Road Improvement Projects for Prioritizing Analysis

Table 8.2.1 List of Road Improvement Projects for Prioritizing Analysis

		(1) Outer Ring Road	(2) Middle Ring Road	(3) Inner Ring Road	(4) DSM Road Widening	(5) Access to Dodoma Univ.
Section		Approximately 15 km radius ring road	7.5 km radius ring road	2.0 km radius ring road	Widening of 10 km section from DSM Avenue RA towards Dodoma Univ. Road	Radial connection between Middle Ring Road and Inner Ring Road.
Current Status	F/S	Completed	On-going (to be completed in 2019)	On-going (to be completed in 2019)	None	None
	Construction	Expected to be implemented by AfDB	-	-	-	-
Section Length		110.2 km	40.0 km	11.6/15.5 km	10.0 km	4.2 km
Jurisdiction		TANROADS	TANROADS	TANROADS/TA RURA	TANROADS	TANROADS
Existence of Road		None	None	Partially exist	Exist	None
Pavement Type		N/A	N/A	Asphalt / Gravel	Asphalt Pavement	N/A
Number of Lanes		N/A	N/A	2-lane	2-lane	N/A
ROW Width		None	None	25-60 m	60 m	None

Source: JICA Study Team

Table 8.2.2 Summary Result of Prioritization of Road Improvement Projects

	(1) Outer Ring Road	(2) Middle Ring Road	(3) Inner Ring Road	(4) DSM Road Widening	(5) Access to Dodoma Univ.
Urgency	2029 traffic volume: 5,000 pcu/day V/C=0.42	2029 traffic volume: 9,600 pcu/day V/C=0.80	2029 traffic volume: 10,500 pcu/day V/C=0.88	2029 traffic volume: 21,200 pcu/day V/C=1.77	NA
Efficiency	Construction cost: USD 220 mil. C/V=44,000 USD/vehicle	Construction cost: USD 160 mil. C/V=16,700 USD/vehicle	Construction cost: USD 46/62 mil. C/V=4,400/5,900 USD/vehicle	Construction cost: USD 40 mil. C/V=1,900 USD/vehicle	NA
Relevance with M/P	Pipeline Project Access to New Dodoma Airport and Government City	Pipeline Project	Pipeline Project CBD and existing airport	Pipeline Project CBD, National Assembly and Government City	University
Social Environmental Impact	More than 200 resettlements Large scale of land acquisition & resettlement	More than 200 resettlements Large scale of land acquisition & resettlement	Less than 200 resettlements Medium scale land acquisition & resettlement	Zero resettlement Minimum land acquisition & resettlement	Less than 200 resettlements Medium land acquisition & resettlement
Overall Evaluation	4 th Priority	3 rd Priority	2 nd Priority	1 st Priority	5 th Priority

Source: JICA Study Team

As the result of discussions on the above study result with TANROADS and other relevant institutions, TANROADS expressed their intention that the construction of Inner Ring Road should be the first priority in order to decongest traffic in the city centre by diverting traffic especially heavy vehicle traffic. However TANROADS also recognized the urgency of the widening of Dar es Salaam Road. Therefore, TANROADS is preparing the feasibility study on widening of Morogoro – Dodoma Road in order to look for the financial source of the construction works.

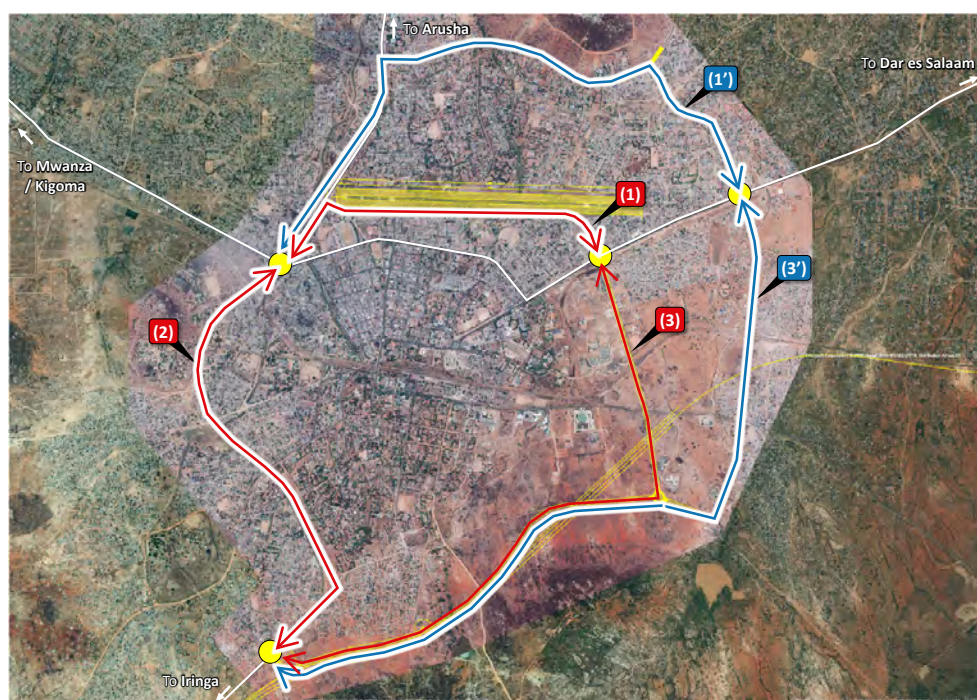
8.2.2 Second Step: Prioritization of Alternative Segments of Inner Ring Road Project

