

The United Republic of Tanzania
Ministry of Works, Transport and Communication
(MoWTC)

**THE PREPARATORY SURVEY REPORT
ON
THE PROJECT FOR CONSTRUCTION
OF
DODOMA CITY INNER RING ROAD
IN
THE UNITED REPUBLIC OF TANZANIA**

February 2021

**JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)**

**INGEROSEC CORPORATION
KATAHIRA & ENGINEERS INTERNATIONAL
METROPOLITAN EXPRESSWAY COMPANY LIMITED**

IM
JR
21-021

PREFACE

Japan International Cooperation Agency (JICA) decided to conduct the preparatory survey on the project for construction of Dodoma City Inner Ring Road in Dodoma in the United Republic of Tanzania and organized a survey team from November 2019 to February 2021.

The survey team finalized this report to present the results of a series of discussions with the officials of the Government of Tanzania, a field investigation in Tanzania and further studies in Japan.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of the United Republic of Tanzania for their close cooperation and hospitality extended to the survey team.

February 2021

Kiyoshi Amada
Director General,
Infrastructure Management Department.
Japan International Cooperation Agency

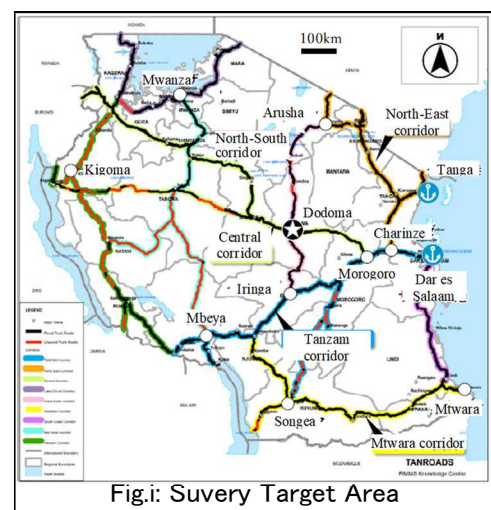
SUMMARY

1. Country overview

The United Republic of Tanzania (hereafter Tanzania) is located in the central part of the East Africa and faces the Indian Ocean. The population is estimated to be approximately 56.32 million (2018, World Bank), and the annual average population growth rate is 3%. The total land area is about 945,000 km² with a plateau that stretches inland at an altitude of 1,000 to 2,000 m and Mt. Kilimanjaro (5,895 m) that rises in the north. Tanzania is adjacent to Kenya and Uganda in the north, Rwanda and Burundi in the west, Zambia, Malawi and Mozambique in the south, and thus occupies an important route of transports goods to landlocked countries (Uganda, Rwanda, Burundi, Zambia, Malawi) that do not have a sea port. The climate of the Indian Ocean coast of Tanzania is hot and humid, which is characteristic of the coastal region, and has a major rainy season from March to May and a minor rainy season from November to December. On the other hand, the temperatures in Dodoma City, which is the target of this study and is located on the inland plateau, has high temperatures of over 30°C during the day from October to November, but high temperatures of about 26°C during the day and low temperatures below 20°C at night in other months (as low as 11°C from July to August). The average annual rainfall is relatively low at 500 to 1000 mm, but the rainfall is concentrated during the rainy season from December to April, and there is almost no rainfall during the half year from May to November. Tanzania had been promoting socialist economic policies since its independence in 1961, but the economy fell into a crisis in the 1980s due to the effects of the oil crisis and drought. In order to improve this situation, economic reforms have been carried out with the support of the World Bank and the International Monetary Fund since 1986, and the GDP growth rate has been around 6-7% since 2012 and 5.4% in 2018 (World Bank). The GNI per capita has also improved steadily from \$210 in 1997 to \$1,020 in 2018. Major industries are agriculture, forestry and fisheries (28% of GDP), mining, manufacturing and construction (27% of GDP) and service industry (37% of GDP) (2018 data, Ministry of Foreign Affairs of Japan).

2. Project background, circumstances and outline

Tanzania plans to transfer the government function to Dodoma city, which is about 400 km inland from the coastal area (transfer completed in June 2020), and a significant increase in the Dodoma city population and need for large scale development of infrastructure are expected (2012: approximately 410,000 → 2039: approximately 1.7 million, Dodoma National Capital City Master Plan 2019–2039 (hereinafter 2019 M/P)) and has led to a need for large-scale infrastructure development in the city. In particular, most of the road network in Dodoma City is unpaved and requires urgent maintenance.



Furthermore, the national development plan of the road sector is also included as a strategic action plan for the achievement of the Second Five-Year Plan (FY2015/2016–FY2020/2021, hereinafter ``FYDP2").

The target is to improve the pavement ratio of roads nationwide from 6.8% to 10%, and the strengthening of the economic growth corridor, the central corridor that branches from the coastal Dar es Salaam Port through Dodoma City to Uganda, Democratic Republic of the Congo, Rwanda, and Burundi is mentioned as a specific development policy. The corridor accounts for most of the country's intercity traffic demand and needs to be strengthened in preparation for future increase in passenger and freight demand. Dodoma City is located at the centre of national transport where the central corridor and the north-south corridor that connects the southern and northern parts of East Africa intersect. From the perspective of strengthening future growth of these economic corridors, as well as the relocation of the government, there is an urgent need to strengthen road infrastructure in preparation for future increases in passenger and cargo demand. To address these issues, the Dodoma City Urban Development M/P, which was formulated in the past, is being reviewed and the new master plan (2019 M/P) being considered includes a new land use plan and priority road development projects, such as three layers of ring road (inner, middle and outer). The inner ring road that occupies one section of this survey is supposed to be developed as 1 project consisting of 4 sections (sections 1 to 4). Currently, most of the large vehicles travelling on the central corridor in the east-west direction pass through the centre of the city where houses, commercial and business facilities are located, and this is resulting in a deterioration of the living environment due to air pollution, noise, etc. and hindering the smooth flow of traffic. Improvement of the inner ring road is considered an urgent task to improve the current situation by rerouting heavy vehicle traffic away from the city centre. Under these circumstances, the Government of Tanzania requested Japan to provide a grant aid project.

Japan International Cooperation Agency (JICA) conducted a data collection survey on the road sector of Dodoma City, Tanzania from December 2018 to March 2019, (hereinafter “JICA confirmation survey”) and confirmed the present status of road development plans in Dodoma City and possibility of Japan's cooperation (mainly grant aid). In the JICA confirmation survey, discussions were made on the initial request of Tanzania to convert the inner ring road of length 14.9 km into

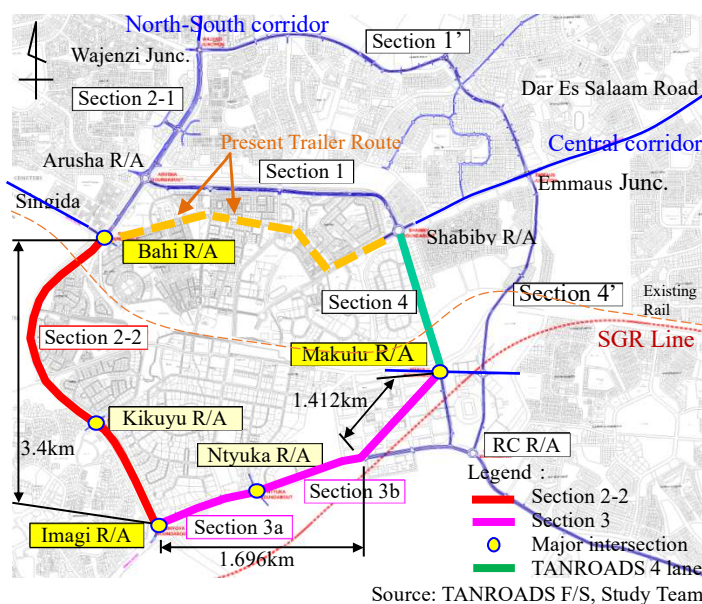


Fig.ii: Scope of the Project

4 lanes and both parties agreed on the scope of grant aid to be construction of a 2-lane road with a total length of 6.3 km for sections 2-2 (3.4 km) and 3 (2.9 km) based on ① urgency, ② business effect, ③ consistency with 2019M/P, and ④ the environmental and social aspects. In order to improve the above situation, the “Preparatory Survey on the Project for Construction of Dodoma City Ring Road” (hereinafter “This Survey”) will investigate the addition of a 2-lane road beside the existing 2-lane road

in section 2-2, which is part of the inner ring road of Dodoma City, and new construction of a 2-lane road in section 3. This development is positioned as an indispensable and high-priority project for the realization of FYDP2 and the government function transfer plan of the country because it aims to smooth traffic flow in the city and improve the city living environment. Based on the above, the purpose of This Survey is to confirm the necessity and validity of the requested project, to make an appropriate outline design as grant aid, to formulate a project plan and estimate the outline project cost.

3. Outline of survey results and project contents

(1) Survey schedule

JICA dispatched the study team from 10th November to 22nd December 2019 and from 23rd February to 12th March 2020. The Survey Team conducted discussions with government officials of Tanzania, conducted a field survey in the planned area, and confirming the necessity and urgency of rehabilitation of the requested section, such as the current status of the section and progress of related plans. From 19th to 29th January 2021, in consideration of the restrictions on movement caused by the new corona pneumonia (COVID-19) in many countries around the world, JICA conducted a web conference using the Internet to explain the contents of the draft report by the JICA survey team to the relevant organizations in Tanzania, obtained their understanding of the contents of the draft report, and concluded minutes of discussions with Tanzania.

(2) Summary of survey results and project contents

In the first field survey, the team surveyed the Section 2-2 (3.4 km) area including the existing 2-lane paved road and the Section 3 (2.9 km) area for construction of a new 2-lane road near an existing earth road, a total area of 6.3 km, and considered the F/S survey and outline design conducted by the Tanzania side in May 2019. It should be noted that about 1 km at the end of Section 3 was changed from the original road alignment requested by the Tanzania side, so an additional survey was conducted on the new route and the final 6.515 km target section of the project (section 2-2 = 3.401 km and section 3 = 3.114 km) was confirmed.

Table i: Outline of plan

Item	Unit	Description		Remarks
Target road section	km	Approx. 6.5km, Start: Bahi Roundabout (R/A) – Imagi R/A – Makulu R/A		Section 2-2: Bahi-Imagi Section 3: Imagi-Makulu
Design Speed	km/hr	Section 2-2	Section 3	Section 2-2= Trunk road, Section 3= Urban road
		80	60	
Carriageway Lane width	m	3.50	3.25	2 lanes (partially one way)
Service road width	m	5.0	5.0	Including footpath
Shoulder width	m	1.0 to 2.0	1.0 to 2.0	Refer standard cross section
Median width	m	14.0	-	Secure land only
Cross fall	%	2.5	2.5	Shoulder also same slope
Max.	%	4	5	

longitudinal slope				
Min. curve radius	m	300	150	
Right of way width	m	60	60 (Part 40m)	40m for Section 3a
Pavement type	Carriageway	Wearing/ Binder: AC Base: DBM40 Sub Base: C1		Refer to related clause
	Service road	Wearing: AC Base: Crushed material (CRS) Sub Base: G45		Ditto
	Bus Stop	Concrete		Ditto
Pavement design life	Year	20		
Return periods for drainage	Year	Major culvert: 25, Minor culvert: 10, Side drain: 5		
Drainage structures		Concrete culvert (box, pipe), U type ditch, etc.		
Incidental structure	—	Kerb, concrete retaining wall, protective fence, road sign & marking, reflective stud, street light, etc.		
Embankment slopes	Less than 1.0 m	1:4		
	1.0 to 3.0	1:2		
	Greater than 3.0	1:1.5		
Excavation slopes	Hard Rock : 1:1 ~ 4:1			
	Decomposed rock and compacted soils : 1:1 ~ 1:2			
	Ordinary soils : 1:1.2~1.5			

Source: Study Team

4. Project construction period and approximate project cost

As a result of the above survey, the construction period is estimated to be 5 months for detailed design, 5.5 months for tendering and 22 months for construction work for implementing this project with Japan's Grant Aid scheme and the costs will be determined before concluding the Exchange of Note for the project.

5. Project evaluation

(1) Relevance of project implementation

The implementation of this project will contribute to the urban development of Dodoma City and to improving the convenience for residents living in the target area, as well as improving the convenience of the east-west and north-south Africa highway network where the target road is located. Therefore, it is significant to implement the project with the grant aid of Japan. In addition, the rapid improvement of the target section is expected to significantly reduce the passage of large vehicles in the city centre. It should be noted that in order to make these achievements function in the long term, maintenance after the completion of the facility can be sufficiently dealt with by the implementing agency in Tanzania considering their past achievements and future efforts.

(2) Effectiveness of project implementation

By implementing this project, the road conditions in the target section will be improved and safe and smooth flow of traffic will be secured. Therefore, it is expected that there will be a great benefit to the residents of Dodoma City and the users who pass through the logistics trunk route. The expected effects of implementing this matter are shown below.

1) Quantitative effect

Table ii: Quantitative effects

Index name	Base value (Actual value in 2019)	Target value (2026) [3 years after project completion]
Number of large vehicles in the city center (units/day)	14,459 Nos.	8,675 Nos. (-40%)
Number of passengers (person/year)	11,200,000	21,100,000
Cargo volume (tonne/year)	4,210,000	7,920,000

Note: The quantity study method for each of the above items is as follows.

Source: Survey team

- > Number of large vehicles = 2109 and 2026 estimates based on the results of the traffic volume survey for the city center route, with and without the installation of a detour.
- > Number of passengers = Based on the traffic volume survey for Section 2-2, with a number of passengers for Sedan=2 people, tricycles=2, bus=20, motorcycle=1, and estimated the growth rate at 6.5%.
- > Cargo volume = Based on the traffic volume survey and the axle weight survey for Section 2-2, and set the loading capacity by vehicle type and estimated the growth rate at 6.5%.
- > Large vehicle=Type 5~9 of table 18 of page 1-21.

2) Qualitative effect

- ① Improvement of smooth traffic flow in Dodoma city
- ② Improvement of living environment by reducing noise, vibration, etc. in Dodoma city by detouring large vehicle traffic.
- ③ Contribute to the smooth distribution and economic development of Tanzania by reducing transportation costs by facilitating intercity transportation.
- ④ Contribution to reducing traffic accidents by improving the safety and smoothness of night traffic by installing street lights and reflective studs.

Index

Preface

Summary

Table of contents

Location map / conceptual drawing / photos

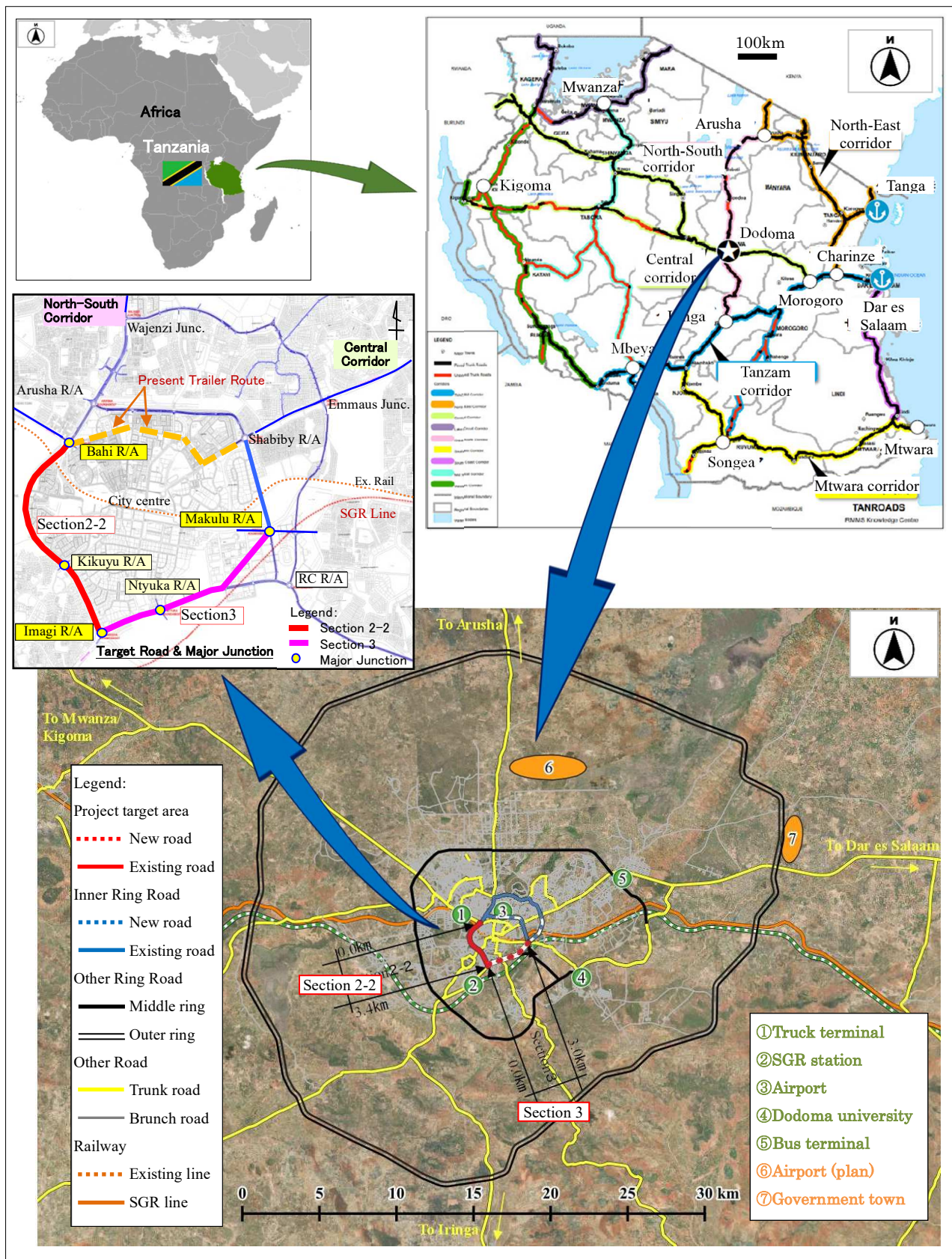
List of Figures & Tables

Abbreviations

Chapter 1. Background and status of the Project.....	1-1
1-1 Current status and issues of the sector.....	1-1
1-1-1 Current situation and issues.....	1-1
1-1-2 Development Plan of the target area.....	1-2
1-1-3 Socio-economic status.....	1-6
1-2 Background and outline of the grant aid request.....	1-6
1-3 Project site and surroundings.....	1-9
1-3-1 Status of related infrastructure development.....	1-9
1-3-2 Natural conditions.....	1-23
1-4 Environmental and social considerations.....	1-24
Chapter 2. Contents of the Project.....	2-1
2-1 Outline of the Project.....	2-1
2-2 The Project Outline Design.....	2-1
2-2-1 Design policy.....	2-1
2-2-2 Basic plan.....	2-2
2-2-3 Outline Design Drawing.....	2-34
2-2-4 Implementation/Procurement Plan.....	2-34
2-3 Obligations of Recipient Country.....	2-44
2-3-1 General Items in the Government of Japan's Grant Aid Scheme.....	2-44
2-3-2 Specific requirements for the project.....	2-44
2-4 Project Operation and Maintenance Plan.....	2-46
2-5 Project Cost Estimation.....	2-47
2-5-1 Initial Cost Estimation.....	2-47
2-5-2 Operation and Maintenance Cost.....	2-47
Chapter 3. Project Evaluation.....	3-1
3-1 Conditions for project implementation.....	3-1
3-2 Counterpart Inputs (Burdens) Necessary to Achieve the Overall Project Plan.....	3-1
3-3 External conditions for achieving the overall plan of the project.....	3-1
3-4 Project evaluation.....	3-2
3-4-1 Relevance.....	3-2
3-4-2 Effectiveness of project implementation.....	3-2

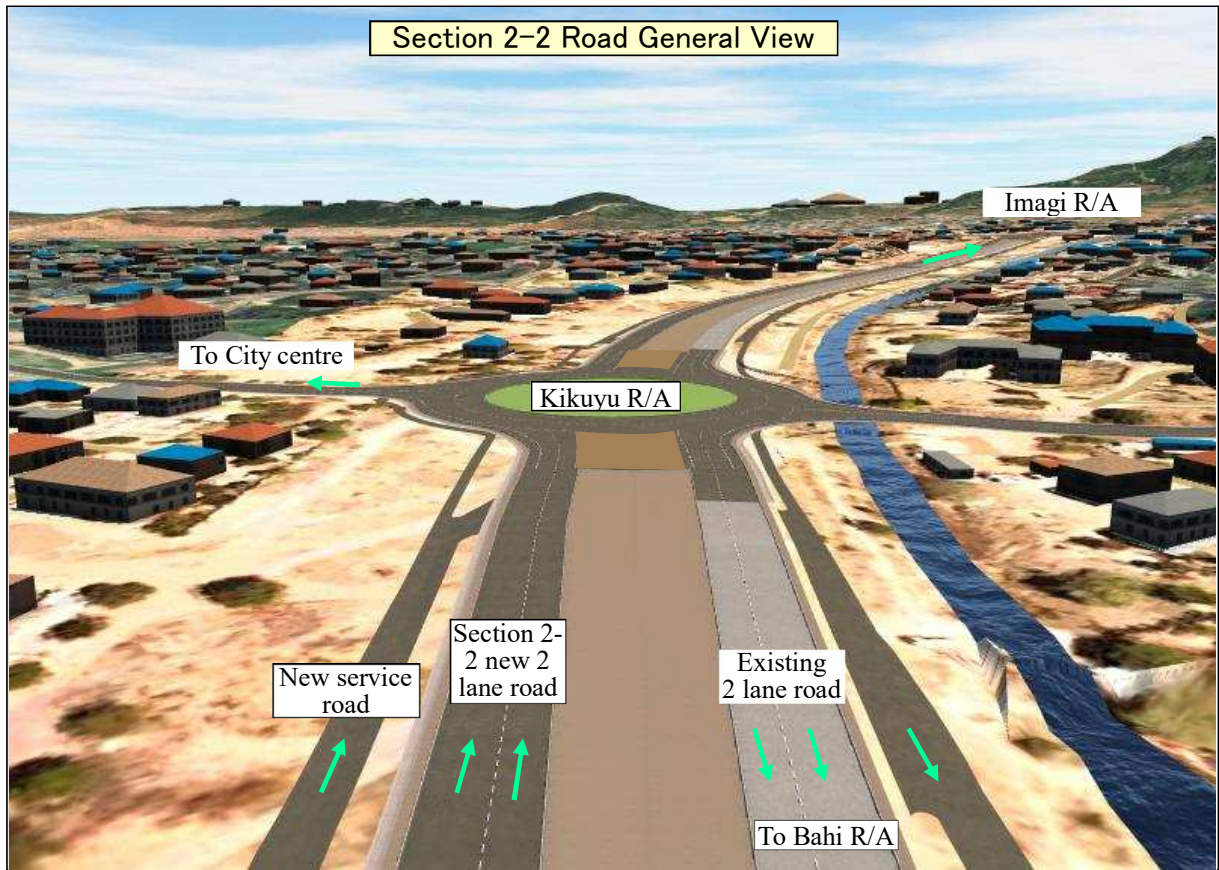
[APPENDICES]

1. Member List of the Survey Team.....	A-2
2. Survey Schedule.....	A-3
3. List of Parties Concerned in the Recipient Country	A-5
4. Minutes of Discussion (M/D) for 1st and 2nd site survey.....	A-7
5. Technical Note for the Project.....	A-80
6. Meeting attendants list for 5th/Mar./2020 at TANRAODS Dodoma office.....	A-82
7. Environmental Monitoring Form and Environmental Checklist	A-83
8. Other Documents (Outline Design Drawings)	A-92