Since the previous section justifies urgency and necessity of the Inner Ring Road Project, this section identifies alternative alignments and segments of the Inner Ring Road Project and prioritize these alternative segments. As briefed in Chapter 4, TANROADS is currently conducting feasibility study and detailed design of the Inner Ring Road Project. In the course of the feasibility study, two alternative alignments are being studied, including (i) new road improvement adjacent to the existing Dodoma Airport and (ii) road widening of the existing Prime Minister Road. In addition to alternative road alignments, the Study needs to consider the sectional traffic demand since the projected traffic demand significantly varies by directions along the ring road. Accordingly, the following alternative segments are set for priority analysis in the Study:

- Section (1) Shabiby RA- Bahi RA
- Section (2) Bahi RA – Imagi RA
- Section (3) Imagi RA – Shabiby RA
- Section (1') Emmaus Ya Pili- Bahi RA
- Section (3') Imagi RA – Emmaus Ya Pili

The location and alternative segments of the Inner Ring Road Project are summarized in the Figure 8.2.2 and Table 8.2.2 and Table 8.2.4. Like the first step described above, each alternative segment was analysed and prioritized based on the evaluation criteria and the result of prioritization on these segments justifies necessity and scope of the Project.

- Section (1) Shabiby RA- Bahi RA was evaluated as the most prioritized section, fulfilling all evaluation criteria as High and functions as a bypass of the Dar es Salaam Road and School Avenue which currently bear a considerable amount of traffic. Compared to Section (1'): Emmaus Ya Pili- Bahi RA, this section was given priority due to the risk that widening of existing Section (1') ,which passes through the well-established residential and community area, may derive adverse environmental impacts, including resettlements. Another reason Section (1') is given less priority is that the road improvement work on Section (1') was just completed in 2018 and there is still on-going improvement works (provision of side ditches and walkways) along Section (1') and therefore, improvement on this section is considered a duplication of investment.
- Other sections were judged to be priority compared to Section (1) (as well as Section (1')) because the projected traffic volume of these sections is relatively small and accordingly, the efficiency of the improvement project of these sections also considered lower level. The comparative study on the proposed alignments of these sections, Section (3) Imagi RA – Shabiby RA is given priority to Section (3') Imagi RA – Emmaus Ya Pili, considering the scale of resettlement and land acquisition. Another reason Section (3) is preferred is that Section (3') requires an additional bridge in the SGR where the alignment of Section (3') and SGR merges, and this requires a revision of the SGR design and may significantly increase the project cost of the SGR.



Source: JICA Study Team

Figure 8.2.2 Segment Alternatives of Inner Ring Road for Prioritizing Analysis (Second Step)

Table 8.2.3 Route/Segment Alternatives of Inner Ring Roads for Prioritizing Analysis (Second Step)

Section	(1)	(2)	(3)	(1')	(3')
	Shabiby RA – Bahi RA	Bahi RA – Imagi RA	Imagi RA – Shabiby RA	Emmaus Ya Pili – Bahi RA	Imagi RA – Emmaus Ya Pili
Section Length	3.3 km	3.4 km	4.9 km	6.0 km	7.0 km
Jurisdiction	TANROADS	TANROADS	TANROADS	TARURA	N/A
Existence of Road	Partially exist	Exist	Partially exist but is local road	Exist	None
Pavement Type	Asphalt Pavement	Asphalt Pavement	Gravel	Asphalt Pavement	N/A
Number of Lanes	Partially 2-lane	2-lane	Partially 2-lane	2-lane	N/A
ROW Width	ROW is secured excluding the area besides Dodoma Airport, which needs transfer of land from Civil Aviation Authority to TANROADS.	ROW is secured for future widening.	None	ROW is secured for future widening but some section needs additional land acquisition and resettlement of properties.	None

Source: JICA Study Team

Table 8.2.4 Result of Prioritization on Segment Alternatives of Inner Ring Roads (Second Step)

Section	(1)	(2)	(3)	(1')	(3')
	Shabiby RA – Bahi RA	Bahi RA – Imagi RA	Imagi RA – Shabiby RA	Emmaus Ya Pili – Bahi RA	Imagi RA – Emmaus Ya Pili
Urgency	2029 traffic volume: 10,500 pcu/day V/C=0.88	2029 traffic volume: 5,000 pcu/day V/C=0.42	2029 traffic volume: 1,000 pcu/day V/C=0.08	2029 traffic volume: 10,500 pcu/day V/C=0.88	2029 traffic volume: 1,000 pcu/day V/C=0.08
Efficiency	Construction cost: USD 13 mil. C/V=1,200 USD/vehicle	Construction cost: USD 14 mil. C/V=2,800 USD/vehicle	Construction cost: USD 20 mil. C/V=20,000 USD/vehicle	Construction cost: USD 24 mil. C/V=2,300 USD/vehicle	Construction cost: USD 28 mil. C/V=28,000 USD/vehicle
Relevance with M/P	Pipeline Project as Ring Road	Pipeline Project as Ring Road	Partially Pipeline Project as Ring Road	Non pipeline project Acknowledged in Master Plan	Non pipeline project Partly acknowledged in Master Plan
Social Environmental Impact	Less than 100 resettlements Minimum land acquisition & resettlement	Less than 100 resettlements Minimum land acquisition & resettlement	Less than 200 resettlements Minimum land acquisition & resettlement	Less than 200 resettlements Medium land acquisition & resettlement	Less than 200 resettlements Large scale of land acquisition & resettlement
Overall Evaluation	1 st Priority	2 nd Priority	3 rd Priority Partially under improvement by TANROADS/TARURA		