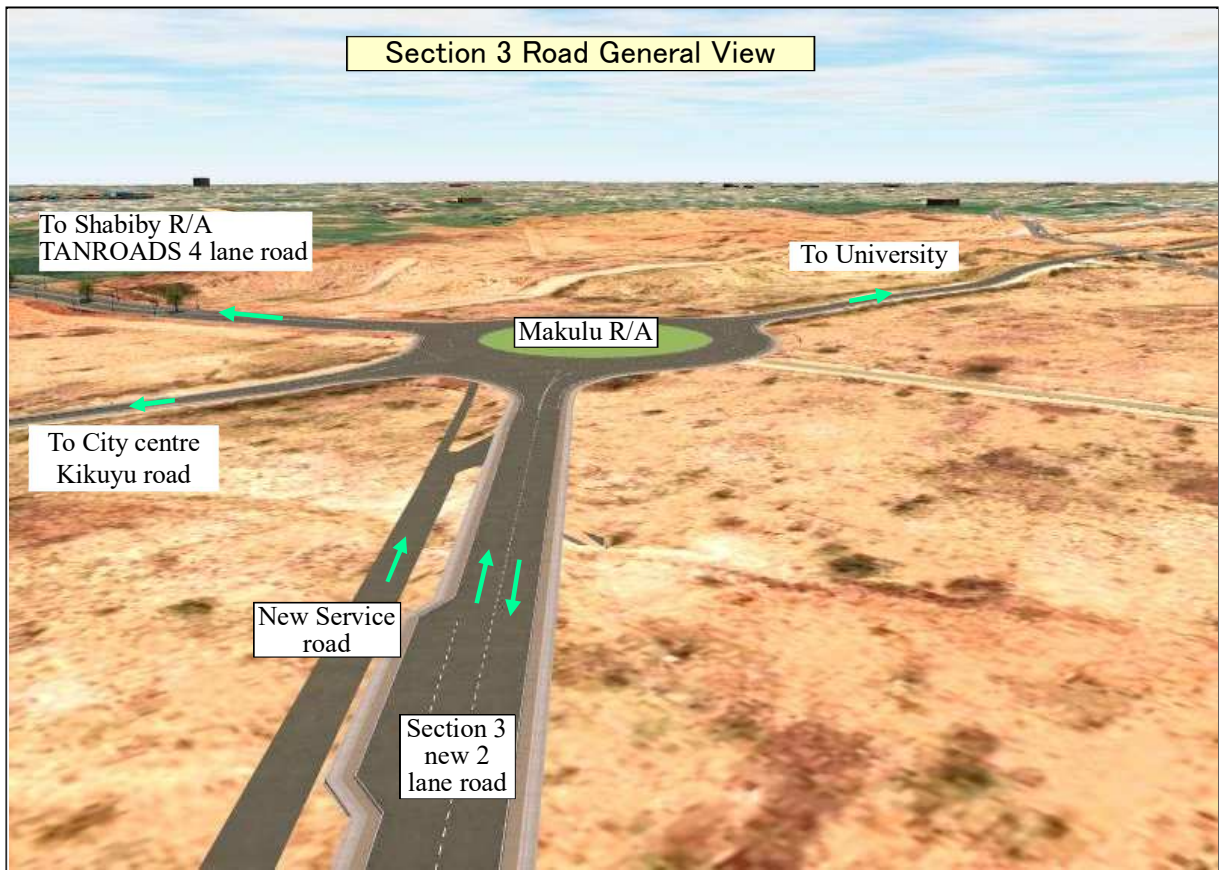


Source: Survey Team

Location Map for the Project Road Section



Note: R/A= Roundabout type intersection



Project Completion Image

List of Figures & Tables

Fig.i: Suvery Target Area.....	ii
Fig.ii: Scope of the Project.....	iii
Fig.1: Urban Development M/P(2019-2039).....	1-2
Fig.2: Priority 5 road development project	1-3
Fig.3: Location map for F/S target roads	1-3
Fig.4: Outer Ring Road North Section.....	1-4
Fig.5: Overview of SGR plan	1-5
Fig.6: Request of Tanzania Government and scope of this survey	1-7
Fig.7: New route plan & surrounding Facilitie	1-7
Fig.8: Project Scope	1-8
Fig.9: F/S Inner Ring Road Plan and Project section.....	1-9
Fig.10: Natural streams crossing section 3b road	1-16
Fig.11: Traffic volume survey location.....	1-17
Fig.12: Traffic volume survey results (both direction daily traffic volume).....	1-18
Fig.13: Traffic volume survey at Survey Point 2 (present large vehicle route)	1-18
Fig.14: Traffic volume survey at Survey Point 4 (on Section 2-2)	1-19
Fig.15: Travel route for travel time.....	1-20
Fig.16: Travel time by travel route and time zone	1-20
Fig.17: Existing Bus Stops.....	1-22
Fig.18: Rain fall and high/low temperature	1-23
Fig.19: Earthquake occurrence	1-23
Fig.20: NEMC Organization Chart.....	1-29
Fig.21: EIA approval process.....	1-31
Fig.22: Implementation and monitoring system of EMP at Construction/operation stage	1-58
Fig.23: Status of existing houses in the road right-of-way (Section 3a)	1-65
Fig.24: Scope and Scale of Plan.....	2-3
Fig.25: Longitudinal section of Section 2-2 and Section 3	2-4
Fig.26: Traffic transition of Bahia R/A & intersection type judgment area.....	2-12
Fig.27: Standard road cross section (Section 2 and 3)	2-13
Fig.28: Selection of junction type	2-14
Fig.29: Service road width arrangement.....	2-15
Fig.30: Service road layout plan	2-15
Fig.31: Traffic volume of large vehicles expected to pass the target road.....	2-16
Fig.32: Results of trial excavation of existing 2-lane paved road in Section 2-2.....	2-19
Fig.33: Field bearing test results (CBR values for Section 2-2 and Section 3).....	2-19
Fig.34: Area of unsuitable soil.....	2-20
Fig.35: Section 2-2 CBR value for each depth	2-20

Fig.36: Section 3 CBR value for each depth.....	2-21
Fig.37: Pavement structure	2-23
Fig.38: Dodoma rain fall and temperatures.....	2-24
Fig.39: Dodoma City drainage system.....	2-24
Fig.40: Drainage system around the target road	2-24
Fig.41: Rainwater inflow from the hill area of section 3	2-26
Fig.42: Annual daily max. rainfall (mm/day)	2-27
Fig.43: Catchment area and major rivers in the study area.....	2-29
Fig.44: Riverbed protection example.....	2-31
Fig.45: Culvert's plan including riverbed protection (draft)	2-32
Fig.46: Protection facilities.....	2-32
Fig.47: Reflective stud.....	2-32
Fig.48: Bus stop image	2-33
Fig.49: Location map of base camp yard candidate site	2-42
Table i: Outline of plan.....	iv
Table ii: Quantitative effects.....	vi
Table 1: Organizations related to highway administration	1-1
Table 2: Road conditions of main roads and local roads	1-1
Table 3: Roles of MoWTC and TANROADS	1-2
Table 4: Assumed road projects.....	1-4
Table 5: Related TANROADS road projects.....	1-4
Table 6: Outline of Inner Road Plan	1-9
Table 7: Existing road outline (Section 2-2).....	1-10
Table 8: Existing paved road Survey (Section 2-2)	1-10
Table 9: Existing road outline (Section 3a).....	1-11
Table 10: Existing road outline (Section 3b)	1-11
Table 11: Existing road outline (Section 4a, b).....	1-12
Table 12: Status of major Junctions (Section 2-2).....	1-12
Table 13: Status of major Junctions (Section 3)	1-12
Table 14: Existing Access Road and Entrance Status (Section 2-2).....	1-13
Table 15: Existing Access Road and Entrance Status (Section 3)	1-14
Table 16: Schedule of passenger trains to / from Dodoma and related facilities	1-14
Table 17: Traffic flow survey items and methods.....	1-16
Table 18: Vehicle classification for traffic volume survey	1-17
Table 19: Travel route for travel time survey	1-20
Table 20: Field trial pit excavation	1-22
Table 21: Public facilities within the ROW	1-22
Table 22: Work volume of various surveys	1-24

Table 23: Overview of the project	1-25
Table 24: Changes in the population of Dodoma.....	1-26
Table 25: Related organizations of this project and their roles.....	1-28
Table 26: Tanzania's environmental impact assessment-related policies and legal systems	1-29
Table 27: Ambient air quality standards.....	1-30
Table 28: Air quality emission limits.....	1-30
Table 29: Comparison of JICA Environmental and Social Consideration Guidelines with Tanzania's Environmental Consideration Policy	1-33
Table 30: EIA license acquisition schedule (draft).....	1-38
Table 31: Comparison of Alternative Options.....	1-38
Table 32: Provisional Environmental Scoping	1-39
Table 33: TOR for Environmental and Social Consideration.....	1-42
Table 34: Survey results of environmental and social considerations	1-44
Table 35: Impact assessment.....	1-45
Table 36: Mitigation measures.....	1-50
Table 37: Environmental management / monitoring plan (draft).....	1-52
Table 38: Targets of stakeholder meetings	1-58
Table 39: Comments and views from stakeholder representatives	1-59
Table 40: Overview of stakeholder meetings for residents.....	1-59
Table 41: Comments at stakeholder meetings for residents.....	1-60
Table 42: Outline of local residents consultation (public consultation).....	1-61
Table 43: Comments and Response during the Consultative Meeting from Residents	1-62
Table 44: Policies and legal systems of land acquisition and involuntary resettlement.....	1-66
Table 45: Compensation content.....	1-68
Table 46: Comparison between JICA guidelines & legal system for resettlement in Tanzania ...	1-71
Table 47: Overview of reacquisition price.....	1-78
Table 48: Number of Project Affected Units (PAUs) and Affected Persons (APs).....	1-78
Table 49: Overview of land acquisition and resident relocation.....	1-79
Table 50: Entitlement Matrix for the Dodoma Inner Ring Road	1-81
Table 51: Committees and Responsibilities for RAP implementation.....	1-87
Table 52: Breakdown of ARAP cost.....	1-88
Table 53: Road Design Parameter	2-5
Table 54: Adopted design standards	2-6
Table 55: Traffic volume survey results (PCU conversion)	2-6
Table 56: Demand forecast scenario settings and network diagram.....	2-8
Table 57: Road network specifications in demand forecast.....	2-9
Table 58: Vehicle classification and sedan car conversion factor (PCU) in demand forecast.....	2-10
Table 59: Demand forecast results.....	2-10
Table 60: Intersection type in the target section	2-14

Table 61: Traffic volume on Section 2-2 and Dar es Salaam Road.....	2-17
Table 62: Standard axis conversion values (VEF).....	2-18
Table 63: Material type of each pavement layer.....	2-20
Table 64: Criteria for unsuitable soil.....	2-21
Table 65: Comparative examination of unsuitable soil countermeasure works.....	2-21
Table 66: Examination of pavement structure (section 2-2).....	2-23
Table 67: Examination of pavement structure (section 3).....	2-23
Table 68: Existing drainage facilities.....	2-25
Table 69: Rainfall return periods by drainage facility.....	2-27
Table 70: Annual maximum daily rainfall for each probability year.....	2-27
Table 71: Catchment area of Sections 2-2 and 3 and design runoff.....	2-29
Table 72: Flow capacity of existing drainage facilities.....	2-30
Table 73: Drainage facility plan.....	2-30
Table 74: Outline of Road Drainage Facility Plan.....	2-31
Table 75: List of Basic design drawing.....	2-34
Table 76: Personnel and roles for the implementation design and tender stage.....	2-37
Table 77: Construction supervision personnel and roles.....	2-37
Table 78: Lists of items of quality control.....	2-38
Table 79: Procurement of Main Material.....	2-39
Table 80: Main Works Machinery Procurement Sources.....	2-40
Table 81: Candidate borrow pit, quarry, disposal area and distance to the project site.....	2-41
Table 82: Work implementation schedule (draft).....	2-43
Table 83: Outline of the Scope of Works on the Tanzanian Side.....	2-45
Table 84: Main maintenance Items and Costs.....	2-48
Table 85: Quantitative effects.....	3-3

Abbreviations

<u>Abbreviation</u>	<u>Official name (English)</u>
AASHTO	American Standard of State Highway and Transportaion Officials
AfDB	African Development Bank
BS	British Standard
CBR	California Bearing Ration
CRB	Contractor Registration Board
DBST	Double Bituminous Surface Treatment
DCC	Dodoma City Council
DCP	Dynamic Cone Penetration
EIA	Environmental Impact Assessment
E/N	Exchange of Note
EMP	Environmental Management Plan
ERB	Engineer Registration Board
EU	European Union
G/A	Grant Agreement
GNI	Gross National Income
GDP	Gross Domestic Product
GNP	Gross National Product
GOT	Government of Tanzania
JICA	Japan International Cooperation Agency
M/D	Minutes of Discussion
MoWTC	Ministry of Works, Transport and Comunication
MoWT	Ministry of Works, Transport
NEMC	National Environmental Management Council
NSGRP	National Strategy for Growth and Reduction of Poverty
RAP	Resettlement Action Plan
RC	Reinforced Concrete
ROW	Right of Way
SADC	Southern African Development Community
SATCC	Southern African Transport and Communications Commission
SBST	Single Bituminous Surface Treatment
TANROADS	Tanzania National Roads Agency
TLC	Traffic Load Class
Tshs	Tanzania Shillings

Chapter 1 Background and status of the project

Chapter 1 Background and status of the project

1-1 Current status and issues of the sector

1-1-1 Current situation and issues

(1) Current state of road administration

3 organizations related to trunk road administration in Tanzania are the Ministry of Public Works and Transport (MoWTC), the Tanzania National Roads Agency (TANROADS), and the Road Fund Board. Below are the outlines of 3 organizations: The project implementing agency is TANROADS.

Table 1: Organizations related to highway administration

Organization	Establish	Role and responsibility	Remarks
Ministry of Works, Transport and Communication, MoWTC	Name changed from Ministry of Works in 2016 (change to MoWT in Nov./2020)	Road and rail policy decision making and maintenance, especially policy formulation, strategic planning, personnel development, issuance of standards	Supervision of TANROADS, supervision of construction corporation/electric machinery corporation, management of highway projects under the direct control of the government of Tanzania
TANROADS	July 2000	Efficient development and maintenance of trunk and regional highways under the supervision of MoWTC	Development and maintenance of trunk and regional highways
Road Fund Board	December 1998	Petrol related tax, collection of fees from road users, usage monitoring of road fund	Fund allocation for road infrastructure development to MoWTC, TANROADS, Ministry of Local Government, etc.

Source: TANROADS

(2) Road situation and issues

The total length of the road network in Tanzania is about 86,470 km, which consists of 12,200 km of trunk roads and 22,130 km of regional roads that constitute the 34,330 km roads under the control of TANROADS, and 52,140 km of roads under the jurisdiction of local governments. The conditions of roads managed by TANROADS are shown in Table 1-2. The condition of paved roads is relatively good for both trunk roads and regional roads, but maintenance of unpaved roads is a major issue. Furthermore, the work categories and roles of MoWTC and TANROADS related to road development are shown in Table 1-3.

Table 2: Road conditions of main roads and local roads

Road type	Pavement type	Road maintenance status (%)		
		Good	Fair	Bad
Trunk road	Paved	62	31	7
	Un-paved	39	40	21
Regional road	Paved	74	23	3
	Un-paved	39	35	26

Legend: Good = Section where route maintenance is possible with slight maintenance

Normal = A section where route maintenance is possible with regular maintenance

Poor = A section that cannot be maintained by regular maintenance

Source: TANROADS

Table 3: Roles of MoWTC and TANROADS

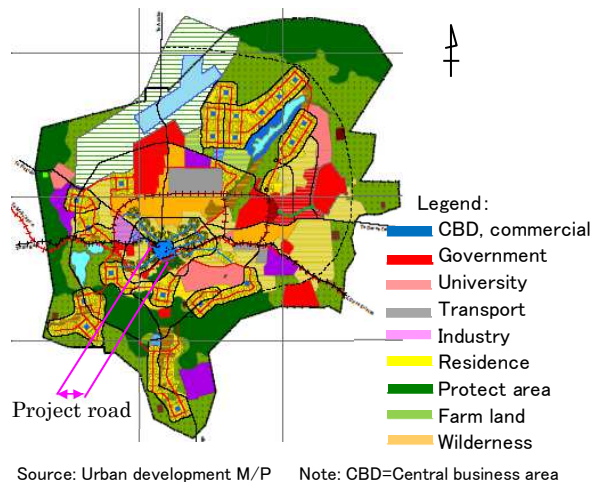
Description	MoWTC	TANROADS
Guidelines for road administration	Main charge	—
Determination of overall plan and maintenance priority	Main charge	—
Concrete road maintenance	Special things (such as BOT)	Main charge
Maintenance work	—	Main charge

Source: TANROADS

1-1-2 Development Plan of the target area

(1) Background of Dodoma City Development

The United Republic of Tanzania (hereinafter Tanzania) plans to transfer the government function to the Dodoma city, which is about 400km inland from the coastal area (completed by the relocation of the Presidential Office in June 2020), and significant Dodoma city population increase and needs of large scale development of infrastructure are expected (2012: Approximately 410,000 → 2039: Approximately 1.7 million, Dodoma National Capital City Master Plan 2019-2039 (hereinafter 2019 M/P)). Since Dodoma city is located at the key point of the intersection of the central corridor from Dar es Salaam Port, which is the main port of Tanzania, to the landlocked country, and the north-south corridor connecting the cities from south to north of East Africa, in view of strengthening these economic growth corridors, there is also an urgent need to strengthen road infrastructure in order to avoid serious traffic congestion on city roads in preparation for future increases in passenger and cargo demand.



Source: Urban development M/P Note: CBD=Central business area

Fig.1: Urban Development M/P(2019–2039)

The city of Dodoma, which passes through the main road corridor of Tanzania crosses the city centre where large vehicles are lined with residential and commercial facilities. Construction of inner ring road will be necessary as an alternative route in the southern part of the city to bypass large vehicle traffic from the city centre in order to secure a smooth traffic flow in the city and to prevent the deterioration of the living environment due to air pollution, noise, etc. From the above, the roads targeted by the project will meet the needs for large-scale infrastructure development in the city following the relocation of the capital to Dodoma and will facilitate smooth traffic passing through the east-west and north-south corridors. These are expected to contribute to the development of Dodoma City and the economic development of Tanzania.

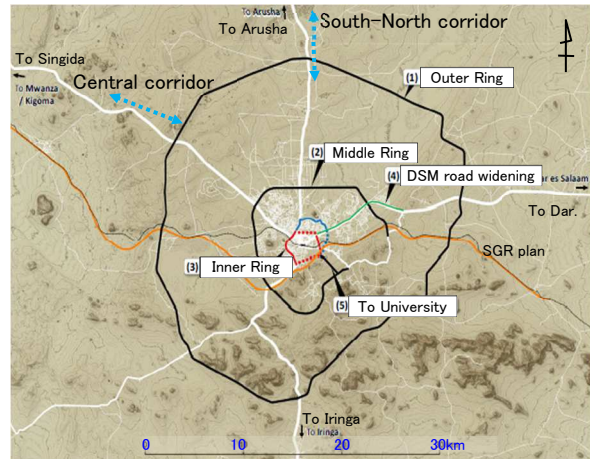
(2) Upper-level plan and related plan

1) Dodoma City Development Master Plan

In Dodoma City, the Comprehensive Urban Development Master Plan (M/P) was formulated in 1976 and is positioned as a higher-level plan that is directly related to this project. The M/P aims to harmonize

the people by making Dodoma City, which is located in the centre of Tanzania, the capital and to develop the nation in harmony by placing each function of the city in the Dodoma city area. It should be noted that the M/P is partially diffused in the suburbs of the residential area where the direction of planned urban development was lacking due to the temporary suspension of plans during the economic downturn.

On the other hand, with the declaration of the relocation of government function to Dodoma City in 2017, a review of the M/P and a study of the new master plan (2019 M/P) was conducted by the Ministry of Land, Housing and Residential Development (MOLHHSD) and 5 priority road development projects are planned, including threefold ring roads (inner, middle, and outer) along with the land use plan. Regarding the current state of the plan, an interview with a Dodoma city council (DCC) city planner who is a member of the City Planning Committee indicates that the plan is being changed from time to time, so the plan for Dodoma City as a whole has not been compiled.

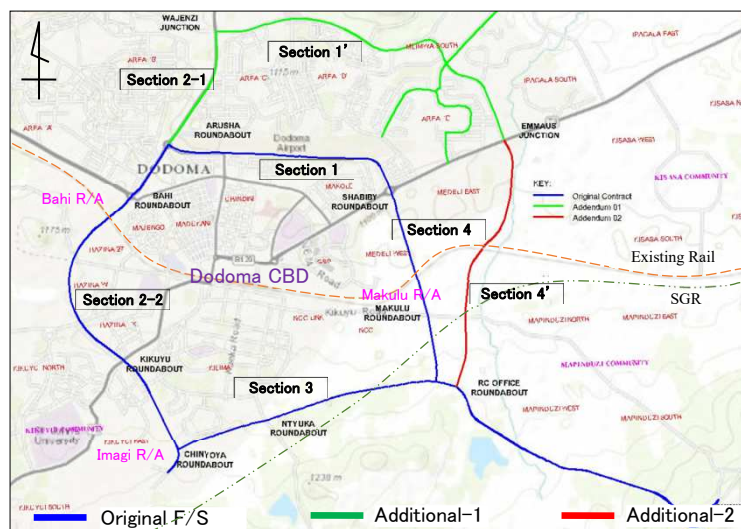


Source: Study Team Note: DSM= Dar es Salaam

Fig.2: Priority 5 road development project

2) Outline of F/S study on inner ring road by TANROADS

The previous outline design of the inner ring road occupying one section of the road covered by this project was carried out by a local consultant in May 2019 during the Feasibility Study (F/S) arranged by Tanzanian National Roads Agency (TANROADS) Dodoma Regional Office. Initially, the F/S targeted sections 1 to 4, but sections 1', 2-1 and 4' were added during the F/S implementation because some difficulty was



Source: TANROADS

Fig.3: Location map for F/S target roads

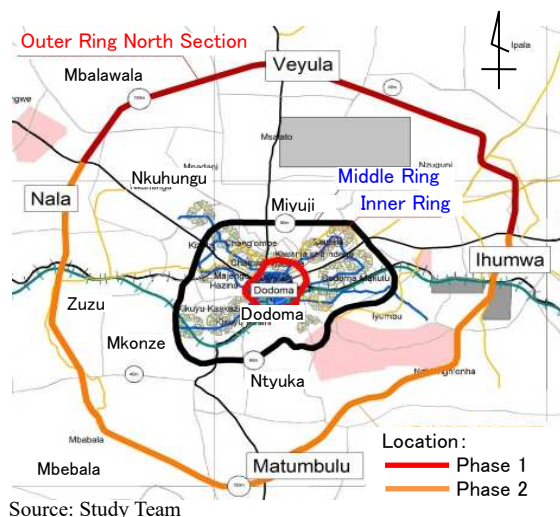
expected in securing land along section 1. At the time of the field survey conducted by this project in November 2019, the above F/S documents and a set of drawings regarding inner ring road were received from TANROADS Dodoma Office. Because it was judged that these documents and drawings could be utilized for this project, the necessary adjustments for an optimal plan were examined based on the materials received.

3) Other road improvement projects

In 2019 M/P, road maintenance projects by TANROADS (Refer 1-01 to 1-05 of table 1) and Tanzania Rural and Urban Roads Agency (TARURA) are planned (Refer 2-01 to 2-13 of table 1). About 110km of the Dodoma Outer Ring Road (No.1-01) in the table below is divided into 2 phases as Phase 1 (north section 52.3km between Nala – Veyula – Ihumwa Dry Port) and Phase 2 (south section 60km between Ihumwa Dry Port – Matumbulu – Nala). On the northern section of outer ring road, about 20 billion yen was signed by the African Development Bank (AfDB) on 19 August 2019, and the bid was announced by TANROADS on 28 August. The selection of the consultant in charge of construction is being finalized, and the contractor has been selected for the northern and southern sections. Regarding the widening of the road between Dodoma and Dar es Salaam, an invitation for bids for the design of 30 km between Dodoma City and Chamwino has been announced and preparations for the bid selection procedure are underway (Refer Table 2).

Table 4: Assumed road projects

No.	Name of Project	L(km)	Type of Works	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	13.6	Widening and new construction	TANROADS
1-04	Widening of Dar es Salaam Road	10.0	Widening of existing road	TARURA
1-05	Access from Univ. Road to Inner Ring Road	4.2	New Construction	TARURA
2-01	Upgrading of Government City Roads	39.0	Upgrading of roads into DBST	TARURA
2-02	Rehabilitation of Mwanzaga-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 Univ. 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: Study Team

Fig.4: Outer Ring Road North Section

Source: Dodoma National Capital City Master Plan 2019-2039
Note : Project in progress

Table 5: Related TANROADS road projects

Section	Authority	Current status
(1) Outer Ring Road	African development bank (AfDB)	Announcement of tender for northern section (52.3km between Nala – Veyula – Ihumwa Dry Port)
(2) Dar es Salaam Road	Tanzania government	Announcement of tender for widening of existing road (Dodoma – Chamwino 30km)

4) Other urban development projects

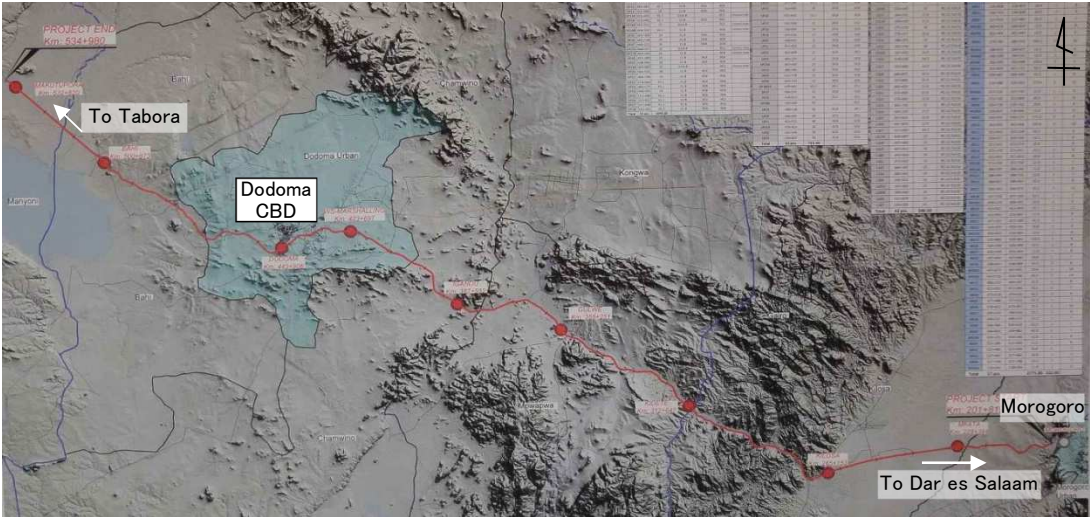
Along with the above road maintenance projects, various infrastructure development projects such as water and sewage, electric power and communications are underway in the Dodoma city area, and the development of the city plots are also proceeding at a rapid pace. In this project, information on the projects by Tanzania and other donors that may affect this project's effect was collected and confirmed sufficiently and reflected in this plan as necessary.

(5) Current status of standard gauge railway (SGR) plan

The standard gauge railway (SGR) construction project between Dar es Salaam and Morogoro (Lot-1) is currently underway and the construction between Morogoro and Dodoma area (Lot-2) will follow. The Lot-2 section is expected to be design-build method, and the SGR plan's exclusive land (right of way, ROW) width is at least 60 m (maximum 120 m).

SGR Lot-2 implementation Structure

- Project Outline: Targeting 426 km between Morogoro-Dodoma-Maktopora, the section is expected to be implemented by the design-build (DB) method with a total construction cost of US \$ 1.92 billion (assumed to be completed in Dec. 2022).
- Consultant: JV of Korail (Korea) and Tanzania Railways Corporation (TRC). Subcontracting is a local consultant UNITEC
- Contractor: Yapi Merkezi (Turkey), DB design support SENER (Spain)



Source: SGR Team

Fig.5: Overview of SGR plan

At intersections with roads, the SGR is planned to overpass (flyover), and the SGR project planners need to receive information about the position of intersections and the ROW widths of the roads from TANROADS and TARURA. The SGR project has a policy that it will consider and deal with all intersections, and prompt information exchanges with the above parties is required and construction work near the target area of this plan was scheduled to start in January 2020.

However, plans are currently being coordinated with TANROADS for road intersections. The flyover bridge has a standard span of 25 m, and if longer span is required, it will be planned separately. It is also assumed that a gravel pavement service road will be installed along the track and connected to the roads of TANROADS or TARURA. Initially, the intersection of the SGR and the planned road was assumed in section 3, but a new route plan that does not intersect the SGR was requested by the Tanzanian stakeholders, and consideration for a flyover in this plan is no longer necessary (Refer item 1-3 (2)). In addition, in the section where the SGR planned line passes on the upstream side of this project road, it is necessary to be consistent with the drainage plan of the SGR. However, since the SGR drainage plan

was not completed at the time of this survey, the drainage plan (draft) for this project was presented to the SGR project team (to the SGR contractor in the presence of the SGR consultant). Furthermore, whenever there are any changes to the SGR plan or other plan by Dodoma City Council, a meeting of stakeholders is convened and the contents are confirmed each time; the procedure is the same for this project. The SGR passenger / freight operation plan will be set based on the track record after the opening of the Lot-1 Dar es Salaam-Morogoro section.

1-1-3 Socio-economic status

After independence, Tanzania promoted socialist economic policies, but the economy fell into a crisis in the 1980s due to the effects of the oil crisis, the war against Uganda, and drought. In order to improve the situation, Tanzania started economic reform with the support of the World Bank and the International Monetary Fund in 1986, and the GDP growth rate has been approximately 6 to 7% based on the rates of 6.16% in 2015 and 6.97% in 2019. Also, GNI per capita has been steadily improving from Approx. \$200 in 1990's to \$948 in 2015, \$1080 in 2019. Major industries consist of agriculture, forestry and fisheries (23% of GDP), manufacturing and construction (22% of GDP) and service industry (50% of GDP). The population distribution is about 36% in urban areas and about 64% in rural areas, but trends show that the population distribution is increasing in urban areas year by year.

1-2 Background and outline of the grant aid request

(1) Background and circumstances of the request

The Government of Tanzania (GoT) requested support from Japan to convert the inner ring road into four lanes in order to smooth the city's traffic flow, facilitate logistics in the country and improve the living environment of the city by diverting heavy vehicle traffic currently passing through the centre of Dodoma City to alternative routes. Prior to this survey, in the information gathering confirmation survey conducted in February 2019, the GoT discussed with the Japanese stakeholders about improving 14.9km of the inner ring road to 4 lanes, which was their original request. It was agreed that the scope of this plan is the construction of two-lane roads on sections 2-2 (3.4 km) and 3 (2.9 km), totalling 6.3 km, of the inner ring road, which have the highest priority regarding (1) urgency, (2) project effect, (3) alignment with the 2019 M/P, and (4) environmental and social considerations. In addition, the section 1' plan is funded by the European Community (EU) and is designed as a Class 1 road in accordance with the Tanzania National Road Standard (4 lanes, 3.5m/lane, 2.5m/shoulder, streetlights installed).

This plan intends to improve the above situation by adding an additional 2-lane road to widen the existing 2-lane road on section 2-2, and by constructing a new two-lane road on section 3. Sections 2-2 and 3 are part of the inner ring road of Dodoma City that consists of 4 sections. In order to achieve the above targets, this survey is based on the results of the F/S survey and the outline design conducted by the Tanzanian stakeholders in May 2019, and the 1st field survey was conducted in November 2019 for Section 2-2 road including the existing 2-lane paved road, and Section 3 for the construction of a new 2-lane road on the existing earth road. In February 2020, the Tanzanian stakeholders requested a new route plan for the end of section 3 that does not intersect with the SGR in order to respond to new

occupants of the land originally planned for the road site. In order to respond to this, it was necessary to confirm the site for the new route consisting of approximately 1 km at the end of Section 3 (which turns left from the original route and connects to the Makulu intersection, which is located at the meeting point of Kikuyu Road and the 4-lane road currently under construction by the Tanzanian stakeholders). The site confirmation work included conducting additional surveys such as surveys, soil quality, environmental and social considerations surveys, and proceeding with outline design and project cost calculation. Regarding the examination of the plan specifications for road improvement, at the time of the field survey, the basic specifications of the design were discussed with the Tanzanian stakeholders, the results were summarized as a technical note, and both parties confirmed the specifications by signing the note.

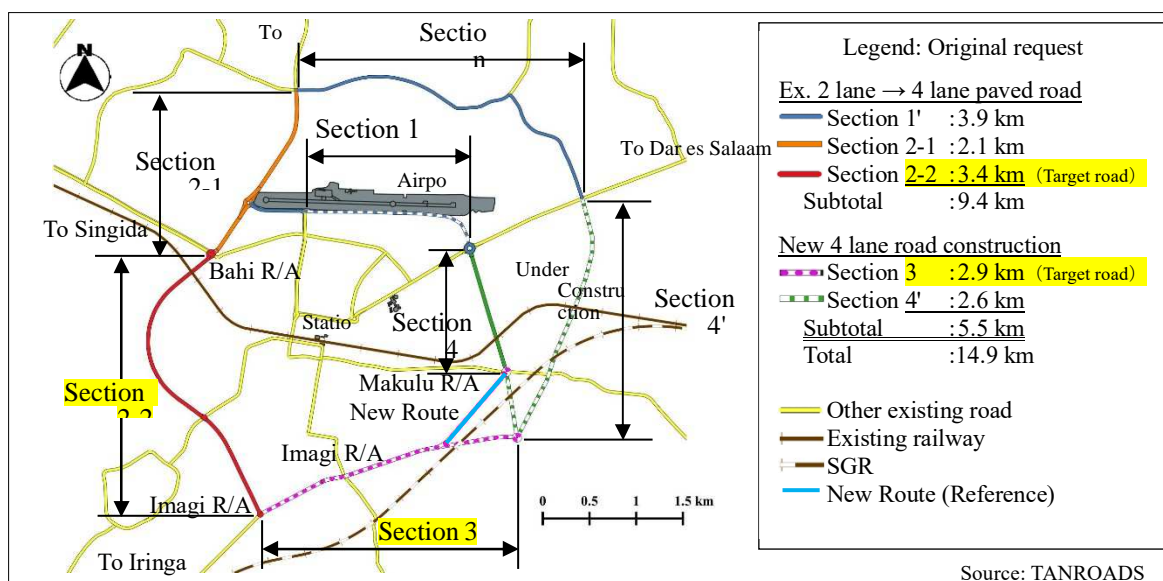


Fig.6: Request of Tanzania Government and scope of this survey

(2) Coordination with related plans

Design coordination between the project road and the planned SGR line at the end of section 3 road was carried out at a joint meeting by the relevant organizations (Ministry of Construction and Communications (MoWTC), TANROADS, TARURA, DCC, SGR consultants, and contractors) and correspondence on the SGR side was confirmed. However, the land around the endpoint of Section 3 was notified as exclusive by Tanzanian stakeholders, and finally a new route proposal that did not intersect with SGR was requested by TANROADS. In addition, TANROADS will coordinate with

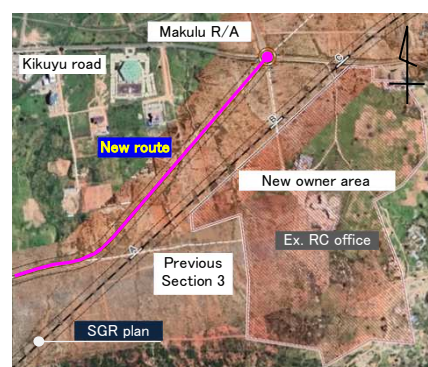


Fig.7: New route plan & surrounding Facilities Source: Study Team

the new plot owner and related organizations because the Dodoma City Urban Planning M/P assumes the placement of government buildings near the new route currently in the wilderness at the end of Section 3 (which turns left from the original route to connect with Makulu intersection). A joint meeting at the TANROADS Dodoma Office Meeting Room was carried out on 5 March, 2020, by the

representatives of TANROADS Headquarters and Dodoma Office, MoWTC, DCC, TARURA, and the study team. During the meeting, an explanation of the project design outline by JICA survey team, and discussions of the outline of the plan were held for securing ROW land and explaining drainage related issues. Afterwards, a site visit for confirmation of the status was carried out. In addition, on 6 March, the DCC City Planning Department confirmed the following regarding the determination of the new route road site by TANROADS and DCC.

- a) The new route will pass through the presidential office-exclusive portion and the DCC city planning area, the presidential office site portion has been agreed with the presidential office, and the remaining portion will be completed with an agreement letter from DCC to TANROADS.
- b) The DCC will incorporate the JICA Study Team's plan into the latest Dodoma City Planning CAD diagram and confirmed the affected lot numbers (7 plots: 17, 21, 22, 24, 25, 26, 27) and the list of affected organisations (research centre, post office, all public institutions).
- d) DCC will deal with the change of landowner to the new route ROW of TANROADS by relocating the affected plots to another location, since there are no buildings that pose a problem.
- e) DCC will prepare ROW consent letter for TANROADS in about one week, and thus TANROADS road land acquisition will be completed.

(3) Project Scope

The target section of the project is Section 2-2 and 3. Section 2-2 is 3.401km from the starting point Bahi roundabout (roundabout, R/A) to about 75m before the existing Imagi R/A. Section 3 is 3.108km from the 3.401km point of Section 2-2, follows the design route of the F/S by TANROADS eastwards through the Ntyuka intersection up to the 1.696km point, turns to the left, follows the new 1.412km route and connects to the existing Makulu intersection. From the above, the total length of the target road will be increased by 209 m from the originally assumed distance of 6.3 km to 6.509 km.

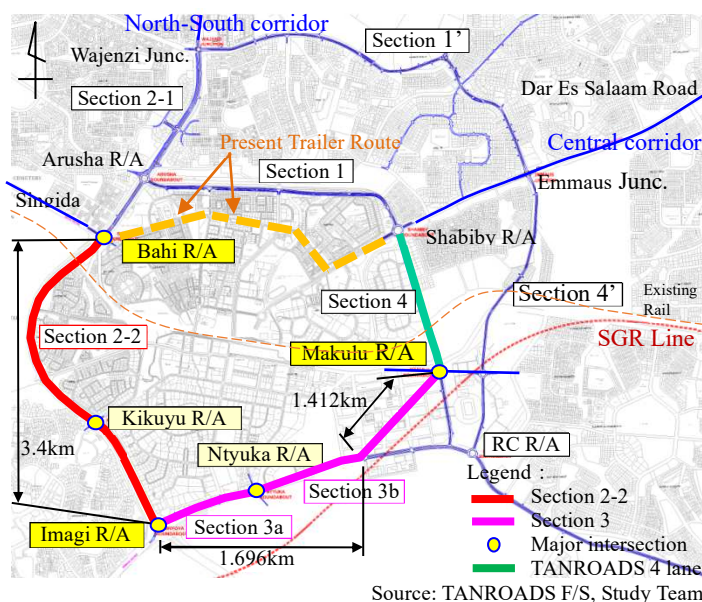


Fig.8 Project Scope

1-3 Project site and surroundings

1-3-1 Status of related infrastructure development

(1) Inner ring road and target section

The inner ring road was initially composed of 4 sections (Sections 1 to 4) and was planned to be developed as one unit. After that, section 1' was proposed because of the difficulty of securing land for section 1, and section 4' connecting to the section was also added. GoT wants Japan to support development of Sections 2-2 and Section 3 as the sections that should be prioritized in order to avoid large vehicles passing through the centre of Dodoma and to ensure smooth traffic flow.

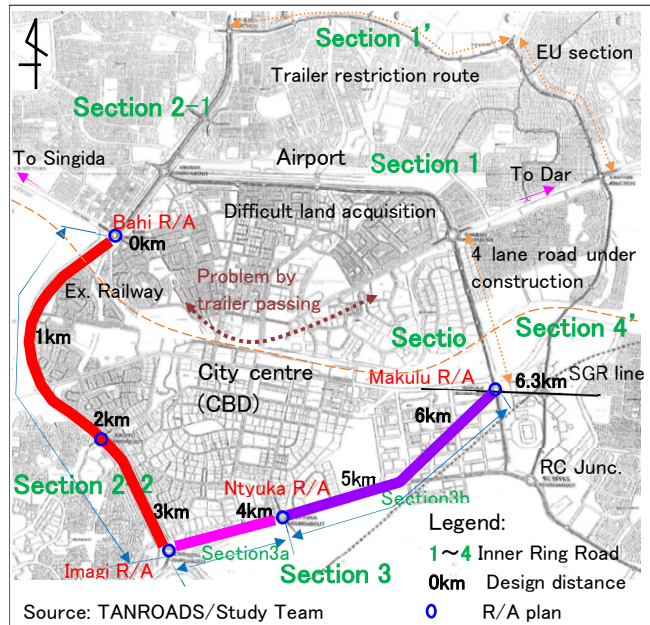


Fig.9: F/S Inner Ring Road Plan and Project section

Table 6: Outline of Inner Road Plan

Section	Description
(1)	Difficult to secure road site due to housing and airport
(1')	2 lanes road are developed by the EU (Restrictions on large vehicles due to residential areas).
(2-1)	Existing 2-lane paved road.
(2-2)	Existing 2-lane paved road. TANROADS F/S recommends new 2 lanes inside.
(3)	New route needs to avoid houses demolition as much as possible.
(4)	Some sections have been started by GoT.
(4')	Land acquisition work for road construction started

Source: Study Team


(2) Current status of target roads (section 2-2 and section 3)

1) Condition of section 2-2 road (Bahi intersection–Imagi intersection)

1-1) Existing road

In section 2-2 (3.4km), TANROADS secures a width of 60m for the right of way (ROW) as the trunk road of Tanzania, and a concrete road boundary pegs are installed at some part of the road edge. In addition, in the vicinity of the starting point Bahi R/A of section 2-2, the existing 2-lane paved road is installed near the centre of the ROW, but other sections are installed on the right side (west side) of the ROW. The existing road is laid with asphalt concrete (AC) pavement and the shoulders with double-layer asphalt surface treatment (DBST) pavement, and no median strip is installed. In addition, at several places in the ROW, you can see a simple veranda overhanging the ROW and temporary placement of concrete blocks.

Table 7: Existing road outline (Section 2-2)

<u>Section 2-2 outline</u>	<u>Features</u>	
Length: 3.4km	> Addition of 2 lanes to the left side of existing two-lane paved road to create a four-lane road was recommended by TANROADS F/S.	
Number of lanes: 2	> Level crossing with the existing railway at 320m from the starting point (passenger cars and freight cars are about 3 trains a day)	
Lane width: 3.25m	> No resettlement will occur	
Pavement: AC		
Sidewalk: None		
ROW: 60m		
Source: Study Team		

1-2) Existing Road Pavement

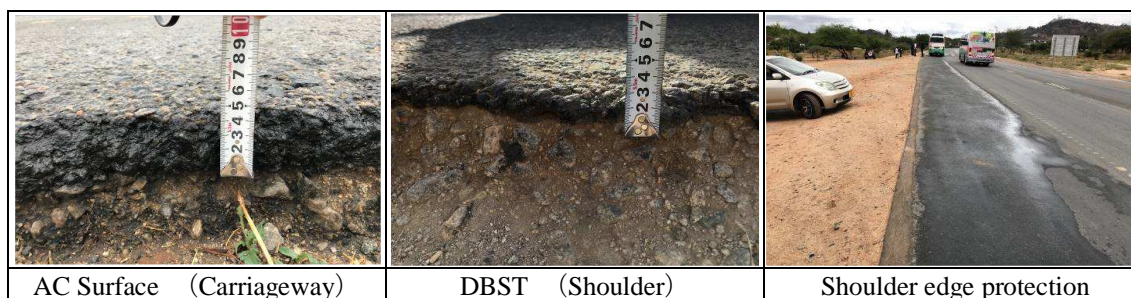
The information from TANROADS and the result of existing road survey of section 2-2 is summarized below. The survey started at Bahi R/A (0km) and was conducted every 500m. The ruts and cracks on the surface of the pavement were visually inspected, and the flatness was evaluated according to the International Roughness Index (IRI) Class 4 method (evaluation by the riding comfort and visual evaluation). As a result of the investigation, although small potholes were found at 1 or 2 places in the R/A section, the existing carriageway pavement remains in good condition overall. Furthermore, the road surface temperature of the pavement was also measured during the above survey (see below table). Based on the results of the survey, the study proceeded with the examination of the utilization plan of the existing paved road in this project.

Table 8: Existing paved road Survey (Section 2-2)

Distance (km)	Road Width (m)			Pavement condition	Flatness IRI<4	Fill height (m)
	Shoulder (Left)	Carriageway	Shoulder (Right)			
0.0	2.4	6.8	2.4	No damage	○	0.0
0.5	2.4	6.8	2.6	Ditto	○	0.6
1.0	2.5	6.8	2.6	Ditto	○	0.8
1.5	2.4	6.8	2.6	Ditto	○	1.0
2.0	2.5	6.8	2.4	Ditto	○	0.6
2.5	2.5	6.8	2.5	Ditto	○	2.0
3.0	2.6	6.8	2.5	Ditto	○	1.5
3.4	2.4	6.7	2.6	Ditto	○	2.0
Average	2.5	6.8	2.5	←Total road width=11.8m		1.1

Source: Study Team

Remarks: Height of fill= difference between local road surface and shoulder, Pavement structure= surface AC5 cm, upper road surface CRR (CBR80), lower road surface G45, subgrade (local material). Road surface temperature survey= low results: road 45°C, shoulder 42°C, side slope 40°C (14:00pm, sunny day)



Source: Study Team Note: Good condition is maintained by edge protection for erosion prevention.


2) Condition of section 3 road (Imagi intersection–Ntyuka intersection–Makulu intersection)

The section 3 (3.1km) road has different site environments between the starting point at Imagi intersection and the Ntyuka intersection at about 0.9km (section 3a), and between the Ntyuka intersection and the end point at Makulu intersection (section 3b). Therefore, the following explanation of the site condition is divided into two sections.

2-1) Section 3a (Imagi intersection–Ntyuka intersection)

On the left side of the existing dirt road are concrete walls of houses, and on the right side is a settlement dotted with simple houses. TANROADS designated the left concrete wall as the left boundary of the ROW and a provisional ROW width of 40m. Existing houses (about 25 houses) within the ROW area up to the Ntyuka intersection have the confirmation number for removal of TANROADS displayed in paint on the house wall, and the relocation procedure is in progress. In addition, in order to secure a standard road width of 60m in the future, TANROADS plans to limit the construction of new houses within the remaining 20m width.


Table 9: Existing road outline (Section 3a)

<u>Section 3a outline</u>	<u>Features</u>	
Length: 0.9km	> Houses are scattered along the existing dirt road, and some residents will be relocated	
Number of lanes: 2	> Construction of new 2-lane paved road is expected on left side	
Lane width: 2m	> There are facilities such as existing electric wires and water pipes and control valves within ROW	
Pavement: Earth	> Concrete wall exists at ROW left boundary	
Sidewalk: None		
ROW: 40m		
Source: Study Team		

2-2) Section 3b (Ntyuka intersection–Makulu intersection)

In section 3b, the 1km section from the Ntyuka intersection (up to 1.696km from the Imagi intersection) has only one narrow dirt road with a width of about 2m in the wilderness. There are no buildings nearby and electric poles, electric wires, water pipes, incidental facilities, etc. are installed in the part of the 60m width ROW assumed by TANROADS. Approximately 1.2km after that, a new route that passes through the wilderness, turning left from the dirt road before the previously assumed intersection with the SGR, connects to the Makulu intersection at the southern end of the 4-lane road constructed by TANROADS (completed Nov./2020). A ROW width of 60m in this section was confirmed in March 2020 through an explanation on site by the study team and discussions with concerned parties. In addition, TANROADS and SGR continue discussions regarding the area around the Dodoma Governor's Office (RC office), which was originally expected to be the endpoint of sections 3 and 4, including intersections of the SGR with the original sections 3 and 4 and with the existing Kikuyu road.



Table 10: Existing road outline (Section 3b)

<u>Section 3b outline</u>	<u>Feature</u>	
Length: 2.2km	> A narrow dirt road passes through the wilderness. Streams running northward from the hill on the south side crosses the dirt road.	
Number of lanes: 0	> No houses and no resettlement will occur.	
Lane width: 2m	> Assuming construction of a new 2-lane paved road on the left side of the ROW	
Pavement: Earth	> Existing facilities such as existing electric wires and water pipes and control valves in the ROW.	
Sidewalk: None		
ROW: 60m		
Source: Study Team		

2-3) Other related sections

Other road sections related to the above road section are shown below.

Table 11: Existing road outline (Section 4a, b)

<p><u>Section 4a outline</u> (Shabiby–Makulu) Length: 1.4km, 4 lanes, width: 3.5m x 2 + 2.45 median Pavement: DBST Sidewalk: None ROW: 60m</p>	<p><u>Feature</u> > TANROADS constructed 4-lane road to Makulu intersection on Kikuyu road in Nov./2020 > The service has started in some sections > Inner ring road was originally proposed section 1, but section 1' was added due to land acquisition issue > TANROADS tentatively uses as an inner ring and plans to switch to the section 4' in the future.</p>	
<p><u>Section 4b outline</u> (Makulu–Sec. 3) Length: 0.7km Number of lanes: 2 Lane width: 4m Pavement: Earth Sidewalk: None ROW: 40m</p>	<p><u>Feature</u> > Use as a road for construction of Dodoma Regional Commissioner (RC) Office between section 3 of Makulu junction of Kikuyu Road > For the above reasons, the ownership of the current dirt road will be decided by the future road standard setting. > No resettlement will occur</p>	

(3) Major Junctions

The following shows the status of major intersections in Sections 2-2 and 3. When widening the road, planning and design of an appropriate shape and number of lanes will be conducted with consideration of the traffic volume estimation of the section and existing / future connecting roads.