Source: JICA Study Team

Although the Study Team proposes the alignment of Option-1 as an optimum ring road, TANROADS expressed their preference of the alignment of Option-2, and the following points are made during these discussions:

- TANROADS has expressed a great concern on the resettlement and compensation cost caused by the improvement of Section (1). According to TANROADS, TANROADS has been negotiating the resettlement and compensation amount for more than 10 years with the property owners whose properties locate adjacent to the existing Dodoma Airport and therefore which causes significant delay in the implementation of the Inner Ring Road project, when improving the alignment of Option-1.
- Transfer of land title (along Section (1)) of the airport land from Tanzania Civil Aviation Authority (TCAA) to TANROADS would be difficult, and construction of a road in parallel with the runway near the airport would not be approved by TCAA, according to TANROADS. It is because TCAA is planning to expand the run way by 300 meters and install the lighting facilities in order to meet the international standards and allow the night-time flights in the existing Dodoma Airport. These improvement works requires unpredictable amount of land.
- Widening of the Segment-1' would not be difficult because the existing ROW would be good enough to accommodate 4-lane road. Partial land acquisition would be necessary for the widening but the scale of the impact would be minimal. Although the sidewalks and street lightings, which are currently under construction by TARURA, as well as utilities (water piles) and street trees need to be relocated for widening of the Segment-1', this would not be a critical issue and be manageable, according to TANROADS.
- However, there is a section in the Segment (1') having restriction of the influx of heavy vehicle (over 10 ton). According to TARURA, this restriction is due to the pavement strength of the existing road but the entry of many heavy vehicle into this road section would not be preferable

because the surrounding area of the road is planned for residential purpose.

- The construction of new road sections to complete the “ring” represents the utmost priority for stakeholders involved.

8.2.3 Third Step: Prioritization of Alternative Segments of Inner Ring Road Project

As a result of discussions with TANROADS and other relevant institutions, the overall scope of the Project was determined as shown in Table 8.2.5 as well as Table 8.2.6. It was also confirmed that the urgency of the southern part section of the Inner Ring Road (namely, Segment (3) and (4')) has higher priority, taking into account the following reasonings.

- There is a large number of traffic observed, particularly those of heavy trucks, passing through the commercial and institutional area in the city centre. A number of these heavy trucks derive a negative environmental impact, such as increased risks in traffic accidents, air pollution and vibration. Also there would be a rapid increase in traffic demand estimated in 10 years time in the city centre and traffic congestion and adverse environmental impacts would reach to the critical level, if there is no road improvement in the city centre.
- Accordingly, there are two options studied to ease the traffic demand in the city centre: (i) widening of existing northern part of the Inner Ring Road and (ii) improving of missing link in the southern part of the Inner Ring Road. As a result of discussion with local institutions, second option: (ii) improving of missing link in the southern part of the Inner Ring Road, is highly appreciated, since the northern part of the Inner Ring Road functions as a good community access road and the surrounding area of which is acknowledged as a well planned residential area, following the Master Plan.



Source: JICA Study Team

Figure 8.2.3 Segment Alternatives of Inner Ring Road for Prioritizing Analysis (Third Step)

Table 8.2.5 Result of Prioritization on Segment Alternatives of Inner Ring Roads (Third Step)

Segment	(1')	(2)	(3)	(4')
Section	Emmaus Ya Pili - Wajenzi	Wajenzi – Imagi RA (St. Johns)	Imagi RA (St. Johns) – New RC Office	New RC Office – Emmaus Ya Pili
Urgency	2029 traffic volume: 4,900 pcu/day V/C=0.40	2029 traffic volume: 11,300 pcu/day V/C=0.94	2029 traffic volume: 4,200 pcu/day V/C=0.35	2029 traffic volume: 4,700 pcu/day V/C=0.39
Efficiency	Construction cost: USD 16 mil. (4-lane) C/V=3,300 USD/vehicle	Construction cost: USD 22 mil. (4-lane) C/V=1,900 USD/vehicle	Construction cost: USD 12 mil. (4-lane) C/V=2,900 USD/vehicle	Construction cost: USD 13 mil. (4-lane) C/V=2,800 USD/vehicle
Relevance with M/P	Well established residential area with good environment (-)	Part of ring road (+)	Currently open and unplanned area (+-) Form ring road and assist planned development (+)	Ditto
Social Environmental Impact	Less than 100 resettlement	Zero resettlement	Less than 200 resettlements (-) Contribute to improving environment in City Centre (+)	Ditto
External Condition			Coordination with SGR required	Ditto
Overall Evaluation		2 nd Priority	1 st Priority	3 rd Priority

Source: JICA Study Team

Table 8.2.6 Evaluation Indicators of With and Without Project (Third Step)

Year/Case	Route	Route Length (km)	Traffic Volume ('00 PCU)	Heavy Vehicle Ratio (%)	Travel Speed (km/hour)	Travel Time (min)	Volume/ Capacity Ratio
2019 (Base Case)	Emmaus-Bahi RA (thru City Centre)	4.3	77	34%	13.8	18.8	0.75
2029 Without Project		4.3	126	20%	6.0	43.1	1.22
2029 With Project		4.3	129	1%	14.7	17.6	0.61
	Emmaus-Bahi RA (thru Inner Ring Road)	11.3	62	64%	54.5	12.4	0.11

Note: i) With Project case include improvement of (a) Inner Ring Road (southern ring), (b) Outer Ring Road and widening of (c) Dar es Salaam Road and (d) Iringa/Arusha Road,
 ii) Current 10 ton restriction is applied to city centre including (1').