Table 12: Status of major Junctions (Section 2–2)

No.	Length (km)	Direction	Road Name	Width (m)	Pavement	Condition	Drainage	Shape
1	0.000	North	Arusha road	10.6	AC	Good	Both side	R/A
		East	Bahi road	11.0	AC	Good	Nil	
		South	Iringa road	11.6	AC	Good	Both side	
		West	Singida road	19.5	DBST	Good	Both side	
2	0.940	East	Amani road	6.0	DBST	Good	Both side	Cross shape
		West		5.0	Earth	-	Nil	
3	1.640	East	-	11.6	DBST	Good	Nil	Cross shape
		West	-	12.2	Earth	-	Nil	
4	2.260	East	Kikuyu road	8.5	DBST	Good	Both side	R/A
		West	-	8.1	DBST	Fair	Both side	
5	2.870	West	-	7.0	AC	Good	Nil	T shape
6	3.460	West	Iringa road	11.4	AC	Good	Both side	R/A

Source: Study team Remark: Length = Distance from the starting point (same condition of the following tables)

Table 13: Status of major Junctions (Section 3)

No.	Length (km)	Direction	Road Name	Width (m)	Pavement	Condition	Drainage	Shape
1	0.000	North	Iringa road	11.4	AC	Good	Both side	R/A
		East	Section 3	11.0	AC	Good	Both side	
		South	Iringa road	11.6	AC	Good	Both side	
2	0.660	North	Keeka road	6.0	Earth	-	Both side	Cross shape
		South	-	6.0	Earth	-	Nil	
3	0.990	North	-	8.0	Earth	-	Nil	Cross shape
		South	-	8.0	Earth	-	Nil	

Source: Study team

(4) Access Roads

The main connecting roads and entrances of Sections 2-2 and 3 are shown below. In this plan / design, consideration will be given to these and the study will proceed.

Table 14: Existing Access Road and Entrance Status (Section 2-2)

No.	Length (km)	Location		Building type	Width(m)	Pavement type	Remarks
		Left	Right				
1	0.085		○	Restaurant	11.0	Earth road	
2	0.115		○	Petrol station	11.0	Concretet	
3	0.088	○		Car wash	11.8	Earth road	Pipe culvert φ600
4	0.110	○		Car Workshop	17.0	Earth road	Pipe culvert φ600
5	0.121	○		Car Workshop	9.5	Earth road	Pipe culvert φ600
6	0.164		○	Petrol station	17.5	Earth road	Pipe culvert φ600
7	0.220	○		Petrol station	17.0	Concrete	Pipe culvert φ600
8	0.275	○		Petrol station	17.0	Concrete	Pipe culvert φ600
9	0.293	○		Access Road	10.6	Earth road	Pipe culvert φ600
10	0.385		○	Access Road	10.6	Earth road	Pipe culvert φ600
11	0.384	○		Access Road	10.6	Earth road	Pipe culvert φ600
12	0.443	○		Access Road	10.6	Earth road	Pipe culvert φ600
13	0.558	○		Access Road	11.6	Earth road	Pipe culvert φ600
14	0.580		○	House	11.6	Earth road	Pipe culvert φ600
15	0.849	○		Service road	11.6	Earth road	Pipe culvert φ600
16	0.875		○	Access Road	11.6	Earth road	Pipe culvert φ600
17	0.955		○	Access Road	11.6	Earth road	
18	1.251	○		Service road	11.6	Earth road	Pipe culvert φ600
19	1.359	○		Car wash	8.0	Earth road	
20	1.271		○	Access Road	11.6	Earth road	Pipe culvert φ850
21	1.389		○	Shop	8.0	Earth road	
22	1.528	○		Access Road	10.0	Earth road	
23	1.508		○	Shop	8.0	Earth road	
24	1.552		○	Access Road	5.0	Earth road	
25	1.564	○		Shop	8.0	Earth road	
26	1.725	○		Service road	15.0	Earth road	
27	1.861	○		Service road	8.0	Earth road	
28	1.876	○		Petrol station	6.0	Block pave	
29	2.004	○		Petrol station	6.0	Block pave	
30	2.023	○		Service road	6.0	Earth road	
31	2.018		○	Shop	10.0	Earth road	
32	2.109	○		Service road	12.0	Earth road	Pipe culvert φ600
33	2.333	○		Shop	12.0	Earth road	
34	2.608	○		Service road	12.0	Earth road	Pipe culvert φ600
35	2.735	○		Service road	3.5	Earth road	
36	2.722		○	Service road	11.8	Earth road	Pipe culvert φ600
37	2.814	○		Access Road	12.0	Earth road	
38	2.898	○		Service road	4.0	Earth road	
39	2.964	○		Service road	4.0	Earth road	
40	3.016	○		Service road	4.0	Earth road	
41	3.186	○		Service road	4.0	Earth road	
42	3.292		○	Shop	7.6	Earth road	Pipe culvert φ800
43	3.348		○	Petrol station	14.7	Concrete	Pipe culvert φ1000

Source: Study team

Table 15: Existing Access Road and Entrance Status (Section 3)

No.	Length (km)	Location		Building type	Width(m)	Pavement type	Remarks
		Left	Right				
1	0.087		o	Access road	6.7	Earth road	Pipe culvert φ800
2	0.119	o		House	3.5	Earth road	
3	0.195		o	House	2.5	Earth road	
4	0.211	o		Access road	12.0	Earth road	
5	0.273	o		House	5.0	Earth road	
6	0.278		o	House	3.0	Earth road	
7	0.305	o		Public office	5.0	Earth road	
8	0.308		o	Access road	5.5	Earth road	Pipe culvert φ700x2
9	0.371	o		Access road	4.0	Earth road	
10	0.389	o		Access road	4.0	Earth road	
11	0.400	o		Access road	4.0	Earth road	
12	0.507	o		Access road	4.0	Earth road	
13	0.546	o		Access road	4.0	Earth road	
14	0.568	o		House	3.0	Earth road	
15	0.617	o		House	3.0	Earth road	
16	0.693		o	Access road	6.0	Earth road	
17	0.785		o	Access road	6.0	Earth road	
18	0.839	o		Access road	8.0	Earth road	
19	0.836		o	Entrance	1.5	Earth road	




Source: Study team

(5) Existing Railway

Section 2-2 road has at grade intersection (railway crossing) with the track of the Tanzania Railway Corporation (TRC) at about 320 m from Bahi R/A. There is no traffic congestion even the level crossing manager blocks the passage for about 1 minute when the train passes. According to the train schedule at Dodoma Station, which is about 1.6km from the railroad crossing, the trains passing through the railway crossing are 1 daily passenger train (see the table below, no plans to increase trains in the future) and irregularly operated freight train (starting as soon as the collection of luggage is completed, main cargo is agricultural products such as cement and corn) and regarding the assumption of increased/decreased flights, the policy of maintaining the current number of train operation was confirmed.

Table 16: Schedule of passenger trains to / from Dodoma and related facilities

Destination	Passenger train schedule	Remarks
Dodoma to Tabora	5:50 (Tue / Thurs), 7:30 (Tue)	Passenger 1 train / day (1 to 80 passengers, 12 to 15 cars), Freight 2 trains / day (average)
Tabora to Dodoma	17:30 (Mon / Thurs), 4:30 (Fri)	

		
Exterior view of Dodoma Station	Freight train (20-22 cars, waiting at Dodoma Station)	Level crossing 320m from the starting point of Section 2-2 (crossing facility is damaged)

(6) Drainage facility

The status of major drainage facilities in Sections 2-2 and 3 is shown below. For proper planning and design, the study was conducted considering the project implementation conditions in the area.

1) Section 2-2

The existing drainage facilities in Section 2-2 are shown below.

- Open earth ditch on both sides along the existing road except on the left side from Kikuyu R/A to the end point,
- The natural ground slopes gently from the right side to the left side of the target road, and the rainwater that flows down joins to form a small river (Kikuyu River).
- The Kikuyu River flows into the regulating pond on the right side of the 1.7km point and crosses the target road by the existing triple box culvert (width 3.0m, height 2.0m) at the regulating pond.
- Pipe culverts with a diameter of 60 cm are mainly installed at the side of the road.

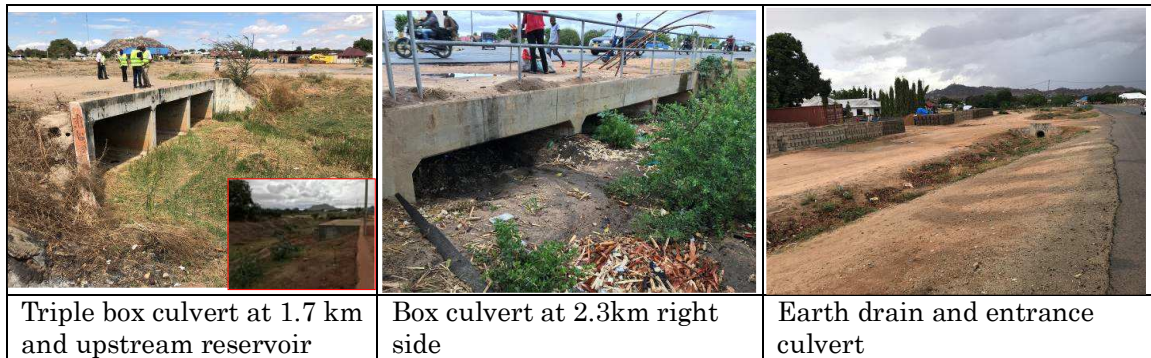


Photo 1: Major drainage facilities in Section 2-2

2) Section 3

The drainage facilities of section 3a from the start point to Ntyuka junction and section 3b after that are shown below.

- In section 3a, a stone gutter is partially installed on the right side along the existing earth road by Dodoma City. In the past, no waterway overflow or road flooding has occurred.
- Drainage facilities have not been developed in the plains of section 3b from the Ntyuka junction to the end point, and there are several natural streams from the right hill. Simple concrete wall and/or gabion mattress for scouring prevention and protection of earth road has been provided at the earth road and natural stream crossing point.

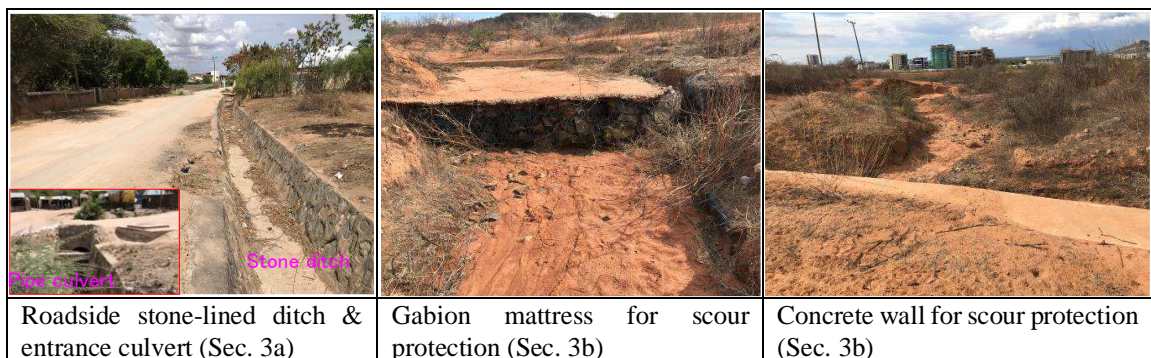
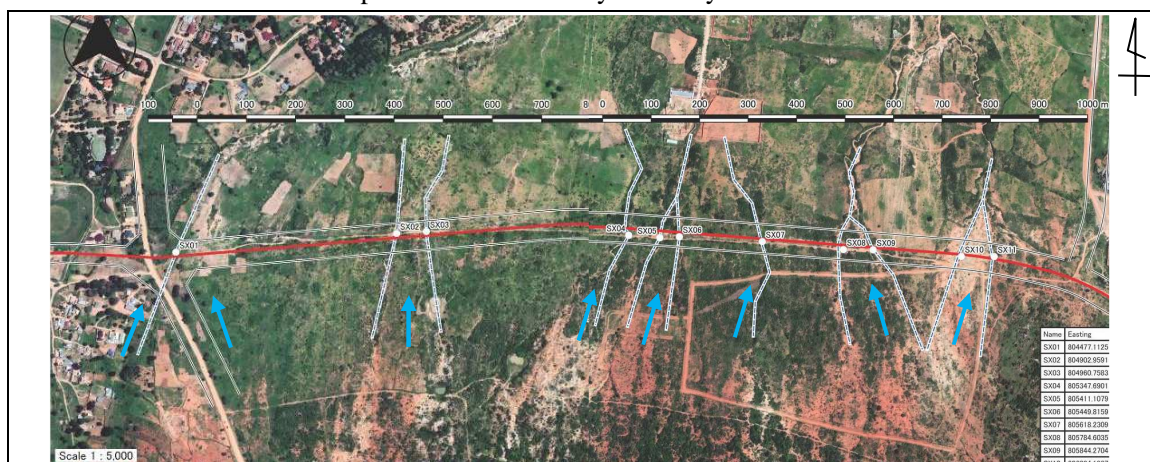


Photo 2: Major drainage facilities in Section 3

There are 11 small natural streams crossing the existing earth road in section 3b after the Ntyuka junction. The water flow direction of these small streams to the target road may change due to the SGR plan passing through the upstream side. Therefore, a drainage plan for cross-drainage facilities and roadside ditches that could meet the SGR plan was examined by the study team.



Source: Study team Fig.10: Natural streams crossing section 3b road

(7) Traffic volume

As for the traffic in the target area, analysis of the traffic survey results of the “Dodoma City Road Sector Information Collection / Confirmation Survey (2019)” by JICA, about 50% of large-vehicle traffic, which accounts for about 25% of Dodoma city's traffic, is transit traffic, and by direction, the east-west direction occupies the most (70%), followed by north-south direction (10%). Since this project will form a detour for the major east-west transit routes in the city, this project can be expected as a countermeasure for the inflow of large vehicles into the city. In this study, survey points, items and methods were set in order to understand the current status of these traffic conditions in the area.

1) Outline of traffic volume survey

A traffic survey was conducted as follows for the purpose of grasping the current traffic situation in Dodoma City and collecting basic data used for forecasting future traffic demand.

Table 17: Traffic flow survey items and methods

Survey item	Survey method	Implementation time / number
Traffic volume (both direction)	<ul style="list-style-type: none"> > Traffic volume by vehicle type and direction > Vehicle type: 12 categories such as bicycle, motorcycle, car, bus, truck, trailer > Record the presence or absence of traffic congestion at the survey location at the same time 	<ul style="list-style-type: none"> > 12/5(Thu), 12/6(Fri) > 6:00AM to 6:00AM (24h), 2 days > 6 places
Travel time	<ul style="list-style-type: none"> > Travel on major routes in the city (routes for large vehicles, routes passing through the city centre) and measure the required time and section speed 	<ul style="list-style-type: none"> > 12/7 (Sat), 12/10 (Tue) > Morning (7-8pm), evening (17-18pm), 2 days > 3 routes x 2 (round trip)
Axle load	<ul style="list-style-type: none"> > Conduct axle load survey of large vehicles along major roads around the city 	<ul style="list-style-type: none"> > 12/16 (Mon) to 20 (Fri) > 4 locations (Singida Road, Arusha Road, Dar es Salaam Road, Iringa Road)

2) Results of traffic volume survey

A traffic volume survey (by vehicle type, time and direction) was conducted to understand the characteristics of automobile traffic in Dodoma city. A 24-hour survey at 6 locations was carried out from 6 am to following morning 6 am. The traffic volume was measured by investigators in 12 vehicle categories by direction and by the hour.

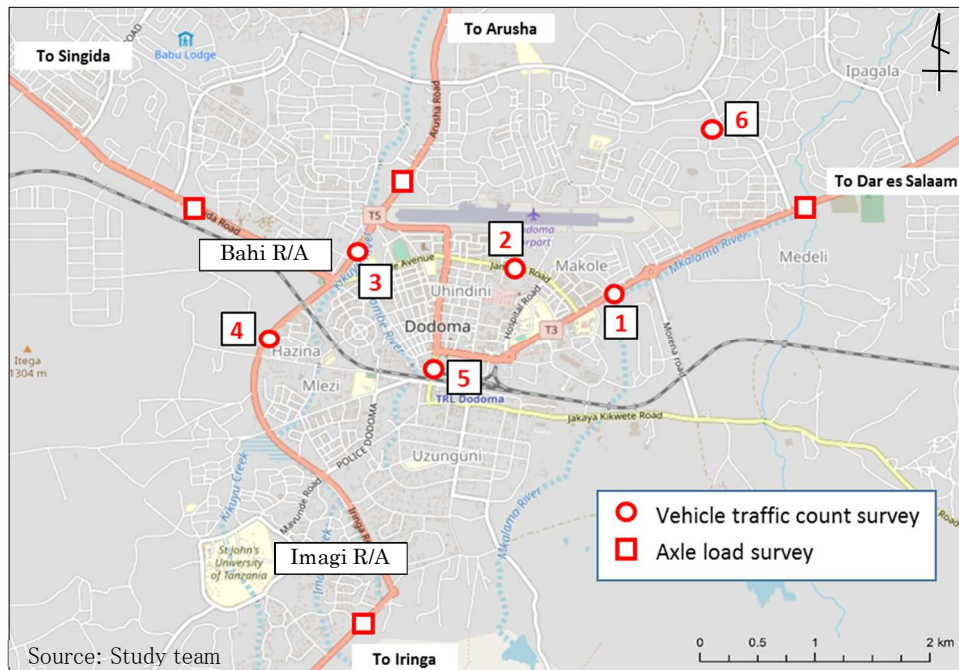


Fig.11: Traffic volume survey location

Table 18: Vehicle classification for traffic volume survey

No.	Type	No.	Type	No.	Type
1	Sedan car	5	Medium Bus	9	Trailer
2	Taxi	6	Large Bus (65 seats)	10	Motorcycle
3	Truck (light)	7	Truck (2 axle)	11	Trike
4	Small Bus (16 seats)	8	Truck (3-4 axle)	12	Other (Bicycle)

Note: Large vehicle=Type 5~9 of above table, Ordinary car=1~4, Motorcycle=10~11

The following shows 24-hour conversion traffic with a combined description based on the results of traffic volume survey conducted on Friday, 6 December, 2019, by the survey team and results of traffic survey conducted by JICA on “Information gathering and confirmation survey on Dodoma City road sector” conducted from 8 to 11 January, 2019 (hereinafter referred to as JICA's past survey).

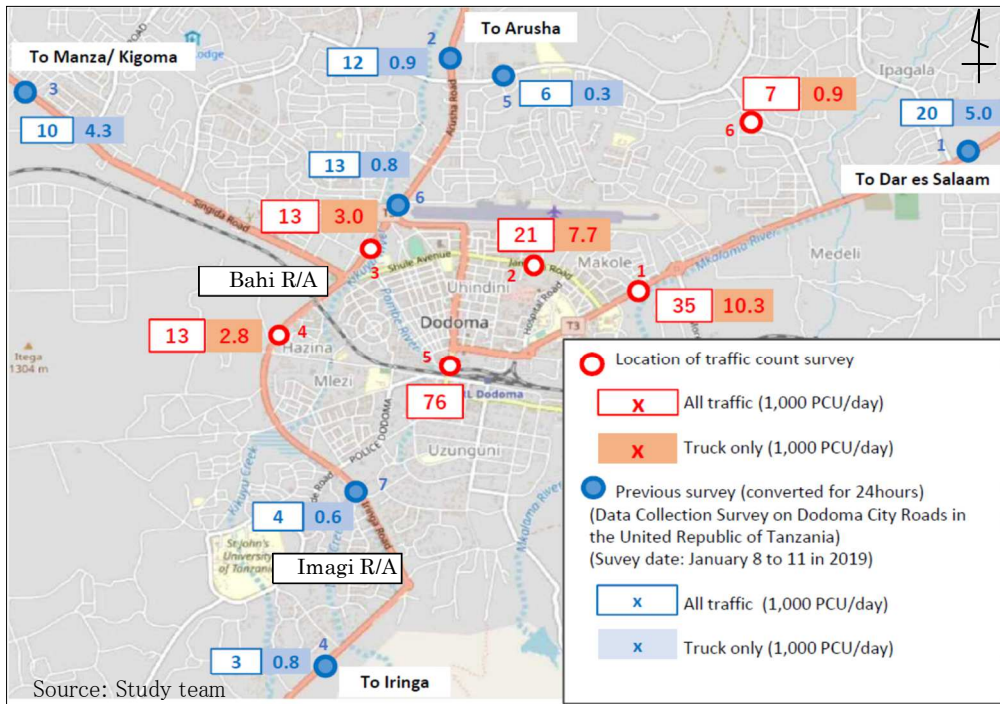
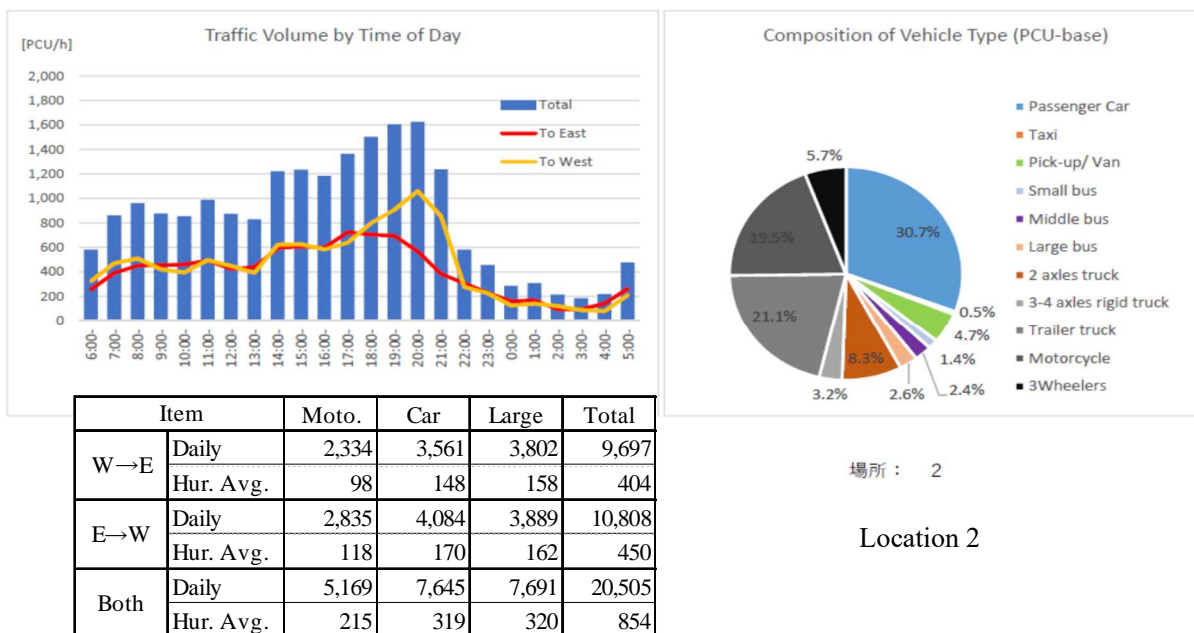
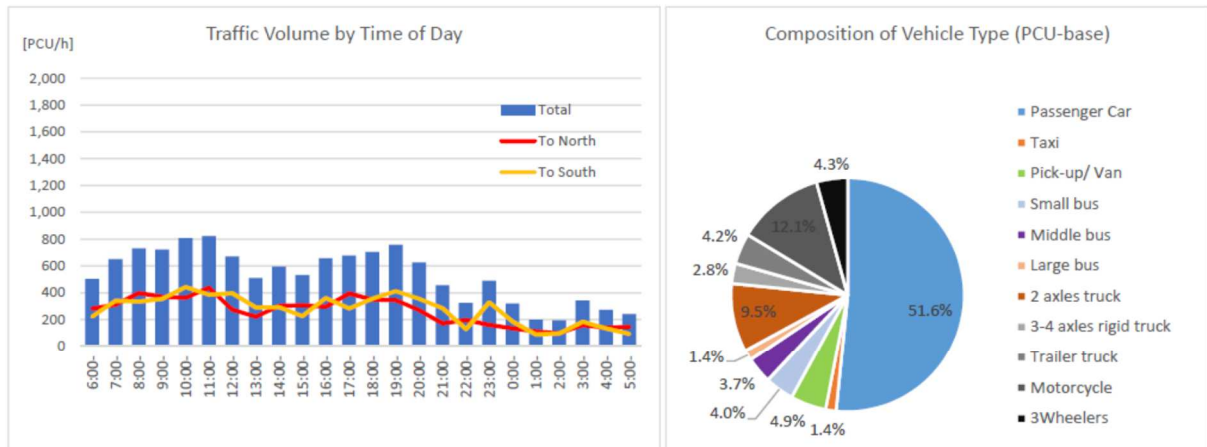


Fig.12: Traffic volume survey results (both direction daily traffic volume)



Source: Study team, Note: Compared to JICA's past survey, Note: W= west, E= east, Moto.= Motor cycle, c
volumes and some routes that h Large = Large vehicle

Fig.13: Traffic volume survey at Survey Point 2 (present large vehicle route)



Item		Moto.	Car	Large	Total
S→N	Daily	1,211	3,491	1,525	6,228
	Hur. Avg.	50	145	64	259
N→S	Daily	886	4,439	1,240	6,565
	Hur. Avg.	37	185	52	274
Both	Daily	2,097	7,930	2,766	12,793
	Hur. Avg.	87	330	115	533

Location 4

Note: S= south, N= north, Moto.= Motor cycle, Large = Large vehicle

Source: Study team

Fig.14: Traffic volume survey at Survey Point 4 (on Section 2-2)

The points and consideration that can be understood from the above results are shown below.