Source: JICA Study Team

9. Direction of Japan's ODA for Dodoma City Roads Development

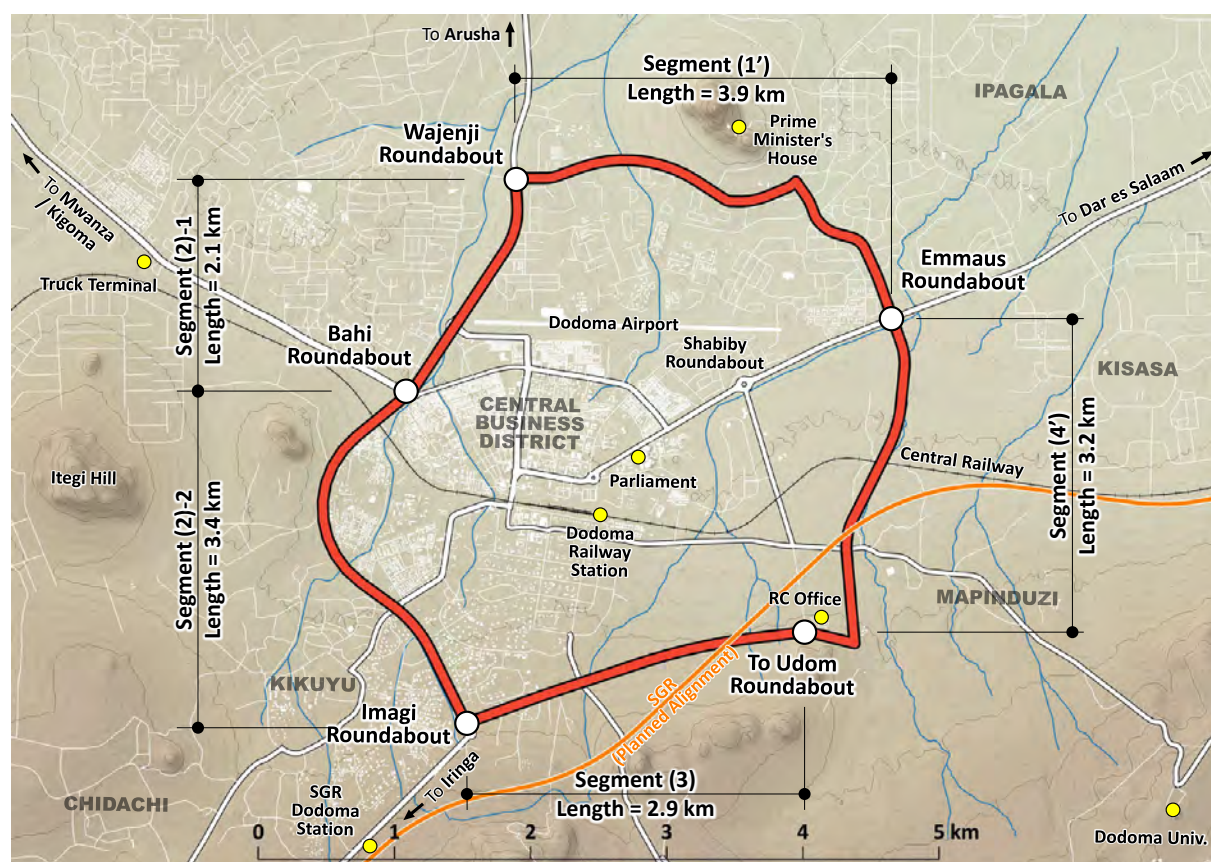
9.1 Assistance Policy

As the result of discussions with TANROADS, it was confirmed that the Government of Japan will support for the Inner Ring Road Construction Project under Grant Aid scheme. Overall scope of works of the Inner Ring Road Project is summarized in Table 9.1.1 and Figure 9.1.1 but the segment(s) to be financed by the Grant Aid need to be finalized at the next stage.

Table 9.1.1 Overall Project Scope

	Segment (1')	Segment (2)	Segment (3)	Segment (4')
Section	Emmaus Ya Pili - Wajenzi	Wajenzi - Imagi RA	Imagi RA - New RC Office	New RC Office - Emmaus Yapili
Length	3.9 km	5.5 km	2.9 km	3.2 km
Jurisdiction	TARURA	TANROADS	TANROADS	TARURA
Type of Works	Widening of existing road from 2-lane to 4-lane	Widening of existing road from 2-lane to 4-lane	Construction of new road	Construction of new road
Priority	No Improvement	2nd Priority	1st Priority	3rd Priority

Source: JICA Study Team



Source: JICA Study Team

Figure 9.1.1 Proposed Road Alignment of Inner Ring Road

9.2 Further Arrangements/Coordination Necessary to be Considered

In order to smoothly implement this Project, it is recommended that the following arrangements or coordination should be considered:

- Existence of the underground utilities (water pipes and electric poles) along the alignment of the proposed project segments, particularly those along the Segment (3): There would be an adjustment of the alignment or re-alignment required when the relocation of these underground utilities costs extraordinarily.



Figure 9.2.1 Existing Manholes of Water Pipe along Segment (3)

- A certain number of involuntary resettlement required for improvement of Segment (3) and Segment (4'): Both alignment and cross section should be carefully studied during the further JICA's study in order to mitigate the involuntary resettlements.