- > In Dodoma City, there is a large amount of traffic on the route connecting the east and west directions (survey location 1 and 2), especially for large vehicles.
- > The result of location 2 shows the daily traffic volume is about 20,000, which is relatively large compared to other location. The peaks are about 1,600 vehicles at 19:00 and 20:00, and large vehicles account for about 40%. From the results, it can be seen that a route near Section 1 and Section 2 are used as a route for large vehicles.
- > The results of location 4 shows small traffic volume total of about 800 vehicles in both directions even at 11:00am which has the highest traffic in a day (approx. 21% large vehicles). This is the traffic volume that does not cause traffic congestion even one lane operation and there will be little impact on traffic during construction.
- > In addition, due to the development of the east-west-south section of the inner ring road by this project, the study proceeded on the assumption that large vehicles in the north-south direction and the east-west direction will travel in sections 2-2 and 3.

3) Travel time survey results

A travel time survey was conducted to understand the traffic conditions during the survey. The survey was conducted along the main routes in the city (see the figure below) and recorded the passage times of the main junctions during the peak traffic hours in the morning and evening on Saturday, 7 December, 2019 and Tuesday, 10 December, 2019. The driving route is as shown on the below table. In addition, the travel routes of the travel time survey (see the figure below) and traveling speed survey results is shown below.

Table 19: Travel route for travel time survey

Route No.	Length	Route detail
①a	4.6km	Shabiby R/A → School Ave → Bahi R/A → Kizota Primary School
①b	4.6km	Kizota Primary School → Bahi R/A → School Ave → Shabiby R/A
②a	4.5km	Shabiby R/A → B129 → Arusha R/A → Njia Panda Area C Bus Stop
②b	4.3km	Njia Panda Area C Bus Stop → Arusha R/A → B129 → Shabiby R/A
③a	4.7km	Imagi R/A → Kikuyu R/A → Bahi R/A → Njia Panda Area C Bus Stop
③b	4.7km	Njia Panda Area C Bus Stop → Bahi R/A → Kikuyu R/A → Imagi R/A

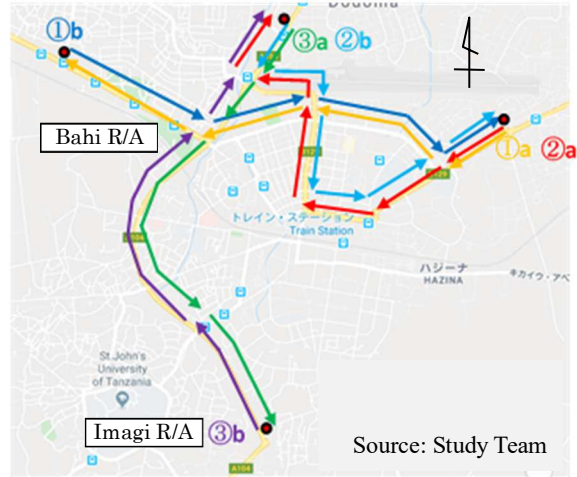
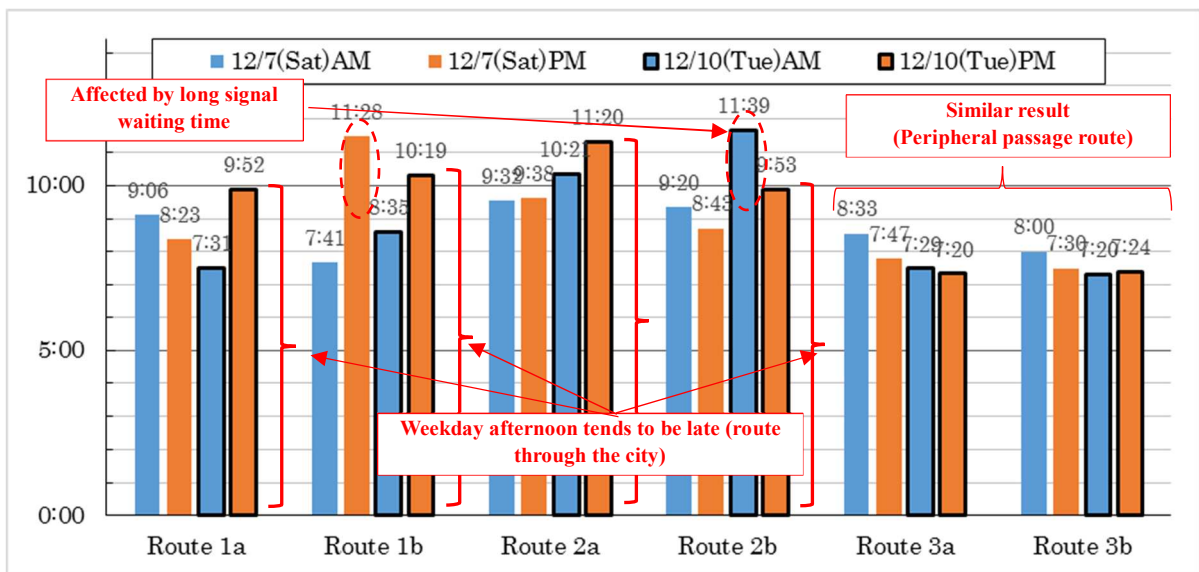


Fig.15: Travel route for travel time



Source: Study Team

Fig.16: Travel time by travel route and time zone

- > For routes (1,2) that pass through the city center, the time required on weekday afternoons tends to increase (however, the increment is about 1 to 2 minutes).
- > Almost no change in the route (3) that does not pass through the urban areas.
- > No difference in direction

In addition, Route1b on the afternoon of 7th December and Route2b on the morning of 10th December have longer transit times than other days. This is because the timing of approaching the signalized junction was particularly bad, and it took about 2 minutes longer to pass through the junction than at other times. From this result, the following 3 points are considered.

- > The fact that the required time does not increase or decrease depending on the time of day indicates that the road capacity has a margin with respect to the current traffic volume.
- > Section 2-2, which is additional 2-lane section (peripheral passage routes (include section 3a, 3b)), has little traffic volume and is considered to have little impact on transit traffic during construction.
- > The improvement effect cannot be expected so much when comparing changes in transit time with the

ex-post evaluation of the project due to the good current traffic situation. Therefore, it is necessary to set an index that can appropriately evaluate the effect of the project, considering the increase in demand accompanying the development of the city (detour of large vehicle traffic, etc.)

4) Axle load survey

Axle load survey was carried out on major roads in Dodoma City in December 2019 and January 2020 with a total of 696 trucks and trailers (large vehicles) and 3441 axles. It should be noted that, compared with VEF obtained from the axle load measurement result at Dar es Salaam in 2017, it is considered that measures against overloading of large vehicles have a certain effect, and this measurement result exceeds 10 tonnes per axis was low at 3.5% (6 axles are often overloaded). In addition, since Tanzania applied the East African Joint Vehicle Management Law 2016, the limit axle load was 10 tonnes from March 2019, and vehicles over 3.5 tonnes were subject to weighing. It is envisioned that thorough overloading measures will be strengthened.

(8) Road related facilities

1) Road ancillary facility survey

1-1) Road signs and markings

Signs based on the “A Guide to Traffic Signing (Ministry of Infrastructure Development Safety and Environment Unit, 2009)”, the installation standard for road signs and road markings in Tanzania, are installed on the target routes. Road markings are disappearing in many cases especially for road markings and pedestrian crossings and periodic maintenance is required to ensure safety.

- Regulatory signs: stop, pause, speed regulation (50 km/h), weight regulation (15T, 10T), etc.
- Warning signs: junctions ahead, pedestrian crossings, hump caution
- Information signs: pedestrian crossing, bus stop information, etc.

1-2) Crosswalks and humps

The locations of pedestrian crossing and humps in section 2-2 are shown below. In addition, installation of these facilities is not seen on the earth road in Section 3.




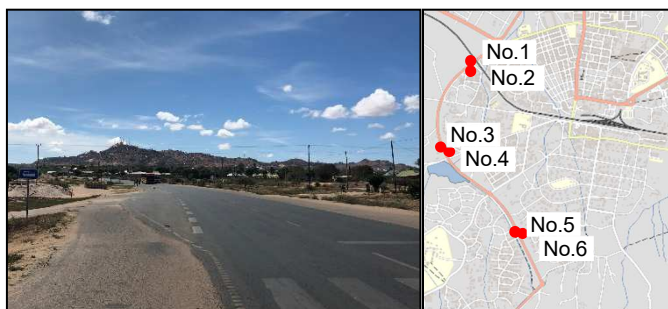
Pedestrian crossing	Hump	Rumble strip
		
<p>Install before junction, near bus stops</p>	<p>Install before junction (on the hump)</p>	<p>Install before junction (before the hump)</p>

Photo 3: Pedestrian crossings and humps on existing roads

1-3) Bus stop

In section 2-2, there are 6 bus stops at the side of the road at intervals of about 1km (0.45, 1.5, both sides of 2.8km point). The bus stop has a sufficient width for the minibus to stop, but no waiting space.

Particular consideration was necessary for the designing locations of bus stops in order to deal with site situations observed where some minibuses stopping and passengers get on and off at locations other than the bus stop.



Source: Study team Fig.17: Existing Bus Stops

1-4) Guard post

In section 2-2, guard posts and guardrails are not installed in most places, and vehicles can cross road shoulders and freely connect to surrounding roads and areas. The guard posts were installed near the target road only near the truck depot on the north side of the Bahi R/A (to prevent truck intrusion).



1-5) Traffic lights, Street lights

In Dodoma city, solar-powered traffic lights are installed only at the junction of Mpwapwa road and A104 road in the central area, and no traffic lights are installed on other roads including the target road. In addition, street lights are not installed on the target roads, but a general power supply with high-intensity discharge lamp (HID) system and solar-power with LED lamp system are installed on some area such as EU rehabilitation section along the side of the road at an interval of 40 to 60 m on each side. In this project, consideration will be given to whether streetlights are installed or not and the type (power supply type or solar type).



(9) Obstacles

In order to confirm obstacles to be affected by the project, site investigation was executed to collect information from the facility Management Company. Also, joint site observation and field trial pit excavation carried out for actual confirmation of location, depth, and diameter of the buried obstacles. The public facilities confirmed in the ROW of the target road, which need to be relocated to implement this plan, are shown below. The relocation / removal will be carried out by the budget of the recipient side, and the completion of securing land without obstacles will be the prerequisite for starting the construction start procedure.

Table 20: Field trial pit excavation

Survey item	Quantity
① Pit excavation	6 locations
② Data collection	6.6km

Table 21: Public facilities within the ROW

Item	Section	Location (km)	Length (m)	Remarks
Relocation (water pipe)	2-2	0.95	60	D150, Depth 0.35m
		0.95	60	D150, Depth 1.10m
	3	0.84	60	D150, Depth 0.40m

		Total	180	D600 excluded due to 1.5m overburden
Relocation (Electricity)	2-2	0.30-0.35	50	East side
		0.925-0.95	25	East side
		1.20-1.33	130	East side
		1.60-1.65	50	East side
		2.20-2.30	100	East side
		2.90-2.96	60	East side
		0.05	60	Access Road
	0.75	60	Access Road	
	2.22	60	Access Road	
	3	1.90-2.10	200	North side
1.00-2.10		1,100	North side	
	Total	1,895		
Relocation (Communication)	2-2	1.00-2.28	1,280	Vodacom, East side
		2.28-3.28	1,000	VTZ, East side
		2.28	60	TTCL, Access road
	3	0.25-0.50	250	VTZ, North side
		Total	2,590	Note: Contract relocation at own expense

Source: Study team

Remark: Sewer pipe cover is over 3.0m, so it is excluded from the relocation list.

1-3-2 Natural conditions

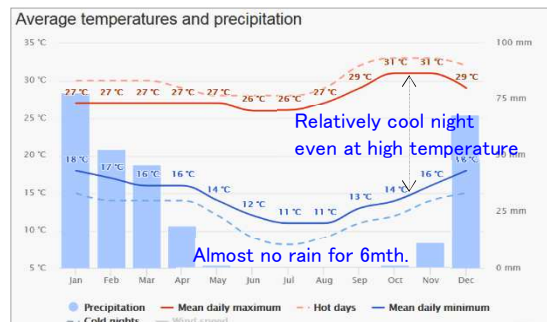
(1) Topography, weather, and earthquake

i) Topography:

The Dodoma area is at a height approx. 1,100 m above sea level, and the city of Dodoma is located in a plain with low hills in the south. The soil consists of colluvial soil caused by erosion of the southern hills and lake sediments in the north, with relatively low fertility and moderate water retention.

ii) Meteorology:

Dodoma Region belongs to the dry plateau climatic zone in the central part of Tanzania. The average annual maximum temperature is 26.6-31.7 °C and minimum temperature is 11.0-18.0 °C. The average annual rainfall is relatively low at 500 to 1000 mm, but the rainfall is concentrated during the rainy season from December to April. In this plan, a construction plan will be drafted in consideration of the effects of these local conditions on various works.



Source: Dodoma National Capital City Master Plan 2019-2039

Fig. 18: Rain fall and high/low temperature

iii) Earthquakes:

Tanzania has two major earthquake risk areas in the east and west, and Dodoma Region belongs to the eastern earthquake area. In the 4 years from 2014, there were 9 earthquakes with a magnitude of 4.5 or more, and this plan will consider seismic resistance as necessary.



Source : National Geographic, UNEP

Fig. 19: Earthquake occurrence

(2) Natural condition survey

1) Topographic survey

For the topographic survey in this survey, the topography, neighbouring houses, road auxiliary facilities,

etc. were reconfirmed based on the F/S design drawings conducted by TANROADS, and then on-site survey was conducted. The longitudinal gradient of the target road is less than 4%, which satisfies the design speed of 80km / hr.

2) Ground survey

In section 2-2, a trial excavation of the existing ground and sampling of soil were performed at 250m intervals between the midpoints of the existing road and the end of the ROW. In addition, a DCP test was conducted on both sides of the trial excavation pit to confirm the geological change position and groundwater level in the transverse direction.

3) Geological boring survey

Since the bearing capacity of the large box culvert was confirmed and bad soil was assumed in Section 3, a boring survey was conducted.

4) Material survey

Aggregate tests for concrete and paving materials and material tests for embankment materials were conducted, and the test results were reflected in planning, design and estimation.

5) Survey of existing roads

In order to confirm the existing pavement structure of the existing road in Section 2-2, trial pit excavation was carried out at a distance of 250 m from each other on the side of the road.

Table 22: Work volume of various surveys

Survey item	Contents	Quantity
Ground survey	① DCP test (every 250m)	104 locations
	② Test pit (every 500m)	19 locations
	③ Laboratory test	One set
Geological boring survey	① Setting	3 locations
	② Boring length	30m
	③ Laboratory test	One set
Material survey	① Sand	2 locations
	② Aggregate	2 locations
	③ Borrow material	2 locations
	④ Laboratory test	One set
Survey of existing roads	① Test pit (every 250m)	14 locations
	② Laboratory test	One set

Source: Study Team

1-4 Environmental and social considerations

(1) Environmental and social considerations for this project

1) Points to note in the study

In this study, the prediction / evaluation of environmental and social impact items, mitigation measures, and preparation of monitoring plans will be made. In addition, confirm the current status of environmental permits based on the Tanzanian EIA Act for the implementation of this project, and the

future procedures and period. Since the EIA survey is being carried out for the F/S conducted by the recipient government, they will be reviewed and additional survey will be conducted in this survey. The points to be noted in the survey are shown below.

- It is assumed that a certain amount of land will be acquired and involuntary resettlement will occur near Bahi RA and Imagi RA.
- The scale and scope of land acquisition and resettlement will be finalized after the RoW of the project is finalized.
- It is necessary to prioritize surveys and road planning studies of sections where land acquisition and involuntary resettlement are expected so that the work of EIA and ARAP carried out by the Government of Tanzania after the RoW is specified will not be delayed.
- The Tanzania Environmental Management Act conducts an environmental impact assessment, and therefore appropriately supports the EIA survey conducted by the Government of Tanzania to include impact factors in terms of social considerations based on JICA guidelines in the survey is required.
- The results of the socio-economic survey on land acquisition and involuntary resettlement conducted in this survey will be shared with the EIA consultants employed by the Government of Tanzania as appropriate. The results of the public consultation conducted at the ARAP stage of this survey will also be shared. It is necessary to provide support for efficient work through mutual cooperation, such as by including it in the EIA survey conducted by the Tanzanian government.

Regarding the current status of the EIA survey on the target roads, it has been confirmed with the National Environment Management Council (NEMC), Tanzania National Roads Agency (TANROADS) headquarters, and TANROADS Dodoma regional office during the survey. In addition, the scale and scope of land acquisition and involuntary resettlement were confirmed through interviews at the site, Dodoma City Council (DCC) and other relevant organizations. At the time of the first survey, it is considered that there are about 25 houses in the area affected by this plan in section 3a. By the end of February 2020, when the work of compiling EIA and RAP reports by TANROADS will be completed, the number of affected houses and the number of affected residents will be known (As a result, 43 households and 187 PAPs were identified. Refer to item 3-6-6 (1) for details).

2) Project components which possibly cause environmental and social impacts

This project is not one of the large-scale projects in road sectors listed in the Japan International Cooperation Agency Environmental and Social Consideration Guidelines (April 2010) (hereinafter “JICA Environmental Guidelines”), and its undesirable effects on the environment are insignificant. This project is classified into environmental category B because according to the JICA Environmental Guidelines, it does not fall under the characteristics that are prone to influence or the areas that are easily affected. The summary of the project is described below.

Table 23: Overview of the project

Name of the Project	The Preparatory Survey on the Project for Construction of Dodoma City Inner Ring Road in the United Republic of Tanzania
---------------------	--

Implementing Agency	Tanzania National Roads Agency (TANROADS)
Target area and section	Section 2-2 (Start point: Bahi R/A End point: Imagi R/A) 3.4km Section 3 (Start point: Imagi R/A End point: Makulu R/A) 3.1km
Target length	Approx. 6.5km
Main components	Widening an additional 2-lane road beside the existing 2-lane road in section 2-2, Construction of new two-lane road to section 3 and maintenance of secondary roads, traffic management facilities, and traffic safety facilities
Bridges and specific structures	No bridges and specific structures in the target section

(2) Environmental and Social Conditions for the Project Area

1) Socioeconomic Situation

According to the 2017 Tanzania Human Development Report (THDR), the gross domestic product (GDP) of the state of Dodoma was 2,635,574 million Tshs in 2015 (132 billion yen equivalent), and the GDP per capita was 1,188,343 Tshs (59,000 yen equivalent). Looking at the Human Development Index (HDI) index, the HDI value in Dodoma was 0.479, ranking 17th out of 26 in the mainland Tanzania. The average HDI value of the mainland of Tanzania is 0.614. The average life expectancy in Dodoma is 64.4, which is longer than the 61.7 in mainland Tanzania.

1-1) Local Administration

Dodoma is located in the central part of the inland mainland of Tanzania with a total area of 41,311 km². It is bordered by the Manyara region in the north, the Morogoro region in the east, the Iringa region in the south, and the Singida region in the west. The state is divided into the following seven districts (counties), which consist of 209 districts and 607 villages.

- Dodoma Urban
- Kondoa
- Kongwa
- Chemba
- Bahi
- Mpwapwa
- Chamwino

1-2) Demography

The population of Dodoma Province has increased significantly in recent years, following the declaration by the Government of Tanzania that “the government will be completely transferred to Dodoma City by 2020”. According to a census conducted in 2002, the population of Dodoma province was 1,086,748 and increased to 2,083,588 in 2012. According to the latest statistics in 2019, the population is 2,568,514, which is a growth rate of 3% over the previous year (2,492,989). The table below shows the population changes for the last two years in each county.

Table 24: Changes in the population of Dodoma

Region/District	Year	Population		
		Total	Male	Female
Dodoma region	2018	2,492,989	1,220,495	1,272,494
Dodoma region	2019	2,568,514	1,258,324	1,310,190
Dodoma district	2018	506,942	247,624	259,318
Dodoma district	2019	523,010	255,112	267,898
Bahi district	2018	263,780	126,898	136,882
Bahi district	2019	271,069	130,534	140,535
Kondoa district	2018	241,897	124,451	117,446
Kondoa district	2019	250,307	128,813	121,494
Mpwapwa district	2018	368,037	178,402	189,635

Mpwapwa district	2019	378,940	184,017	194,923
Kongwa district	2018	372,407	179,645	192,762
Kongwa district	2019	383,701	185,533	198,168
Chamwino district	2018	396,138	190,953	205,185
Chamwino district	2019	405,260	195,815	209,445
Chemba district	2018	274,083	137,798	136,285
Chemba district	2019	283,731	142,539	141,192

Source: Created based on TANROADS Dodoma Office data

1-3) Economic Activities

About 75% of Dodoma residents' income sources are agriculture and livestock, and 25% of the population is engaged in small businesses such as retail stores, carpentry and grocery stores. Other economic activities include SMEs, consultancy, construction, etc. The main industrial products are wine, mattresses, furniture and mineral water. Other examples include honey, wax, herbs, etc.

1-4) Employment

General formal employment is found in many departments of education, government agencies, health and administration, under local authority. Most local residents are engaged in customary employment, and most of them are self-employed in various types of economic activities such as agriculture and livestock raising in the village. However, there is a gap between the growth of the population and the growth of the employment sector, and unemployment remains a problem.

1-5) Poverty

The local economy is dominated by self-sufficient production activities in which the products are directly consumed. Most residents are engaged in agricultural activities and the production method is traditionally labour intensive. Social inequality is seen, and the gap between the rich and poor is large. According to the 2018 Household Budget Survey (HBS), a monthly income of Tsh 49,320 (2,466 yen equivalent) or less per adult is defined as “poor”. The poverty rate in Tanzania is down from 34.4% in 2007 to 26.4% in 2018. According to a household survey of 2017/2018, the poverty rate in Dodoma City is estimated to be 23.2%.

2) Land Use

Land in the area is mainly used for subsistence agriculture, grazing and forest reserves. The estimated area of food crop production is 107,249 hectares, of which approximately 49,304 hectares are for cash crop production. It is also subdivided into rangelands (39,447 hectares), forest reserves (30,046 hectares), open lands (11,362 hectares) and urban areas (39,492 hectares). In urban areas, roads that can be accessed all year round are limited, and in the rainy season, access to rural areas becomes extremely difficult.

3) Ecosystem

The land in the area is mainly covered with short grass, and the hills are scattered with trees and shrubs. The natural vegetation type is a thicket consisting mainly of acacia, cactus and wild sisal plants. Natural vegetation is partially exposed and degraded due to livestock grazing and frequent wildfires. There are no national parks, wildlife, or animal reserves around the target area of the project, but some areas have livestock and are home to small mammals, birds, reptiles, and insects.