Figure 9.2.2 Communities along Segments (3) and (4')

- Cost reduction measures in order to improve the efficiency of the Project: Taking an example of widening of Segment (2), additional 2 lanes could be added adjacent to the existing road with minor pavement improvement in the existing road, when durability of the existing road pertains its design standards. Another example is cross section and number of lanes of Segment (3) and (4'). Considering the future traffic demand, both segments could be first improved with a 2-lane road in order to open up and function as the Ring Road then be widened when/before the traffic demand is saturated.
- Storm water drainage: There are several crossing seasonal channels along the alignment of the Inner Ring Road. Capacity of drainage of the channels and discharge points should be carefully examined in order not to cause any partial flooding.
- Coordination with SGR project: The planned alignment of Standard Gauge Railway (SGR) passes through the CBD of Dodoma City and crosses with the planned alignment of the Inner Ring Road twice. Depending on the possibility of design change of SGR project, shifting of SGR alignment into outside of the Inner Ring Road or harmonization of land use plan (including alignment of the Inner Ring Road) with SGR project should be considered. Moreover, the existing ground elevation at the project site is gradually increasing towards south and difference

in height at Segment (4') and Segment (3) would be at least 20-30 m. Considering that the maximum gradient of railway alignment would be maximum 0.5% and the SGR will be constructed with embankment structure, the elevation of SGR at the crossing with Segment (3) would be almost equal to the existing ground level. Therefore, the railway crossing at Segment (3) may need grade separation such as flyover or underpass.

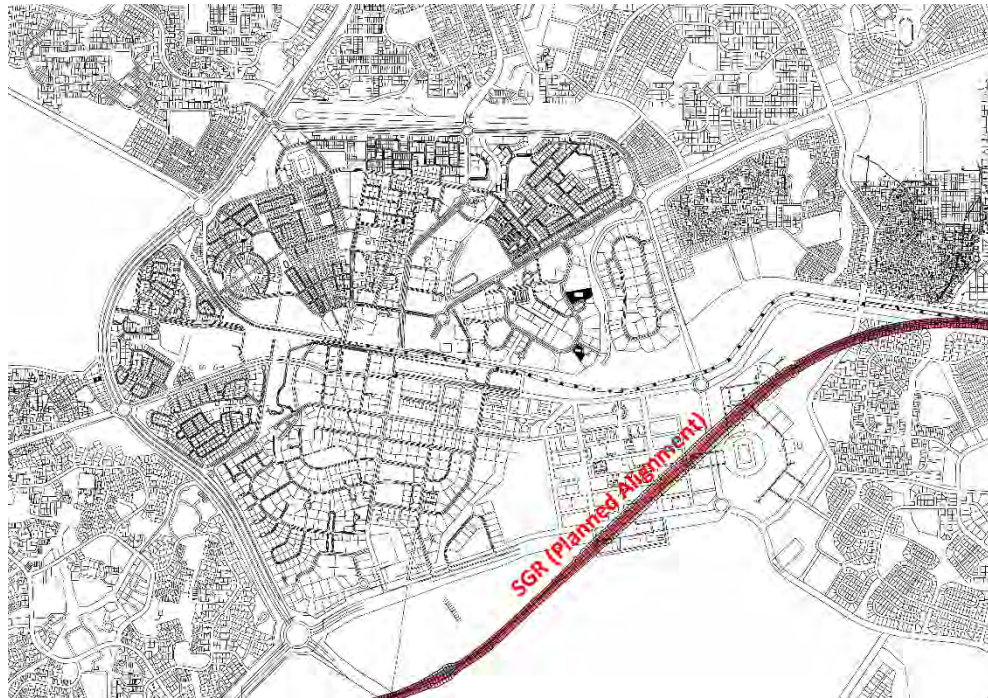


Figure 9.2.3 Superimposed Plan of Future Land Use and Proposed SGR Alignment

- River training along the seasonal channel: The Segment (4') will be constructed beside a seasonal channel. The channel is currently not protected and prone to be eroded by flash flood after heavy rain. Therefore, river training (slope protection) should be considered as a scope of the works of the Segment.



River training by World Bank's Project



Crossing Culverts under Dar es Salaam Road

Figure 9.2.4 Downstream of the Seasonal Channels of Segment (4')

9.3 Tentative Implementation Schedule

The Preparatory Survey (necessary for determination of the scope of the Project) would require 9 months including natural condition survey, outline design, cost estimate and natural/social environmental considerations. This survey period can be shortened if the basic data (such as the topographic survey data and geotechnical investigation result carried out by the feasibility study under TANROADS) would be provided to JICA Study Team.

	1	2	3	4	5	6	7	8	9
Review of Previous Studies									
Natural Condition Survey									
Traffic Demand Analysis									
Outline Design									
Construction Planning & Cost Estimate									
Natural & Social Environmental Considerations									
Discussion on Project Scope									
Report Preparation									
Inception Report									
Draft Final Report									
Final Report									

Source: JICA Study Team

Figure 9.3.1 Preparatory Survey Schedule

Assuming that the Project scope will be construction of 4-lane road at the 12 km-long section of the Segment (2), (3) and (4'), following the Preparatory Survey, the required project period after the Cabinet approval is estimated as 52 months including the detailed design and construction stages.

- E/N, G/A & Consultant Contract: 2 months
- Detailed Design: 4 months
- Procurement of Contractor: 4 months
- Construction Works: 42 months

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
E/N & G/A																																																				
Banking Arrangement																																																				
Consultant Contract																																																				
Verification																																																				
Issuance of A/P																																																				
Detailed Design																																																				
Detailed Design																																																				
Preparation of Tender Documents																																																				
Preparation for Tender																																																				
Tendering & Evaluation																																																				
Procurement / Construction Contract																																																				
Verification																																																				
Issuance of A/P																																																				
Construction																																																				
Mobilization and Preparatory Works																																																				
Road Works																																																				
Drainage Works																																																				
Bridge / Structural Works																																																				
River Training Works																																																				
Miscellaneous Works																																																				
Demobilization																																																				

Source: JICA Study Team

Figure 9.3.2 Implementation Schedule after Cabinet Approval

9.4 Relevance

In order to justify the relevance of implementing the Project under Japan's Grant Aid, it is necessary to evaluate the following points:

- Beneficial Effects of the Project
- Urgency of the Project
- Consistency with Medium to Long Term Development Programs of Tanzania
- Consistency with Japan's Development Cooperation Policy for Tanzania

Beneficial Effects of the Project

It is expected that the Project would derive the following beneficial effects:

- Decentralization of traffic flows by reinforcement of road network and connecting a missing link.
- Smoothing of traffic flow by widening of existing road (expansion of road capacity) whereas the significant traffic volume increase is expected.
- Improvement of living environment in city centre by eliminating heavy vehicle traffic.

Urgency of the Project

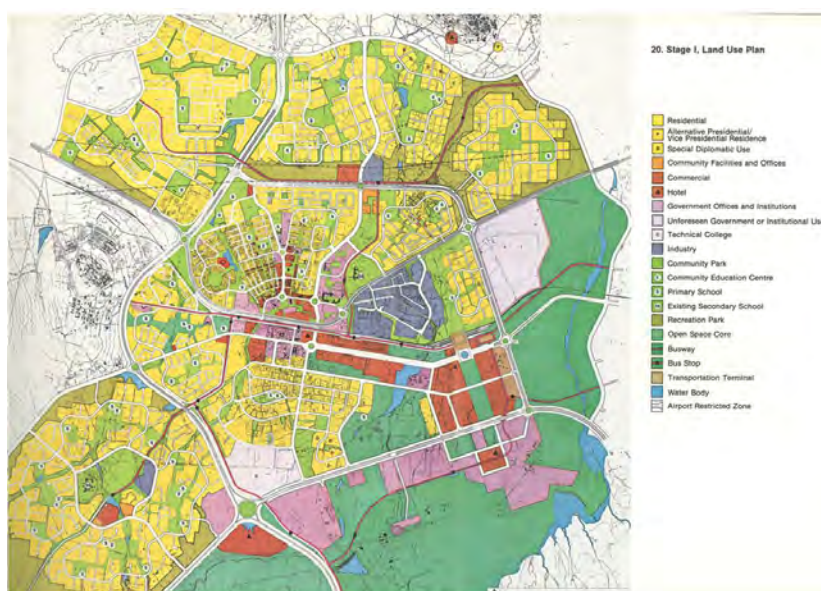
Because of the following reasons, the urgency of the Project is very high:

- Development of urban structure for diverting through-traffic into Outer Ring Road would take time and traffic congestion in city centre would be worse over the short/medium term. Thus, road network within city centre is necessary to be improved.
- Informal settlement is one of the biggest issues on urban development. The 2019 Master Plan emphasizes that importance of prevention of informal development and one of the solution is to demarcate boundary of development by road network development. Inner Ring Road will form a framework of urban structure of the city centre of Dodoma City whereas Dodoma City is expecting rapid urban growth in near future.

Consistency with Medium to Long Term Development Programs of Tanzania

Strengthening of strategic development corridors (such as the Central Corridor passing through the city centre of Dodoma City) and mitigation of traffic congestion in major cities (such as Dar es Salaam and Dodoma) are the important strategic plans under the Second National Five Year Development Plan (FYDP II) 2016/2017- 2020/2021. It is expected that the construction of the Inner Ring Road in Dodoma City will contribute to smoothen the traffic on the Central Corridor (through Dar es Salaam Road and Singida Road) and mitigate traffic congestion in city centre of Dodoma City. Therefore, this Project has strong consistency with the medium to long term national-level development plan of Tanzania.

Moreover, construction of Inner Ring Road was initially planned by 1976 Master Plan as an arterial road to form a framework of urban structure of the city centre in Dodoma City. Some part of the road sections have already been constructed but the construction of the missing link sections is long-awaited. Therefore, this Project also has strong consistency with the medium to long term development plan of Dodoma City.