(3) Legislation and Institution for Environmental and Social Considerations in Tanzania

1) Environmental Administration in Tanzania

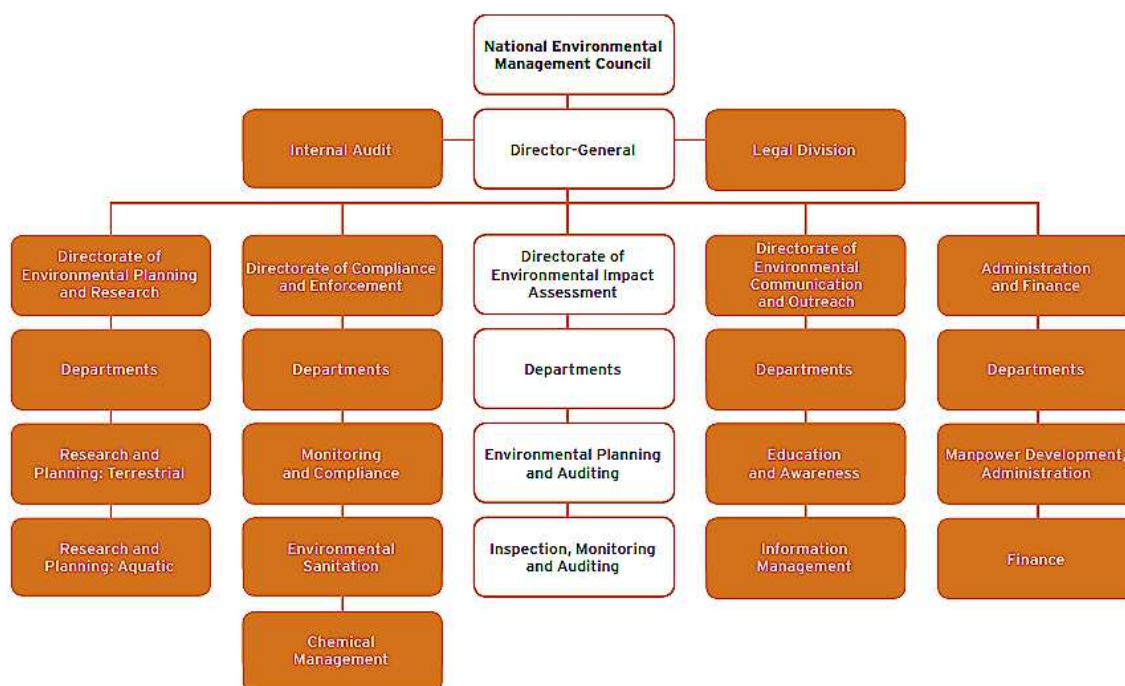
The related organizations and their roles related to environmental and social considerations in Tanzania related to this project are shown in the table below.

Table 25: Related organizations of this project and their roles

Country level	Main role
Ministry of Works, Transport and Communications (MoWTC)	<ul style="list-style-type: none"> • Coordinate policymaking and national environmental agencies to oversee the implementation of national environmental policies. • Ensure compliance with Cap 191 (EMA Cap. 191) of the Environmental Management Act. • Implementation of all environmental issues included in the relevant laws and reporting to NEMC. • For all environmental issues, cooperate with NEMC to cooperate on environmental governance.
Tanzania National Roads Agency (TANROADS)	<ul style="list-style-type: none"> • Financing and implementation of government projects of the United Republic of Tanzania. • Instructing environmental and social issues to be considered during project planning, design, construction and implementation.
Division of Environment Vice Presidents Office (VPO-DOE)	<ul style="list-style-type: none"> • Development of environmental policy. • Coordination and supervision of environmental problems • Review and approve ESIA reports, issue EIA certificates
National Environmental Management Council (NEMC)	<ul style="list-style-type: none"> • Conduct Environmental Impact Assessments (EIA), including compliance, review and monitoring, including facilitating the process of citizen participation in environmental decision making. • Ensure that the project is carried out in an environmentally friendly and socially acceptable manner.
State level	Main role
Tanzania National Roads Agency (TANROADS) Dodoma	<ul style="list-style-type: none"> • Implementation of projects at the regional level representing TANROADS HQ. • Support TANROADS HQ in supervising the implementation of environmental mitigation measures by contractors.
Dodoma City Council	<ul style="list-style-type: none"> • Coordination of environmental management items at the regional level. • Issuance of land use plans and development permits within the jurisdiction. • Oversees the implementation of environmental mitigation measures by contractors through the Environmental Management Officer (EMO).
County, village level	Main role
Project road's wards and villages development committee	<ul style="list-style-type: none"> • Responsible for environmental management issues within the jurisdiction. • Supervision of implementation of environmental mitigation measures by contractors at the construction stage.

Source: Survey Team

The responsible body for conducting EIAs in Tanzania is the National Environment Management Council (NEMC). NEMC, which belongs to the Vice President's Office, has legal authority over environmental conservation and environmental management, and plays a role in making recommendations to the Vice President's Office in all matters related to the environment. It is also responsible for environmental-related supervision such as implementation of EIA, compliance, screening and monitoring.



Source: SADC Environmental Legislation Handbook 2012

Fig. 20: NEMC Organization Chart

2) Relevant legislation and regulation

The basis of environmental legislation in Tanzania is the Environmental Management Act (2004 / Gazette Number No.20 of 2004) which came into effect in November 2004. Environmental regulations are stipulated. The following are laws related to environmental impact assessment in Tanzania.

Table 26: Tanzania's environmental impact assessment-related policies and legal systems

Classification	Name
Policy	National Environment Policy, 1997
	National Transport Policy, 2002
	National Construction Policy
	National Policy on HIV/AIDS, 2001
	National Human Settlements Development Policy (2000)
	Women and Gender Policy, 2002
	National Water Policy, 2002
	National Strategy for Growth and Reduction of Poverty, 2002
	National Energy Policy, 1992
Related legal system	The Constitution of Tanzania, 1977
	Environmental Management Act, 2004
	Environmental Impact Assessment and Audit Regulations, 2005
	The Water Resource Management Act, 2009
	The Forest Act, 2002
	The Mining Act, 2010
	The Occupational Health and Safety Act, 2003
	Employment and Labour Relations Act, 2004
	HIV and AIDS (Prevention and Control) Act, 2008
	Local Government (District Authorities) Act, 1982 and The Local Government Laws (Miscellaneous Amendments) Act, 2006

Source: Study Team

3) Relevant legislation and regulation

The environmental quality standards and emission standards for air pollution in the National Environmental Standards Compendium, 2005 are shown in Tables below.

Table 27: Ambient air quality standards

Pollutant	Guideline	Limit Level
SO _x	Annual mean of 40 – 60 µg/Nm ³ (0.05 – 0.08 mg/kg) or 24-hour average 100 µg/Nm ³ (0.129 mg/kg)	Daily average of hourly values shall not exceed 0.1 mg/kg 0.5 mg/Nm ³ for 10 minutes
CO	Aims at preventing carboxyhaemoglobin levels exceeding 2.5% – 3% in non-smoking people	A maximum permitted exposure of 100 mg/Nm ³ for periods not exceeding 15 minutes Time-weighted exposure at the following levels: · 100 mg/Nm ³ for 15 minutes · 60 mg/Nm ³ for 30 minutes · 10 mg/Nm ³ for 8 hours or Daily average of hourly values shall not exceed 10 mg/kg and average of hourly values in eight consecutive hours shall not exceed 20 mg/kg.
Black smoke	40 ~ 60 µg /Nm ³ (0.05-0.08mg/kg)	Daily average of hourly values shall not exceed 0.10 µg/Nm ³
PM ₁₀	60~90 µg/Nm and 3 3 (0.05~0.116mg/kg)	hourly values shall not exceed 0.20 µg/Nm ³
NO _x	Annual mean of 0.1 µg/Nm ³	150 µg/Nm ³ for 24-hours average value 120 µg/Nm ³ for 8 hours
Pb	Annual mean of 0.5 – 1.0 µg/Nm ³	1.5 µg/Nm ³ for 24-hours average value
O ₃	Annual mean of 10 – 100 µg/Nm ³	120 µg/Nm ³ for 8-hours average value

Source: National Environmental Standards Compendium, 2005

Table 28: Air quality emission limits

Pollutant	Guideline	Limit Level
SO _x	LCP using solid fuel with thermal effect of: 50 – 100 MWth	850 mg/Nm ³
	100 ~ 300 MWth	200 mg/Nm ³
	>300 MWth	200 mg/Nm ³
	LCP using liquid fuel with thermal effect of: 50 – 100 MWth	850 mg/Nm ³
	100 ~ 300 MWth	400 to 200 mg/Nm ³
	>300 MWth	200 mg/Nm ³
	LCP using gaseous fuel	35 mg/Nm ³
	LCP using low calorific gases from gasification of refinery residues, coke oven gas, blast furnace gas	800 mg/Nm ³
CO	Liquid fuel combustion with heat output exceeding 5 MW	Not to exceed 175 mg/Nm ³
	Solid fuel combustion with the heat output exceeding 50 MW	Not to exceed 250 mg/Nm ³
Black smoke	–	Not to exceed 20 mg/Nm ³
PM ₁₀	Inert dust, including cement	Not to exceed 250 mg/Nm ³ (24-hour mean value)
NO _x	LCP using solid fuel with	Yearly average of: 600 mg/Nm ³

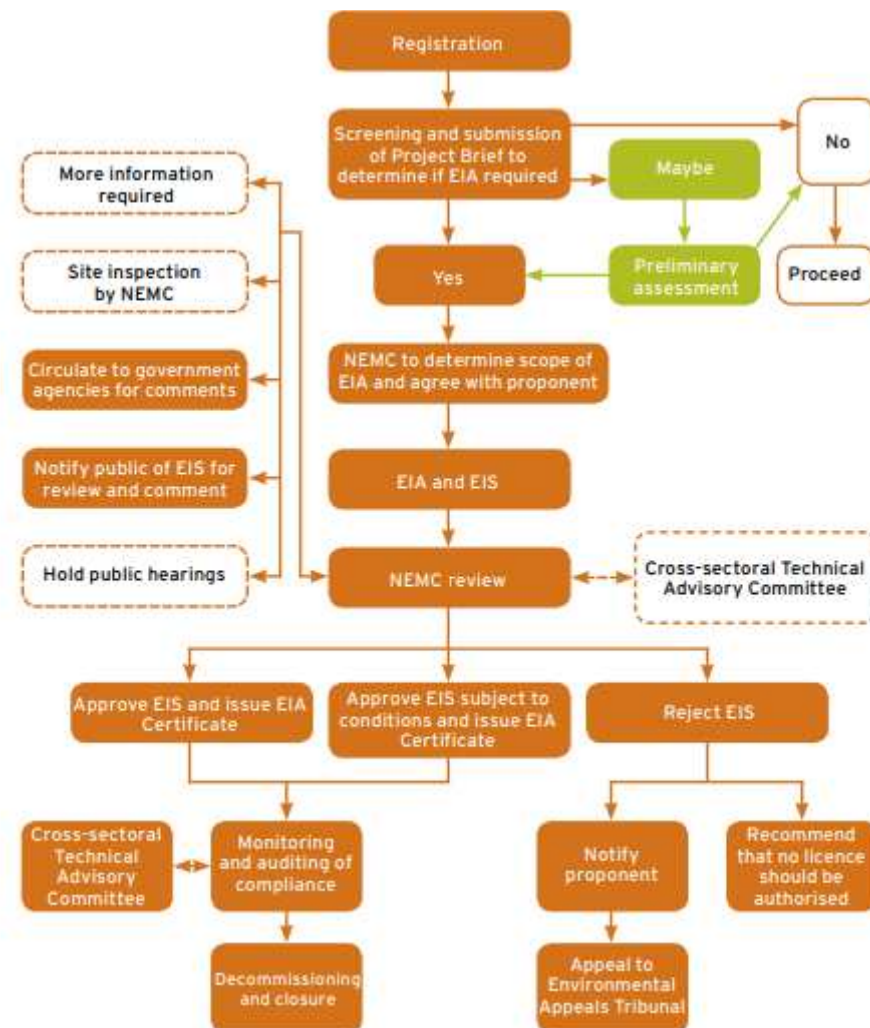
	thermal effect of: 50 – 500 MWth	
	>500MWth	500 mg/Nm ³
	LCP using liquid fuel with a thermal effect of: 50 – 500 MWth	450 mg/Nm ³
	>500MWth	400 mg/Nm ³
Pb	Less than 5 tonnes of lead or lead component per year from fixed pollution sources (measured value of lead component)	200 mg/Nm ³

Source: National Environmental Standards Compendium, 2005

(4) Environmental Impact Assessment (EIA) process in Tanzania

1) EIA authorization process

Legal regulations relating to EIA in Tanzania are provided in Chapter 6 of the Environmental Management Act. The projects that require EIA approval are stipulated for a total of 22 sectors such as transportation infrastructure, agriculture, and energy. EIA approval is also required for new road construction, expansion, and improvement projects. The Tanzania EIA process is defined as follows.



Source: SADC Environmental Legislation Handbook 2012

Fig.21: EIA approval process

① Registration

The proponent is required to register a project with NEMC by submitting duly filled EIA application form.

② Screening

Screening is an initial review step in the EIA process. Thus, the EIA application forms and Project Brief are screened in order to assess and establish the category of project and determine the level of EIA required. This is done by NEMC within 45 working days after submission of EIA application forms.

③ Scoping

If the screening indicates that a full EIA is required, identification of main issues of concern through scoping will be conducted by the developer through his Consultant. This is done by consulting all the relevant concerned parties. Draft terms of references (ToR) will then be prepared to guide the impact assessment study. A Scoping Report and draft Terms of Reference (ToR) are submitted to NEMC for review and approval. ToR is reviewed within 14 days after submission.

④ Impact Assessment

Conducting EIA study is done after approval of ToR by NEMC. The Consultant uses the ToR to conduct the actual EIA study. The crucial task is to identify likely impacts, assess and evaluate their severity and magnitude and propose mitigation measures to minimise potential negative impacts and enhance positive benefits. The output of this stage is an EIA report, also known as Environmental Impact Statement (EIS). This includes an Environmental Management plan (EMP) as well as a Monitoring Plan (MP) that outline management and monitoring of anticipated impacts, including those, which affect local communities in the project area. Public consultation is mandatory when conducting an EIA and the proponent (through his consultant) must meet key stakeholders to get their views.

⑤ Review

Once the proponent has submitted an EIA report (EIS), NEMC conducts site verification visit. The site visit is conducted to verify information provided in the EIS report. NEMC then coordinates a cross-sectoral Technical Advisory Committee (TAC) to review the EIS. The TAC is composed of members from sectors responsible for environment and resource management. Review of EIS is completed by NEMC within 60 days from the date it was received by NEMC, and this is as required by EMA 2004. The Minister may within 30 days, upon receipt of recommendations of the Council approve or disapprove the EIS.

⑥ Public hearing

As part of the review process a public hearing may be necessary to address public concerns over a proposed activity or project. Normally this takes place when major concerns have been raised by the public and potential negative impacts of the proposed project are perceived to be far reaching. Other critical factors that may necessitate public hearing are sensitivity of the site location, type and scale of project, technology used, multiple land use considerations, presence of relocation and resettlement issues, cumulative impacts and any other factor related to a particular project that might cause public concern.

⑦ Environmental decision-making

After submission of the final version of the EIS, NEMC assesses it in order to ascertain whether all the

TAC comments and recommendations have been adequately addressed by the consultant. Thereafter terms and conditions for issuance of the EIA Certificate are prepared by NEMC. Approval/disapproval of the EIS is done by the Minister responsible for Environment as stipulated in EMA 2004 section 92 (1).

⑧ Appeals

Both the proponent and the affected or interested parties have the right to appeal. If there is dissatisfaction on the decision reached, provision for appeal to the Environmental Tribunal or Court of law is provided by law.

⑨ Project implementation

This is conducted according to the terms and conditions of approval and is guided by the Environmental Management and Monitoring Plans.

⑩ Monitoring

Day to day internal monitoring (also known as routine monitoring) is done by the developer (project management team), but compliance monitoring is done by NEMC in collaboration with key stakeholders and regulatory bodies.

⑪ Environmental Audit

There are two levels of Environmental Audits, i.e. Environmental Impact Audit and Environmental Management Audit. Environmental Impact Audit involves comparing the impacts predicted in an EIS with those that actually occur after implementation of the project while Environmental Management Audit involves checks against adherence to plans, mitigation measures and general compliance of terms and conditions.

2) **Comparison of JICA Environmental and Social Consideration Guidelines and Environmental and Social Consideration Policy in Tanzania**

Table below shows the results of a comparative study of the gaps in the Tanzanian Decree and JICA Guidelines conducted in this project. As a result of the examination, no particular difference was found that necessitated adjustments, but there is no provision for monitoring information disclosure in the Tanzanian law.

Table 29: Comparison of JICA Environmental and Social Consideration Guidelines with Tanzania's Environmental Consideration Policy

Items	JICA Environmental and Social Consideration Guidelines	Tanzania's legal system	Gap and coping policy
Basic matters	- Environmental impacts that may be caused by projects must be assessed and examined in the earliest possible planning stage. Alternatives or mitigation measures to avoid or minimize adverse impacts must be examined and incorporated into the project plan. (JICA Guideline, Appendix 1.1)	There is an environmental assessment system specified by EMP. (The Environmental Management Act 2004)	No gap is found
Information Disclosure	- EIA reports (which may be referred to differently in different systems)	- EIA reports, etc. are to be written in a language that can	No gap is found

Items	JICA Environmental and Social Consideration Guidelines	Tanzania's legal system	Gap and coping policy
	<p>must be written in the official language or in a language widely used in the country in which the project is to be implemented. When explaining projects to local residents, written materials must be provided in a language and form understandable to them;</p> <ul style="list-style-type: none"> - EIA reports are required to be made available to the local residents of the country in which the project is to be implemented. The EIA reports are required to be available at all times for perusal by project stakeholders such as local residents and copying must be permitted (JICA Guideline, Appendix2) 	<p>be understood by those involved. (The Environmental Impact Assessment and Audit Regulations, 2005)</p>	
Consultation with Local Stakeholders	<ul style="list-style-type: none"> - For projects with a potentially large environmental impact, sufficient consultations with local stakeholders, such as local residents, must be conducted via disclosure of information at an early stage, at which time alternatives for project plans may be examined. The outcome of such consultations must be incorporated into the contents of project plans. (JICA Guideline, Appendix 1, Social Acceptability.1) - In preparing EIA reports, consultations with stakeholders, such as local residents, must take place after sufficient information has been disclosed. Records of such consultations must be prepared; - Consultations with relevant stakeholders, such as local residents, should take place if necessary throughout the preparation and implementation stages of a project. Holding consultations is highly desirable, especially when the items to be considered in the EIA are being selected, and when the draft report is being prepared; (JICA Guideline, Appendix 2. Illustrative Environmental Impact Assessment Report for Category A Projects) 	<ul style="list-style-type: none"> - Residents are given the opportunity to participate from the screening stage of the project. A public hearing will be held by NEMC during the review period of the EIA report, the EIA report will be published, and comments will be accepted verbally and in writing. In addition, the EIA report is stored as an official document at NEMC and can be viewed when needed. (The Environmental Impact Assessment and Audit Regulations, 2005) 	No gap is found
Impacts to be assessed	<ul style="list-style-type: none"> - The impacts to be assessed with regard to environmental and social considerations include impacts on human health and safety, as well as on the natural environment, that are transmitted through air, water, soil, 	<p>Criteria for screening:</p> <ul style="list-style-type: none"> • The project should not be located in the following areas and should not affect the following areas. (a) National park 	No gap is found

Items	JICA Environmental and Social Consideration Guidelines	Tanzania's legal system	Gap and coping policy
	<p>waste, accidents, water usage, climate change, ecosystems, fauna and flora, including trans-boundary or global scale impacts. These also include social impacts, including migration of population and involuntary resettlement, local economy such as employment and livelihood, utilization of land and local resources, social institutions such as social capital and local decision-making institutions, existing social infrastructures and services, vulnerable social groups such as poor and indigenous peoples, equality of benefits and losses and equality in the development process, gender, children's rights, cultural heritage, local conflicts of interest, infectious diseases such as HIV/AIDS, and working conditions including occupational safety. (JICA Guideline, Appendix 1. Scope of Impacts to Be Assessed.1)</p> <p>- In addition to the direct and immediate impacts of projects, their derivative, secondary, and cumulative impacts as well as the impacts of projects that are indivisible from the project are also to be examined and assessed to a reasonable extent. It is also desirable that the impacts that can occur at any time throughout the project cycle should be considered throughout the life cycle of the project. (JICA Guideline, Appendix 1, Scope of Impacts to Be Assessed.2)</p>	<ul style="list-style-type: none"> (b) Wetlands (c) Productive farmland (d) Important archaeological, historical and cultural sites (e) Areas protected by law (f) Areas inhabited by rare or endangered species (g) Unique or prominent area (h) Mountains, on or near hills on steep slopes (j) Lake and near the lakeside (k) Development of resources important to vulnerable groups (l) Densely populated areas where further development can cause significant environmental problems Areas with active industrial activities and their vicinity (m) Major groundwater recharge areas or areas important for water surface runoff <ul style="list-style-type: none"> • The project should not produce the following results <ul style="list-style-type: none"> (a) Policies to encourage increased agricultural subsidies to impact or mitigate the negative impact (b) Major changes in land tenure (c) Changes in water use through irrigation, drainage or dams, changes in fisheries <ul style="list-style-type: none"> • The project does not have the following effects <ul style="list-style-type: none"> (a) Adverse effects on socioeconomics (b) Land deterioration (c) Water pollution (d) Air pollution (e) Adverse effects on wildlife and their habitats (f) Adverse effects on climate and water cycle (g) By-products, residues or wastes that require treatment and disposal by methods not regulated by existing authorities <ul style="list-style-type: none"> • The project should not cause public concern due to 	

Items	JICA Environmental and Social Consideration Guidelines	Tanzania's legal system	Gap and coping policy
		<p>potential environmental changes. The guideline is as follows.</p> <p>(a) Primarily, are the early effects good or harmful?</p> <p>(b) What is the magnitude of the impact on the number of affected people and wildlife species?</p> <p>(c) How strong is the impact?</p> <p>(d) What about the duration of the impact?</p> <p>(e) Is there a cumulative effect of the impact?</p> <p>(f) Do those effects lead to political debate?</p> <p>(g) Does it bring major economic, ecological and social costs?</p> <p>(h) Does the impact vary by social organization and gender?</p> <p>(i) Is there an international impact of the proposed project?</p> <p>(The Environmental Management Act 2004)</p>	
Monitoring, handling of grievance, etc.	<p>- Project proponents etc. should make efforts to make the results of the monitoring process available to local project stakeholders. (JICA Guideline, Appendix 1, Monitoring,3)</p> <p>- When third parties point out, in concrete terms, that environmental and social considerations are not being fully undertaken, forums for discussion and examination of countermeasures are established based on sufficient information disclosure, including stakeholders' participation in relevant projects. Project proponents etc. should make efforts to reach an agreement on procedures to be adopted with a view to resolving problems. (JICA Guideline, Appendix 1, Monitoring,4)</p>	<p>NEMC is supposed to conduct an environmental audit. The operator that created the EIA retains monitoring data, prepares an annual report, and reports the results of the initial plan to NEMC. In addition, if there is a negative impact, plan and implement appropriate mitigation measures. (The Environmental Management Act 2004)</p>	<p>There are no provisions regarding the publication of monitoring results.</p>
Ecosystem and Biota	<p>Projects must not involve significant conversion or significant degradation of critical natural habitats and critical forests.</p>	<p>Under The Environmental Management Act 2004, the Minister of the Environment will determine the protected area in consideration of the ecosystem / biological fauna,</p>	<p>Under Tanzania's domestic law, there is still room for business approval even within national</p>

Items	JICA Environmental and Social Consideration Guidelines	Tanzania's legal system	Gap and coping policy
		characteristics, interests of local residents, harmony with the international community, etc. (Article 47). The National Policies for National Parks in Tanzania, 1994 state that the main purpose of establishing national parks is to conserve resources and pass them on to the next generation (Chapter 3.1), on the other hand, in national parks, when conducting a business, an environmental impact assessment is conducted, and the business is licensed in consideration of the positive and negative impacts (Chapter 2.9).	parks, depending on the results of the environmental impact assessment. It does not go into the need for an analysis of whether economic benefits outweigh environmental costs.

Source: Survey Team

3) EIA of this project

According to the Environmental Impact Assessment and Audit Regulations, 2005, this project is within the scope of the list of projects (the First Schedule, Mandatory list A, 9-(i)) that require environmental impact assessment. It also includes projects such as new construction, expansion, and improvement of roads, and is required to carry out environmental impact assessment (EIA). In this project, the EIA survey was conducted at the stage of F/S survey and schematic design by Tanzanian stakeholders, and the procedure for approval is in progress. In this project, an ESIA (Environmental and Social Impact Assessment) survey is being conducted. Scoping report and EIA draft TOR were submitted to NEMC for approval in June 2019. However, the procedure has been delayed due to the influence of COVID-19. The EIA report was submitted to NEMC in May 2020 for review and is expected to be approved in early October. TANROADS is in the process of proceeding with the initial target section of F/S until the end of June 2020 with the aim of acquiring an EIA license. According to Article 7, Article 35 of the Environmental Impact Assessment and Auditing Regulations, if a design change occurs after the EIA license is issued, the executing agency must submit Form 5 to NEMC for additional examination regarding the design change content. If it is necessary to change the acquired EIA license, the procedure is as follows.

- i) Report changes to NEMC (screening will be conducted at NEMC)
- ii) Submit Form 5 to NEMC if necessary depending on the results of screening by NEMC
- iii) EIA approval of changes
- iv) EIA correction according to NEMC's instructions

The NEMC procedure described above is expected to take 1-2 months.

In the additional study conducted in February 2020, the target area of the Tanzania EIA study is 500 meters to the left and right of the road centre line, and the linear changes in the final part of section 3 of this project are within that range. Therefore, it was confirmed that the change procedure of EIA is unnecessary because the second half of section 3 is the wilderness and there is no significant change in the natural environment due to the linear change.

Table 30: EIA license acquisition schedule (draft)

Steps	Responsible organization	2019												2020			2021					
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	to	Dec	Jan	Feb	Mar					
Budget approval	TANROADS																					
Registration	TANROADS																					
Screening	NEMC																					
Creating a scoping report	TANROADS																					
Approve scoping report	NEMC																					
Conducting EIA survey	TANROADS																					
Submitting EIA report	TANROADS																					
EIA Report Review	NEMC																					
EIA Report Correction	TANROADS																					
EIA authorization approval	Minister																					

Source: Study Team

(5) Comparative examination of alternatives (including plan not to carry out the project)

From the viewpoint of reducing the negative impact on the social environment, including land acquisition and resettlement, a comparison was made between this plan (2 lanes), alternative / initial request (4 lanes), and plan not to carry out the project.

Table 31: Comparison of Alternative Options

Item	Final plan (2 lanes)	Alternative (4 lanes)	Plan not to carry out the project
Project components	<ul style="list-style-type: none"> Road construction Section 2-2: Widening of additional 2-lane roads beside existing 2-lane roads (Start point: Bahi R / A End point: Imagi R/A) Section 3: New 2-lane road (Start point: Imagi R / A End point: Makulu R / A) Development of secondary roads, traffic management facilities, and traffic safety facilities 	<ul style="list-style-type: none"> Road construction Section 2-2: Widening of additional 2-lane roads beside existing 2-lane roads (Start point: Bahi R / A End point: Imagi R / A) Section 3: New 4-lane road (Start point: Imagi R / A End point: R / C Office) Development of secondary roads, traffic management facilities, and traffic safety facilities 	-
Transportation demand / capacity	The traffic congestion in the city can be eased to meet future traffic demand.	The traffic congestion in the city can be eased to meet future traffic demand.	-
Technical point of view	Expansion of existing roads and construction of 2-lane roads	Expansion of existing roads and construction of 4-lane roads	-
			-
Project effect	It is expected that the living environment in the city centre will be greatly improved by detouring large vehicles that pass through the centre of Dodoma to the target road.	It is expected that the living environment in the city centre will be greatly improved by detouring large vehicles that pass through the centre of Dodoma to the target road.	-
Economic efficiency	Approximately 80% of the project cost of the alternatives, more economical	Approximately 1.25 times the project cost of the final plan, which is economically disadvantageous	-

Degree of difficulty in construction	Does not include special construction	Does not include special construction	-
Maintenance	Daily Inspection and Periodic Repair Work	Daily Inspection and Periodic Repair Work	-
Social environment	In Section 2-2, no resettlement will occur due to the widening of the road. In Section 3, 43 households and 187 people are expected to move due to new road construction.	In Section 2-2, no resettlement will occur due to the widening of the road. In Section 3, due to the construction of new 4-lane roads, the number of relocations is expected to be approximately double that of the plan.	No impact is expected.
Natural environment	Although trees in the ROW will be felled, no significant impact on the ecosystem is expected.	Although trees in the ROW will be felled, no significant impact on the ecosystem is expected.	No impact is expected.
Comprehensive evaluation	○	△	-

Source: Study Team

(6) Scoping plan

The scoping (draft) of this project is shown below.

Table 32: Provisional Environmental Scoping

Category	Environmental Item	Provisional Scoping of Impact		Description	
		Construction	Operation		
Pollution Control	1	Air Quality	✓		Under construction: • Exhaust gas and dust are expected to be emitted temporarily due to the operation of construction equipment. In service: • By reducing traffic congestion, exhaust gas will be reduced in urban areas.
	2	Water quality	✓		Under construction: • There is a possibility of water pollution due to drainage from construction sites, heavy equipment, vehicles and construction dormitories. In service: • Water quality is not expected to deteriorate due to the installation of appropriate road drainage facilities.
	3	Waste	✓		Under construction: • It is expected that waste (general waste, construction soil and waste materials, etc.) will be generated from the construction site, construction office, and lodging. In service: • Waste is not expected to affect the surrounding environment.
	4	Soil Contamination			Under construction: • There is a possibility of temporary oil leakage from heavy construction equipment, but it is limited. In service: • Soil pollution is not expected.
	5	Noise and Vibration	✓	✓	Under construction: • In areas where houses are close to each other, it is expected that noise and vibration will occur around the construction section due to heavy construction equipment and material

Category	Environmental Item	Provisional Scoping of Impact		Description	
		Construction	Operation		
				loading and unloading vehicles. In service: <ul style="list-style-type: none"> It is expected that noise and vibration levels will increase near the roadside due to new road construction and widening. It is expected that noise and vibration levels will increase along with the increase of traveling speed around the road. 	
	6	Ground Subsidence		Under construction: <ul style="list-style-type: none"> There will be no impact because pumping of groundwater will not occur. In service: <ul style="list-style-type: none"> There are no factors that cause subsidence. 	
	7	Odour		Under construction: <ul style="list-style-type: none"> There is a possibility that a foul odour will be generated when the emulsion is sprayed on the asphalt pavement or when the asphalt mixture is laid, but it is temporary. In service: <ul style="list-style-type: none"> No offensive odour is expected. 	
	8	Bottom Sediment		No work is expected to affect bottom sediment.	
Natural Environment	9	Protected Areas		There are no national parks or protected areas in or around the project site.	
	10	Ecosystem		There are no rare flora and fauna in the project area, and no impact on the ecosystem is expected.	
	11	Hydrology		Under construction: <ul style="list-style-type: none"> Existing drainage can be changed temporarily and locally, but work that causes changes in the flow of water such as rivers is not expected. Muddy water will be generated due to the construction, but there is no possibility of affecting the water conditions in the discharge destination water area. In service: <ul style="list-style-type: none"> In order to properly guide the road drainage to the end of the road, a new drainage system is planned to be constructed on the road site, and the end of the drain will not be changed. There is no possibility of affecting the hydrology of rivers or other water bodies where the water is released. 	
	12	Topography and Geology		Since large-scale cutting and embankment are not planned for this project, it is considered that there will be little impact on topography and geology.	
Social Environment	13	Resettlement	✓	Before construction: <ul style="list-style-type: none"> It is expected that about 25 households will be relocated due to road acquisition and land acquisition for new construction. In service: <ul style="list-style-type: none"> No additional land acquisition or resettlement is expected after the start of operation. 	
	14	People in poverty	✓	✓	If the residents affected by this project belong to the poor, or if the negative impact of this project on the residents' lives is significant, it may be difficult to maintain the lives of the residents. A survey is necessary to understand the living conditions of the residents affected by this project and the extent of the impact of this project on the residents' lives.
	15	Ethnic Minorities and Indigenous	✓	✓	It is necessary to confirm whether there are ethnic minorities and indigenous peoples in and around the project site.

Category	Environmental Item	Provisional Scoping of Impact		Description
		Construction	Operation	
	People			
16	Local economy: Employment and means of livelihood, etc.	✓	✓	<p>Before construction:</p> <ul style="list-style-type: none"> Land acquisition and resettlement may affect the livelihoods of affected people. <p>In service:</p> <ul style="list-style-type: none"> Road widening will contribute to smooth traffic and shortening of travel time will contribute to the development of the local economy centred on Dodoma City and the promotion of industry. There is a possibility that the movement of residents will be affected in the area where the house is located.
17	Land Use and Natural Resources		✓	<p>Under construction:</p> <ul style="list-style-type: none"> There is no change in land use because this is a project to maintain the road site. <p>In service:</p> <ul style="list-style-type: none"> Contribute to the effective use of local resources by improving transportation conditions between cities.
18	Water Use			It is assumed that the existence of roads and the passage of vehicles will not affect water use.
19	Existing Social Infrastructure and Institution	✓	✓	<p>Before construction:</p> <ul style="list-style-type: none"> Land acquisition and resettlement may affect the livelihoods of affected people. <p>In service:</p> <ul style="list-style-type: none"> Improvement of access to public facilities due to road maintenance. There is a possibility that the movement of residents will be affected in the area where the house is located.
20	Social infrastructure and social organizations such as local decision making bodies, etc.			It is assumed that no serious impact on local social organizations will occur.
21	Deviations in damage and convenience			The construction of this project is not expected to have unfairly beneficial or negative impacts within the region since it is to be implemented in the existing ROW..
22	Local conflicts of interest			This project is unlikely to cause conflicts of interest in the region.
23	Cultural assets			There are no cultural heritage sites in and around the project site.
24	Landscape			The construction of this project is not expected to have a negative impact on the landscape.
25	Gender	✓		<p>Under construction:</p> <ul style="list-style-type: none"> It is necessary to consider the gender ratio of female construction workers as well as in public hearings. <p>In service:</p> <ul style="list-style-type: none"> No negative impact is expected.
26	Children's rights			No negative impact on children's rights is expected.
27	HIV/AIDS and diseases	✓		<p>Under construction:</p> <ul style="list-style-type: none"> It is assumed that infectious diseases may spread due to the inflow of construction workers if appropriate measures are not taken. <p>In service:</p>

Category	Environmental Item	Provisional Scoping of Impact		Description	
		Construction	Operation		
				<ul style="list-style-type: none"> No impact is expected. 	
	28	Working Condition (including safety)	✓	<p>Under construction:</p> <ul style="list-style-type: none"> If safety measures and safety training for traffic guides are not implemented for construction workers, there is a safety risk. <p>In service:</p> <ul style="list-style-type: none"> No impact is expected. 	
Others	29	Accidents	✓	✓	<p>Under construction:</p> <ul style="list-style-type: none"> It is necessary for the construction staff to take safety measures for traffic guides, safety education, and consideration for accidents during construction. <p>In service:</p> <ul style="list-style-type: none"> Traffic accidents such as pedestrians and motorcycles may increase due to an increase in traffic volume and running speed.
	30	Effects of crossing border and climate change			It is expected that CO2 emissions will increase as the number of vehicles increases, while CO2 emissions will decrease as traffic congestion eases. Therefore, it is unlikely that CO2 will increase significantly, and the negative impact will be minimal.

Source: Study Team

(7) Environmental and Social Consideration Survey TOR

1) Outline of TOR (draft)

The TOR (draft) of the environmental and social consideration survey based on the above scoping (draft) is shown below.

Table 33: TOR for Environmental and Social Consideration

Environmental items	Survey items	Survey method
Consideration of alternative plan	<ol style="list-style-type: none"> Review of alignment Review of work methods 	<ol style="list-style-type: none"> Minimize the number of relocated households, land acquisition & maximize project profits Examination of construction methods to reduce environmental impact and traffic congestion during construction
Air pollution	<ol style="list-style-type: none"> Confirmation of environmental standards, etc. Grasping of current air quality Impact during construction Grasping the degree of increase in traffic volume during operation based on traffic demand forecast 	<ol style="list-style-type: none"> Survey of existing materials Impact forecast based on traffic demand forecast results Confirmation of construction contents and construction method, construction machinery type, operating position, operating period Field survey and interview
Water pollution	<ol style="list-style-type: none"> Tanzania's environmental standards Status of surface water 	<ol style="list-style-type: none"> Survey of existing materials and collection of information by related organizations Interview near the project site Confirmation of construction details and construction method
Solid waste	<ol style="list-style-type: none"> Disposal method of waste around the 	<ol style="list-style-type: none"> Interview with related organizations

Environmental items	Survey items	Survey method
	<ul style="list-style-type: none"> construction site 2) Total amount of sediment, amount used for embankment, amount discarded 3) Capacity of the dump site 	2) Investigation of similar cases
Soil pollution	1) Oil leak prevention measures during construction	1) Interview with related organizations
Noise and vibration	<ul style="list-style-type: none"> 1) Noise / vibration level 2) Distance from source to residential area 3) Impact during construction 	<ul style="list-style-type: none"> 1) Survey of existing materials 2) Field survey and interview 3) Confirmation of construction contents and construction method, construction machinery type, operating position, operating period
Ecosystem	1) Presence of rare animals and plants	<ul style="list-style-type: none"> 1) Survey of existing materials 2) Field survey and hearing
Resettlement	<ul style="list-style-type: none"> 1) Confirm the type, scale, and severity of impact of the affected persons 2) Land lease plan under construction 3) Support for holding stakeholder discussions 4) Support for holding public consultation 	<ul style="list-style-type: none"> 1) Survey of related legal systems and related cases 2) Confirmation of the presence and type of buildings around the target road by field survey 3) Confirmation of land use status around the target road 4) Census, livelihood survey 5) Re-acquisition price survey
People in poverty	1) Confirm the presence or absence of the poor and the impact of the resettlement target people	<ul style="list-style-type: none"> 1) Population Census Survey 2) Livelihood survey
Ethnic Minorities and Indigenous People	1) Confirmation of the existence of minority ethnic groups and their impact on the resettlement target persons	<ul style="list-style-type: none"> 1) Population Census Survey 2) Livelihood survey
Local economy: Employment and means of livelihood, etc.	<ul style="list-style-type: none"> 1) Affected person type, size, and severity of impact 2) Confirmation of livelihood activity line of residents 3) Confirmation of road crossing facility plan 	<ul style="list-style-type: none"> 1) Population Census Survey 2) Livelihood survey 3) Investigation of similar cases
Existing social infrastructure and social services	<ul style="list-style-type: none"> 1) Presence or absence of residences, schools, medical facilities, etc. around the project site 2) Confirmation of pedestrian crossing points and vehicle crossing points 	<ul style="list-style-type: none"> 1) Survey of existing materials and collection of information by related organizations 2) Field survey
Gender	<ul style="list-style-type: none"> 1) Consideration for female workers 2) Implementation status of resident information session 	1) Collecting information at related organizations
HIV/AIDS and diseases	<ul style="list-style-type: none"> 1) Incidence of HIV / AIDS near the project site 2) Survey of similar construction cases 	1) Survey of existing materials and collection of information by related organizations
Working environment (including safety)	<ul style="list-style-type: none"> 1) Occupational safety measures 2) Environmental conditions of worker housing and surrounding areas 	<ul style="list-style-type: none"> 1) Interview with stakeholders 2) Investigation of similar cases
Accidents	<ul style="list-style-type: none"> 1) Occupational safety assurance status in construction work 2) Occurrence of occupational accidents 3) Traffic safety assurance status in areas 	<ul style="list-style-type: none"> 1) Survey of existing materials and collection of information by related organizations 2) Field survey and interviews with related parties

Environmental items	Survey items	Survey method
	around construction work 4) Increasing traffic accidents after widening and speeding up construction (distribution of houses and various facilities, distance and positional relationship between population movement and planned transportation facilities)	3) Investigation of similar cases

Source: Study Team

(8) Environmental and social considerations survey results

The results of the survey based on TOR of the environmental and social consideration survey mentioned above are shown below.

Table 34: Survey results of environmental and social considerations

Impact item	Survey results
Air pollution	During the construction period, due to traffic restrictions, congestion due to vehicle detours, operation of construction equipment, etc., exhaust gas will increase in the vicinity of the construction section, and temporary deterioration of air quality is expected. After the service, the traffic congestion will be alleviated, and the exhaust gas will be reduced in the downtown area. On the other hand, due to the increase in traffic volume of large vehicles due to the construction and widening of roads, the negative impact on air quality due to exhaust gas is expected.
Water pollution	During the construction period, turbid water generated from construction work (especially concrete batching plant) may affect the surface water quality of the discharge destination. To prevent water pollution, the drainage design for Section 2-2 includes a retention pond that can remove pollutants and a drain that can remove sediments and pollutants.
Waste	During the construction period, construction waste will be generated due to the removal of existing structures. In addition, it is expected that waste (general waste, construction waste soil, waste materials, etc.) will also be generated from the construction site, construction office, and lodging. Except for recyclable materials, other construction waste will be transported and disposed of at appropriate places. Approximately 10km south of the project site is the waste disposal site run by Dodoma City. The estimated capacity of the disposal site is about 200,000 m ³ . The amount of waste carried out from this project is estimated to be about 51,000 m ³ . 33,000 m ³ is reused and the final disposal amount is 18,000 m ³ . Even if all of these were transported to the disposal site and disposed of, the scale would be sufficient to cover the capacity of the disposal site.
Soil contamination	Regarding oil leaks from heavy machinery during the construction period, the validity of preventive measures is generally confirmed by the construction plan submitted before the construction, and countermeasures are implemented.
Noise and vibration	In the areas where the houses are close to each other during the construction period, the effects of noise and vibration are expected in the vicinity of the construction section due to heavy construction equipment and material loading and unloading vehicles. Note that noise damage can be reduced by taking measures such as limiting work to daytime and not performing night-time work. In Section 2-2, the residential area is far from the road, so the impact is limited. After operation, a certain increase in noise and vibration levels is expected around the roadside due to the increase in large vehicles and the increase in traveling speed along with the new construction and widening of the road.
Ecosystem	The project site is located around a road that passes through the city, and no "rare species" of plants and animals were found around the planned road. As for the "non-rare species", only shrubs are found around the planned road, and although the trees in the ROW will be partially cut down (about 106 shrubs), the impact on the ecosystem will be very minor.

Impact item	Survey results
Resettlement	Refer to the following section on resettlement
People in poverty	As a result of the census survey, there were five vulnerable groups, including those who do not own land and the elderly, but no one was identified as “poor”.
Ethnic Minorities and Indigenous People	As a result of the census survey, no one was identified as an ethnic minority or indigenous people.
Regional economy such as employment and livelihood	In section 2-2, there are street vendors operating around the road (sales of flower pots, temporary placement of concrete blocks, etc.). These street vendors do not have fixed stores and are extremely mobile. In Section 3, there are several restaurants, shops, etc. that are operating the structure to be relocated and these are subject to relocation and compensation.
Land Use	<ul style="list-style-type: none"> • Section 2-2 is a project to develop the road site, and there will be no change in land use. • By changing the route plan of the final part of Section 3, it is necessary to change the usage of the RC office owned land in the 1km section of the ending point, the procedure will be completed by exchanging letters between the RC office and TANROADS.
Existing social infrastructure and services	Since the widening work for section 2-2 is only one side, the traffic restrictions during the construction will have an effect on the surrounding residents, but the access road can still be used, so the impact can be minimized. In addition, the temporary yard that will be installed during the construction period is planned to be installed near the site (about 300 m from the Ntyuka intersection), so traffic congestion due to traffic of construction-related vehicles is not expected.
Gender	Through on-site interviews, consideration is given to female construction workers and the gender ratio of residents' public consultation.
HIV/AIDS and diseases	According to on-site hearings, awareness-raising activities and awareness-raising campaigns on HIV / AIDS prevention are being carried out, and measures are being taken on construction sites.
Working environment (including safety)	According to on-site hearings, safety education and training for construction workers are being implemented.
Accident	Since Imagi R / A is adjacent to the residential area, there is a risk of accidents involving neighbouring residents or students walking to school due to construction machinery and construction vehicles under construction.

Source: Study Team

(9) Impact assessment

Based on the results of the environmental and social considerations survey, the evaluation results of the environmental and social considerations impact of the implementation of this project are shown below.

Table 35: Impact assessment

Category	Environmental Item	Provisional Scoping of Impact		Based on survey results Impact assessment		Description
		Construction	Operation	Construction	Operation	
Pollution Control	1 Air Quality	✓	✓	B-	B+/-	<p>Under construction:</p> <ul style="list-style-type: none"> • Due to traffic restrictions and congestion due to vehicle detours, an increase in exhaust gas is expected around the construction section. • Air quality is expected to deteriorate temporarily due to the operation of construction equipment. <p>In service:</p> <ul style="list-style-type: none"> • By reducing traffic congestion, exhaust gas will be reduced in urban areas. • As a result of increased traffic volume of large

Category	Environmental Item	Provisional Scoping of Impact		Based on survey results Impact assessment		Description
		Construction	Operation	Construction	Operation	
						vehicles due to new road construction and widening, negative impact on air quality due to exhaust gas is expected.
2	Water quality	✓		B-	D	Under construction: <ul style="list-style-type: none"> Muddy water generated from construction work (especially concrete batching plant) may affect the surface water quality of the discharge destination. In service: <ul style="list-style-type: none"> Water quality is not expected to deteriorate due to the installation of appropriate road drainage facilities.
3	Waste	✓		B-	D	Under construction: <ul style="list-style-type: none"> It is expected that waste (general waste, construction soil and waste materials, etc.) will be generated from the construction site, construction office, and lodging. There is a designated waste disposal site in Dodoma City approximately 10km south of the site. In service: <ul style="list-style-type: none"> According to the field survey results, no dumping of waste from vehicles was confirmed on the target road.
4	Soil Contamination	✓		B	N/A	Under construction: <ul style="list-style-type: none"> There is a possibility of temporary oil leakage from heavy construction equipment, but it is limited. In service: <ul style="list-style-type: none"> Soil pollution is not expected.
5	Noise and Vibration	✓	✓	B-	B-	Under construction: <ul style="list-style-type: none"> In areas where houses are close to each other, it is expected that noise and vibration will occur around the construction section due to heavy construction equipment and material loading and unloading vehicles. In service: <ul style="list-style-type: none"> It is expected that noise and vibration levels will increase near the roadside due to new road construction and widening. It is expected that noise and vibration levels will increase along with the increase of traveling speed around the road. In section 2-2, the impact is limited because the residential area is far from the road.
6	Ground Subsidence			N/A	N/A	Under construction: <ul style="list-style-type: none"> There is no impact because there is no pumping of groundwater. In service: <ul style="list-style-type: none"> There are no factors that cause subsidence.
7	Odour			N/A	N/A	Under construction: <ul style="list-style-type: none"> A foul odour may be generated when spraying emulsion on asphalt pavement or when laying asphalt mixture, but it is temporary.