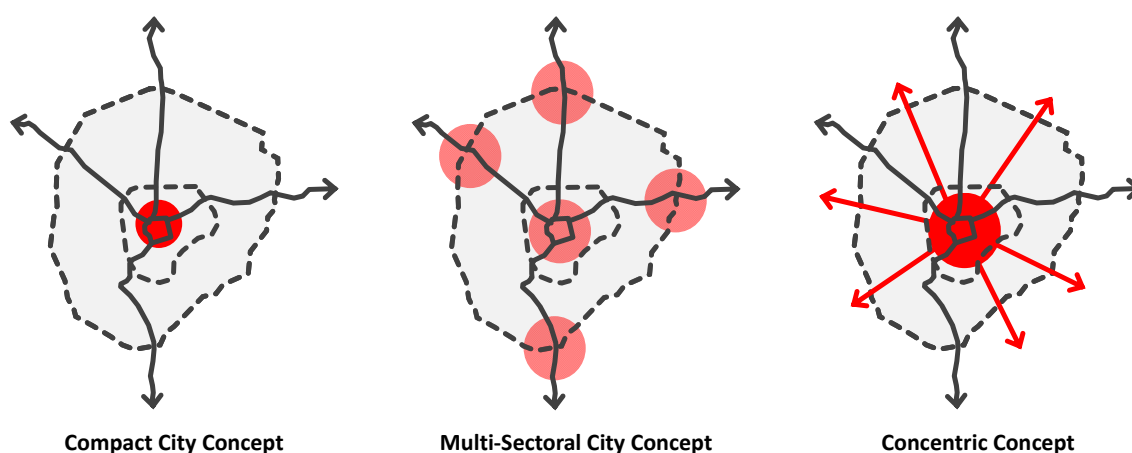


Source: 1976 Master Plan

Figure 9.4.1 Inner Ring Road Plan in 1976 Master Plan

The 2019 Master Plan proposes phased development where the Outer Ring Road will mark the boundary of city expansion within 20 years. The proposed three-layered ring roads and the existing four (4) radial arterial roads (Dar es Salaam Road, Arusha Road, Singida Road and Iringa Road) are essential elements in the designation of the various land uses and functions

The development concepts of 2019 Master Plan are i) compact city concept that presumes confinement of city development within the Inner Ring Road, ii) multi-sectoral city concept that assumes concentration of development in multi centres located at junction nodes of the Outer Ring Road and the four radial arterial roads, and iii) concentric concept that assumes development to radiate from the present CBD outward to the borders of the capital city district.



Compact City Concept

Multi-Sectoral City Concept

Concentric Concept

Source: In reference to 2019 Master Plan, JICA Study Team prepared.

Figure 9.4.2 Development Concepts of 2019 Master Plan

Considering the above, the expected functions or roles of the three-layered ring roads are as follows:

- Inner Ring Road: i) formulation of basic framework of urban structure in city centre, ii) diversion of through-traffic in the short and medium term and iii) decentralization of traffic within city centre.

- Middle and Outer Ring Roads: i) formulation of development boundaries for new urban developments and ii) diversion of through-traffic in the long-term.

Consistency with Japan's Development Cooperation Policy for Tanzania

In line with the national strategy of Tanzania to be a middle-income country, the Government of Japan has assisted Tanzania in creating and promoting a virtuous circle of comprehensive, sustainable and stable economic growth and poverty reduction. The three (3) priority areas of Japan's development cooperation are i) nurturing driving forces of economic growth, ii) infrastructure development conducive to economic and social development, and iii) improvement of governance and the public service delivery.

In order to facilitate the basis of the socio-economic development, the Government of Japan has supported basic infrastructure improvement in transportation and traffic as well as electricity and energy by employing Japan's high quality infrastructures, which were well emphasized in the Sixth Tokyo International Conference on African Development (TICAD VI). Regarding transportation and traffic, the improvement of arterial traffics and urban transportation is focused.

The requested Inner Ring Road in Dodoma City will be one of the most important roads in Dodoma City Development and therefore, the Project has a strong consistency with Japan's development cooperation policy for Tanzania.

9.5 Effectiveness

Effectiveness of the Project can be evaluated by quantitative and qualitative effects. The following are the possible indicators for the Project and the detailed target values will be determined after finalization of the scope of the Project.

Quantitative Effects

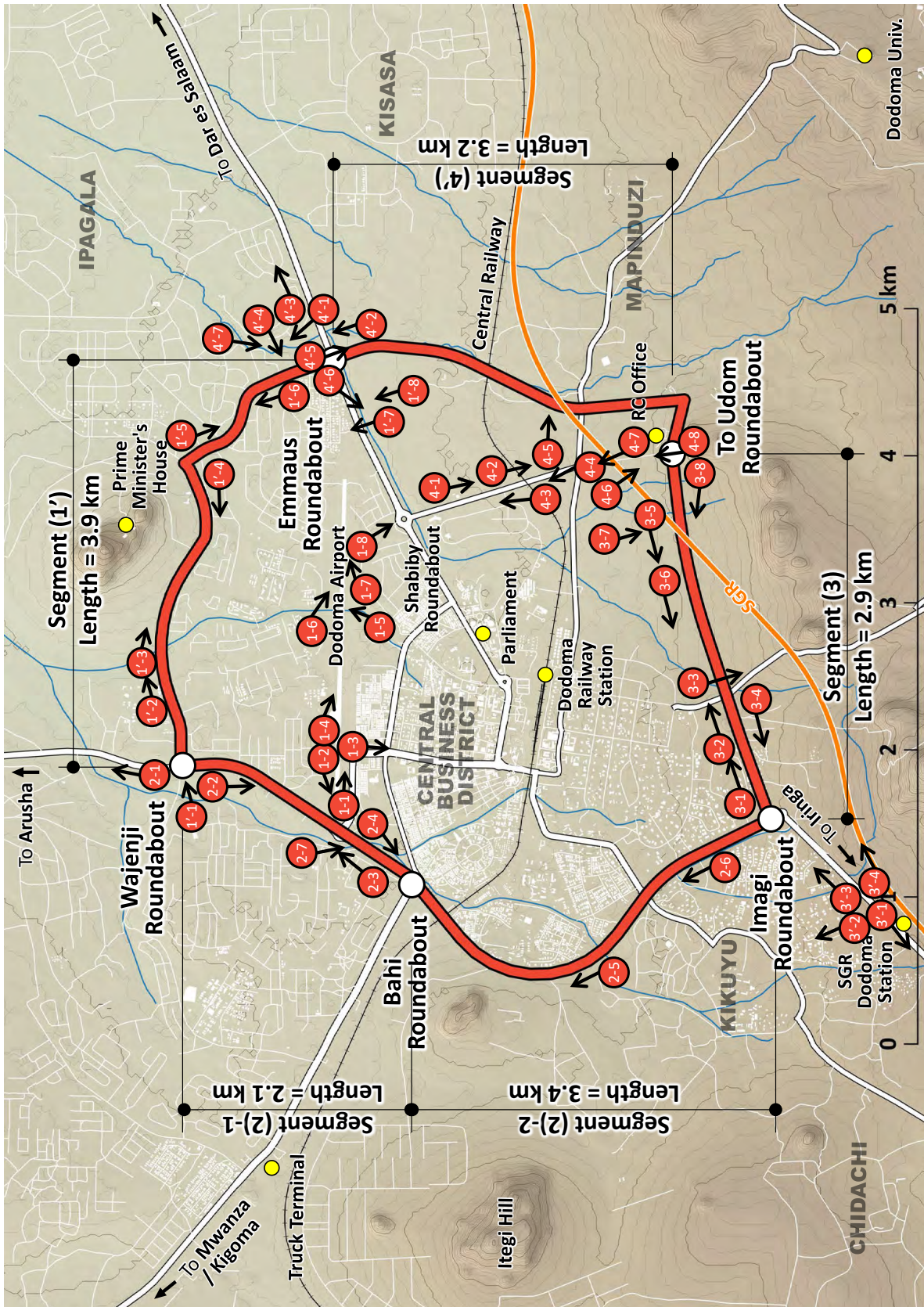
It is expected that the Project would derive the following quantitative effects:

- Reduction of travel time
- Mitigation of traffic congestion in city centre
- Elimination of heavy vehicle traffic from city centre
- Improvement of air quality/noise/vibration

Qualitative Effects

It is expected that the Project would derive the following qualitative effects:

- Navigating concentric urban development in city centre
- Improving quality of life in city centre
- Enhancing confidence between Tanzania and Japan



PROJECT LOCATION MAP

PHOTOS - SEGMENT (1)



(1)-1: 2-lane road (Trunk Road) beside Dodoma Airport



(1)-2: A open space between Dodoma Airport and 2-lane road



(1)-3: 4-lane road connecting from the south of the airport towards city centre



(1)-4: The fence on the boundary of Dodoma Airport



(1)-5: Stream passing through the land of the airport



(1)-6: Empty space inside of the land of the airport



(1)-7: Church/school located in the south of the airport



(1)-8: Vacant space in the south of the airport towards Shabiby Roundabout

PHOTOS - SEGMENT (2)



(2)-1: Arusha Road (direction towards Arusha)



(2)-2: Arusha Road (direction towards city centre)



(2)-3: Arusha Road (between Airport Roundabout and Bahi Roundabout)



(2)-4: Arusha Road (between Airport Roundabout and Bahi Roundabout)



(2)-5: Iringa Road (between Bahi Roundabout and Imagi Roundabout)



(2)-6 Iringa Road (between Bahi Roundabout and Imagi Roundabout)



(2)-7: Truck parking beside Arusha Road (between Airport Roundabout and Bahi Roundabout)

PHOTOS - SEGMENT (3)



(3)-1: Manhole of water pipe buried along Segment (3)



(3)-2: Existing local road along Segment (3) towards Regional Commissioner's Office



(3)-3: Local community along Segment (3)



(3)-4: Existing local road along Segment (3) towards Imagi Roundabout



(3)-5: Undeveloped area along Segment (3)



(3)-6: Electric cable installed along Segment (3)



(3)-7: Water pipe installed along Segment (3)



(3)-8: View from Proposed To Udom Roundabout towards Bahi Roundabout

PHOTOS - SEGMENT (4)



(4)-1: 4-lane road construction works under TANROADS



(4)-2: 4-lane road construction works under TANROADS



(4)-3: 4-lane road construction works under TANROADS



(4)-4: 4-lane road construction works under TANROADS



(4)-5: Kikuyu Avenue (direction towards Dodoma Univ.)



(4)-6: Earth road along Segment (4) (direction towards Regional Commissioner's Office)



(4)-7: Earth road along Segment (4) (direction towards Kikuyu Avenue)



(4)-8: View from Proposed To Udom Roundabout towards Shabiby Roundabout

PHOTOS - SEGMENT (1')



(1')-1: Wajenji Intersection (10t restriction)



(1')-2: Segment (1')



(1')-3: Manhole of sewage



(1')-4: Segment (1') and residences



(1')-5: Segment (1') under construction by TARURA



(1')-6: Segment (1') under construction by TARURA



(1')-7: Segment (1') and planned community area



(1')-8: Emmaus Intersection proposed to be a roundabout

PHOTOS - SEGMENT (3')



(3')-1: Iringa Road (direction towards Iringa)



(3')-2: Local road towards St. John's Univ.



(3')-3: Iringa Road (direction towards city centre)



(3')-4: Surrounding area of Segment (3')

PHOTOS - SEGMENT (4')



(4')-1: Seasonal channel crossing Dar es Salaam Road



(4')-2: Culverts crossing under Dar es Salaam Road



(4')-3: Dar es Salaam Road (direction towards Dar es Salaam)



(4')-4: Dar es Salaam Road (direction towards city centre)



(4')-5: Surrounding area of Segment (4')



(4')-6: Seasonal channel along Dar e Salaam Road



(4')-7: Seasonal channel and local community along Segment (4')