Category	Environmental Item	Provisional Scoping of Impact		Based on survey results Impact assessment		Description
		Construction	Operation	Construction	Operation	
						In service: • No offensive odour is expected.
	8 Bottom Sediment			N/A	N/A	No work is expected to affect bottom sediment.
Natural Environment	9 Protected Areas			N/A	N/A	There are no national parks or protected areas in or around the project site.
	10 Ecosystem			N/A	N/A	There are no rare flora and fauna in the project area, and (approx. 106) shrubs in the ROW are partially cut, but extremely minor impact on the ecosystem is expected. Furthermore, the trees planted alongside the road are common trees.
	11 Hydrology			N/A	N/A	Under construction: • Existing drainage can be changed temporarily and locally, but work that causes changes in the flow of water such as rivers is not expected. • Muddy water will be generated due to the construction, but there is no possibility of affecting the water conditions in the discharge destination water area. In service: • In order to properly guide the road drainage to the end of the road, a new drainage system is planned to be partly constructed outside the road site, and the end of the drain will not be changed. There is no possibility of affecting the hydrology of rivers or other water bodies where the water is released.
	12 Topography and Geology			N/A	N/A	Since large-scale cutting and embankment are not planned for this project, it is considered that there will be little impact on topography and geology.
Social Environment	13 Resettlement	✓		B-	N/A	Before construction: • In line with land acquisition for new road construction, resettlement of 43 households will occur in Section 3. In service: • No additional land acquisition or resettlement is expected after the start of operation.
	14 People in poverty	✓	✓	B-	D	As a result of the population census survey, there are 5 vulnerable people who need special support, including people who do not own other land and elderly people; however, no one was identified as “poor”. When the relocation is implemented, support for the vulnerable people will be provided in cooperation with Dodoma City Hall and the local community.
	15 Ethnic Minorities and Indigenous People	✓	✓	D	D	There are no ethnic minorities or indigenous peoples in or around the project site.
	16 Local economy:	✓	✓	B-	B+/-	Before construction: • There is a street vendor operating near the road

Category	Environmental Item	Provisional Scoping of Impact		Based on survey results Impact assessment		Description
		Construction	Operation	Construction	Operation	
	Employment and means of livelihood, etc.					in section 2-2 (flower pot sales, etc.). This street vendor does not have a fixed store and is extremely mobile. In Section 3, there are several restaurants, shops, etc. that are operating the structure to be relocated and these are subject to relocation and compensation. In service: <ul style="list-style-type: none"> • Road widening will contribute to smooth traffic, and shortening of travel time will contribute to the development of the local economy centred on Dodoma City and the promotion of industry. • It is expected that the movement of residents will be affected in the area where the house is located.
17	Land Use and Natural Resources		✓	N/A	B+	Under construction: <ul style="list-style-type: none"> • Section 2-2 is a project to develop the road site, and there will be no change in land use. • By changing the route plan of the final part of Section 3, it is necessary to change the usage of the RC office owned land in the 1km section of the ending point, the procedure will be completed by exchanging letters between the RC office and TANROADS. In service: <ul style="list-style-type: none"> • Contribute to the effective use of local resources by improving transportation conditions between cities.
18	Water Use			N/A	N/A	It is assumed that the existence of roads and the passage of vehicles will not affect water use.
19	Existing Social Infrastructure and Institution	✓	✓	B-	B+/-	Before construction: <ul style="list-style-type: none"> • It is necessary to relocate and protect existing infrastructure facilities such as electricity, gas, water and sewage installed in the ROW. In service: <ul style="list-style-type: none"> • Access to public facilities will be improved by road improvement. • It is expected that the movement of residents will be affected in the area where the house is located.
20	Social infrastructure and social organizations such as local decision making bodies, etc.			N/A	N/A	It is assumed that no serious impact on local social organizations will occur.
21	Deviations in damage and convenience			N/A	N/A	The construction of this project is not expected to be unfairly and intensively beneficial to the region or to have a negative impact on the region since it is to be implemented in the existing ROW..
22	Local			N/A	N/A	This project is unlikely to cause conflicts of interest

Category	Environmental Item	Provisional Scoping of Impact		Based on survey results Impact assessment		Description
		Construction	Operation	Construction	Operation	
	conflicts of interest					in the region.
	23 Cultural assets			N/A	N/A	There are no cultural heritage sites in and around the project site.
	24 Landscape			N/A	N/A	The construction of this project is not expected to have a negative impact on the landscape.
	25 Gender	✓		D	N/A	Under construction: • By interviewing at the site, it is known that consideration was given to the gender ratio of female construction workers and briefing sessions for residents. In service: • No negative impact is expected.
	26 Children's rights			N/A	N/A	No negative impact on children's rights is expected.
	27 HIV/AIDS and diseases	✓		B-	N/A	Under construction: • According to the interviews conducted locally, awareness-raising activities and awareness-raising campaigns regarding HIV / AIDS prevention are being conducted, and measures are being taken at construction sites. In addition, it is assumed that the inflow of construction workers may spread the infectious diseases such as dengue fever and diarrhoea (via mosquitoes). In service: • No impact is expected.
	28 Working Condition (including safety)	✓		D	N/A	Under construction: • According to a local interview, safety education and training for construction workers are being conducted. In service: • No impact is expected.
Other	29 Accidents	✓	✓	C-	C-	Under construction: • Although safety measures and safety education are implemented, the risk of accidents due to construction machinery operations by construction workers cannot be denied. In service: • Traffic accidents such as pedestrians and motorcycles may increase due to an increase in traffic volume and running speed.
	30 Effects of crossing border and climate change			N/A	N/A	It is expected that CO2 emissions will increase as the number of vehicles increases, while CO2 emissions will decrease as traffic congestion eases. Therefore, it is unlikely that CO2 will increase significantly, and the negative impact will be minimal.

Source: Survey Team Evaluation A+/- : Significant positive/negative impact is expected
B+/- : Positive/negative impact is expected to some extent.
C+/- : Extent of positive/negative impact is unknown. (Further examination needed)
D : No impact is expected

(10) Mitigation and costs for implementing mitigation

As a result of the above impact assessment, the following measures are taken to mitigate the possible negative impacts. The cost for implementing the mitigation measures will be included in the cost borne by Tanzania or the total project cost.

Table 36: Mitigation measures

No.	Impact item	Mitigation measures	Implementing agency / responsible agency	Cost (Tshs)
Construction				
1	Air Quality	<ul style="list-style-type: none"> • Selection of transportation routes to avoid populated areas and cultivated areas. Sprinkle water according to the surrounding conditions so that sand and dust do not scatter as the construction vehicles and heavy machinery travel. • Cover with a waterproof sheet to prevent sand and dust from scattering from the material transportation vehicle during transportation. • Immediately transport the stored soil and waste materials from the construction site to the designated disposal site. 	Contractor • TANROADS	20,000,000
2	Water pollution	<ul style="list-style-type: none"> • Install construction facilities such as on-site construction offices in places where sewers are installed to prevent wastewater from draining into public water areas. If sewers are not installed, use appropriate equipment, such as oil traps and septic tanks. • Installation of concrete slabs or culverts that cross roadside drains at intersections. 	Contractor • TANROADS	80,000,000
3	Waste	<ul style="list-style-type: none"> • A designated contractor collects the waste generated from construction-related facilities such as on-site construction offices and disposes it at the designated waste disposal site. • Reusable soil materials will be used for landscaping. 	Contractor • TANROADS	20,000,000
4	Soil Contamination	Regular maintenance will be carried out to maintain heavy construction equipment in good condition.	Contractor • TANROADS	-
5	Noise and vibration	<ul style="list-style-type: none"> • Restrict transportation of construction materials to daytime only. • Whenever possible, contractors should not pass through the residential area. 	Contractor • TANROADS	100,000,000
6	Ecosystem	Due to the fact that some trees in the ROW will be cut down (mainly shrubs) during the construction of the Project, tree planting zones will be installed at both ends of the ROW, and trees will be planted (section 2-2: 163, section 3: 149).	Contractor • TANROADS	2,596,000
7	Resettlement	<ul style="list-style-type: none"> • Minimize design changes that result in changes to the PAPs. • Conduct appropriate research and consultation on new PAPs to be added as a result of design changes, if necessary. • Provide appropriate support for PAPs. • Monitor the generation and response to complaints to ensure that issues are resolved. 	TANROADS, Dodoma City Hall / Government of Tanzania	200,000,000

No.	Impact item	Mitigation measures	Implementing agency / responsible agency	Cost (Tshs)
		<ul style="list-style-type: none"> Develop a construction plan to ensure that there are no unanticipated negative impacts on structures and residents outside the ROW as a result of the Project. 		
8	Regional economy such as employment and livelihood	<ul style="list-style-type: none"> Prioritize the employment of local residents. All construction workers are registered with the Social Security Fund. In accordance with labour law, ensure that all workers are paid at least the minimum wage. Make sure that all retirees are paid retirement benefits. 	Contractor <ul style="list-style-type: none"> TANROADS 	117,000,000
9	Existing social infrastructure and services	<ul style="list-style-type: none"> Relocation and restoration of affected infrastructure / utilities. 	TANROADS (Collaboration with public / public interest organizations such as TTCL) • MoWTC	200,000,000
10	Infectious diseases such as HIV / AIDS	<ul style="list-style-type: none"> Development and implementation of HIV / AIDS prevention program. Increase employment of local workers and minimize the possibility of new HIV infections by limiting the number of immigrant workers. 	Contractor (Collaboration with HIV / AIDS related institutions) <ul style="list-style-type: none"> TANROADS 	50,000,000
11	Working environment (including work safety)	<ul style="list-style-type: none"> Development and implementation of Occupational Health and Safety Management System (OHSMS). Safety manager provides on-site management and first aid kit. Providing personal protective equipment (PPE) including safety / protection equipment. Training on the use of safety / protection equipment. 	Contractor <ul style="list-style-type: none"> TANROADS 	20,000,000
12	Accident	<ul style="list-style-type: none"> All construction machinery and trucks will be equipped with warning and signalling equipment. Enclose all pits and trenches with barriers to prevent people from falling. Operation of machinery / equipment should be restricted to trained personnel only. Enclose the construction site with a fence to prevent people from entering. Install warning signs in English and Swahili to prevent people from entering the construction site without permission. 	Contractor <ul style="list-style-type: none"> TANROADS 	20,000,000
Operation				
13	Air Quality	<ul style="list-style-type: none"> Use a signal adjustment system to reduce the waiting time at signalized intersections. Promote the use of public transportation. 	Contractor <ul style="list-style-type: none"> TANROADS 	-
14	Noise and Vibration	<ul style="list-style-type: none"> Perform appropriate maintenance to maintain the road surface in good condition. Promote the use of public transportation. 	Contractor <ul style="list-style-type: none"> TANROADS 	-
15	Regional economy such as employment and livelihood	TANROADS will work with the relevant agencies to provide information to students, local residents, bus drivers and other members of the public about safety practices on the roads.	<ul style="list-style-type: none"> TANROADS 	-
16	Existing	TANROADS will work with the relevant	<ul style="list-style-type: none"> TANROADS 	-

No.	Impact item	Mitigation measures	Implementing agency / responsible agency	Cost (Tshs)
	social infrastructure and services	agencies to provide information to students, local residents, bus drivers and other members of the public about safety practices on the roads.		
17	Accident	• Placement of road signs and reinforcement with speed humps and rumble strips.	• TANROADS	50,000,000
Total				879,596,000

Source: ESIA report (Environmental and Social Impact Assessment Report) Remark : Tshs=Tanzania shilling

(11) Environmental management and monitoring plans

1) Environmental management and monitoring plans (draft)

Based on the above-mentioned mitigation measures, the environmental management / monitoring plan (plan) at each stage of planning, construction, and after service was examined as shown in the table below. The specific contents of the monitoring plan are described in the section of the monitoring form draft.

Table 37: Environmental management / monitoring plan (draft)

Environmental items	Item	Place	Frequency	Responsible organization	Supervisory authority	Cost
【Before Construction】						
Authorization	• EIA acquisition status • Compliance with EIA incidental conditions	N/A	Before construction starts	TANROADS	NEMC	-
Existing infrastructure	Confirmation of redevelopment status of temporarily removed public facilities	Near construction site	Before construction starts	Contractor	TANROADS	Included in SV costs
【Construction】						
Air pollution	Dust and exhaust gas during construction such as NO ₂ , NO, SO ₂ , CO, PM10, PM2.5	Near construction site (A specific point will be decided at the construction starts)	Once a month	Contractor	TANROADS	Included in SV costs
Water pollution	Muddy water generated during construction	Near construction site	Once a month	Contractor	TANROADS	ditto
Waste	Type, amount, and treatment method of generated waste	Near construction site	Once a month	Contractor	TANROADS	ditto
Soil Contamination	Oil leaks etc. that occur when using heavy equipment	Near construction site	Once a month	Contractor	TANROADS	ditto
Noise and vibration	Influence of noise and vibration of heavy equipment on the residential area around the site during construction	Near construction site	Once a month	Contractor	TANROADS	ditto
Resettlement	Please refer to 3-8					
Regional economy such as employment	• Implementation status of policy to prioritize employment of local residents	N/A	Once a month	Contractor (+Environmental experts)	TANROADS	ditto

Environmental items	Item	Place	Frequency	Responsible organization	Supervisory authority	Cost
and livelihood	<ul style="list-style-type: none"> • Social security registration status of long-term construction workers • Wage payment status to workers • Retirement payments to retirees 					
Existing Social Infrastructure and Institution	<ul style="list-style-type: none"> • Relocate and restore affected infrastructure / utilities. 	Near construction site	Once every 6 months	TANROADS (in collaboration with public organizations such as TTCL) / MoWTC	TANROADS	ditto
Infectious diseases such as HIV / AIDS	Implementation status of HIV / AIDS preventive management program by contractors	Near construction site	Once every 6 months	Contractor (+Environmental experts)	TANROADS	ditto
Working environment (including work safety)	<ul style="list-style-type: none"> • Occupational health and safety management system (OHSMS) formulation and implementation status • Installation and management status of first aid kit • Use of personal protective equipment (PPE) • Implementation status of regular occupational health and safety (OHS) training 	Near construction site	Once a month	Contractor (+Environmental experts)	TANROADS	ditto
Accidents	<ul style="list-style-type: none"> • Implementation status of occupational safety management plan • Accident occurrence status 	Near construction site	Once a month	Contractor	TANROADS	ditto
【In use】						
Air pollution	Dust and exhaust gas during construction	Near construction site	Once a month	TANROADS	TANROADS	SV costs included
Water pollution	Oil leaks etc. that occur when using heavy equipment	Around the target road	Once a month	TANROADS	TANROADS	ditto
Waste	Type, amount, and treatment method of generated waste	Around the target road	Once a month	TANROADS	TANROADS	ditto
Noise and vibration	Noise and vibration due to increased traffic volume	Around the target road	Once a month	TANROADS	TANROADS	ditto
Regional economy such as employment and livelihood	Changes in the road safety situation	Around the target road	Once a month	TANROADS	TANROADS	Conducted by staff, no cost
Existing Social infrastructure	Changes in the road safety situation	Around the target road	Once a month	TANROADS	TANROADS	ditto

Environmental items and institutions	Item	Place	Frequency	Responsible organization	Supervisory authority	Cost
Accidents	Traffic accidents due to increased traffic volume and speedup	Places with heavy traffic around the target road	Once a month	TANROADS	TANROADS	ditto

Source: ESIA report (Environmental and Social Impact Assessment Report) , Note: SV= Construction supervision

In accordance with the Monitoring Plan, a draft monitoring form for the Project is provided below. The monitoring form is also described in Appendix 3.

Based on the monitoring plan, the proposed monitoring form for this project is shown below.

< Monitoring during construction >

1. Permit / Explanation

Monitoring item	Monitoring results
Status of environmental permit	
Status of compliance with incidental conditions of environmental permit	

2. Stakeholder consultation

No.	Stakeholder consultation date	Participants (affiliation, number of participants)	Agenda / Comments from participants	Action Items
1				
2				
3				

3. Resettlement

Compensation payment

Target area	Total number of plans (number of households HHs) (A)	Number of households that have received compensation (HHs) (B)	Progress rate % (B/A x 100)
Section 3a			

Implementation of relocation

Target area	Total number of planned relocations (number of households HHs) (A)	Number of relocated households (HHs) (B)	Progress rate % (B/A x 100)
Section 3a			

Others

Item	Monitoring results
Grievance procedure	
Restoration of livelihood	
Relocation site	

4. Waste

Item	Content	Type of waste	Amount generated (Monthly)	Processing method	Contractor
Waste disposal	Check the validity of waste treatment				

5. Noise, Vibration, Air and Water quality

Item	Content	Measurement item	Measured value	Measured value before construction	Measurement location / frequency
Noise and vibration	During construction, check the effects of noise and vibration from construction vehicles, etc.	Noise and vibration situation Interview with local residents	dB (Example Japan: Area facing the road 65 dB or less)		Measurement place: Construction site (Measurement before the start of construction and monthly during construction) Frequency: When loading large truck and operating large machine
Air and water quality	Check the impact of construction	Dust / oil leak	mg/m3 (Standard value 0.1mg/m3)		Near construction site. At the start of construction and once a month

6. Local economy: employment and means of livelihood, etc.

Item	Monitoring period	Monitoring results
Implementation status of policies that prioritize the employment of local residents		
Social security registration status of long-term construction workers		
Status of wage payments to workers		
Status of payment of retirement allowances to retirees		

7. Existing Social Infrastructure and Institution

Item	Monitoring period	Monitoring results
Relocation and restoration of affected infrastructure / utilities		

8. HIV/AIDS and diseases

Item	Monitoring period	Monitoring results
Implementation status of HIV / AIDS preventive management programs by contractors		

9. Working Condition (including safety)

Item	Monitoring period	Monitoring results
Formulation and implementation status of occupational safety and health (OH & S) management plan		
First aid kit installation and management status		
Usage of personal protective equipment (PPE)		
Occupational Safety and Health (OH & S) Regular Training Implementation Status		

10. Accidents

Item	Monitoring period	Monitoring results
Implementation status of occupational safety management plan		
Accident occurrence status (number, location, accident content, response status)		

<In-service monitoring >

1. Waste

Item	Content	Type of waste	Amount generated (Monthly)	Processing method	TANROADS
Waste disposal	Check the validity of waste treatment				

2. Noise and vibration

Item	Content	Measurement item	Measured value	Measured value before construction	Measurement location / frequency
Noise and vibration	During construction, check the effects of noise and vibration from construction vehicles, etc.	Noise and vibration situation Interview with local residents	dB (Example Japan: Area facing the road 65 dB or less)		

3. Local economy: employment and means of livelihood, etc.

Item	Monitoring period	Monitoring results
Changes in the road safety situation (Visual inspection, interviewing neighbors.)		

4. Existing Social Infrastructure and Institution

Item	Monitoring period	Monitoring results
Changes in the road safety situation (Visual inspection, interviewing neighbors.)		

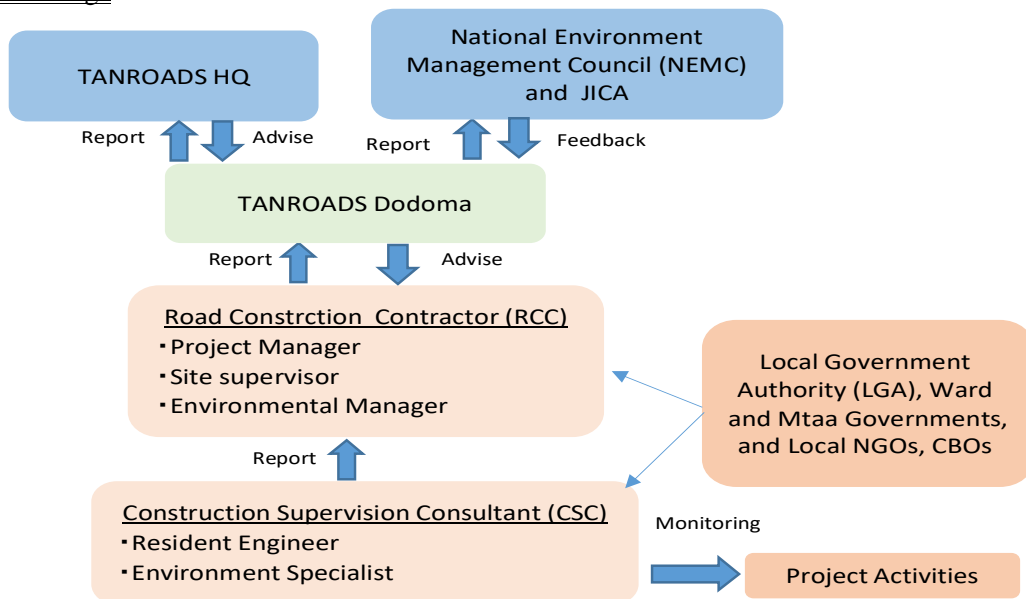
5. Accidents

Item	Fulfilment status	Frequency
Traffic control status, security system, accident prevention measures		Every 6 months

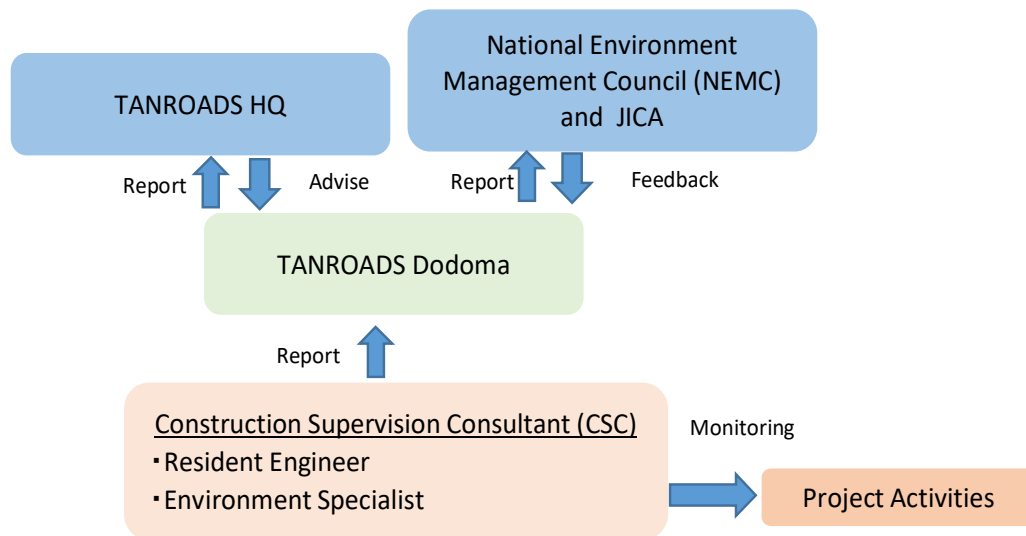
(12) Implementation system

The following figure shows the implementation system of mitigation measures and monitoring during construction and operation. During construction, the environmental expert of the construction management consultant employed by TANROADS Dodoma monitors the project based on EMoP and reports the results to the construction contractor. The construction contractor will report to TANROADS Dodoma and then to TANROADS headquarters, NEMC and JICA at the same time. TANROADS headquarters will send feedback to TANROADS Dodoma after reviewing the report, and TANROADS Dodoma will report the feedback from headquarters to the construction contractor. At the time of operation, the construction management consultant will monitor the project and report the results to TANROADS Dodoma. After receiving the report, TANROADS Dodoma will share the report contents with JICA and the headquarters, and will receive the guidance and feedback respectively. Monitoring will be carried out for a minimum of 3 years after construction is completed.

Construction stage



Operation stage



Source: Prepared by the study team based on ESIA report (Environmental and Social Impact Assessment Report)

Fig.22: Implementation and monitoring system of EMP at Construction/operation stage

(13) Stakeholder meeting

1) Holding a meeting

Based on Tanzania's *Environmental Management Act*, TANROADS conducts stakeholder meetings during the EIA process. At this meeting, the project's plan, the environmental and social impacts of the project and their mitigation measures will be analysed and explained, and questions and answers will be exchanged with the participants. The date and time of the stakeholder meeting held in the EIA of this project and the breakdown of the target persons are shown below.

Table 38: Targets of stakeholder meetings

Date	Name of Organization	Name of Person	Designation
18/04/2019	TANROADS	Eng. Leonard Chimagu	Regional Manager
	TRC	Athuman A. Muya	Engineer
15/08/2018	TANROADS	Eng. Leonard Chimagu	Regional Manager
	TTCL	Humphrey Ngowi	Regional Manager
		Sydney Mndolwa	Engineer
14/08/2018	TANROADS	Eng. Leonard Chimagu	Regional Manager
	TANESCO	Eng. Tumaini Nyari	Ag. Regional Manager
	DUWASA	Eng. Kshilimu Mayunga	Technical Manager
13/08/2018	TANROADS	Cyprian Lubida	Engineer
		Daniel Malima	Engineer
		Magesa Magili	Engineer
	City Council	Eng. Salome Kabunda	Ag. Regional Manager
		Eng. Emmanuel Manyanga	Coordinator TSCP
		Abeid Msangi	City Economist
		Fatuma Kitojo	CDO

Source: ESIA report (Environmental and Social Impact Assessment Report)

2) Comments from major stakeholders

At the stakeholder meeting, attendees expressed their expectations for the effects of the project on traffic

volume reduction and economic promotion in Dodoma City. No objection was made to the project. The following table summarizes the comments and concerns received from each stakeholder.

Table 39: Comments and views from stakeholder representatives

Stakeholder	Comments
TANROADS	Consultants must provide feedback of whatever is happening in the field and wanted the consultant to cooperate with other authorities and local communities. Consultants should not give any promises to the community during consultation meetings. TANROADS is aware of the compensation issues in Makole ward. The area is already valued since 2016
Dodoma City Council (DCC)	Dust management and safety should be observed during implementation of the project. Road traffic signs should be installed after the implementation. The Local Community should be consulted during drainage channels construction. The local people along the road section at Chinyoya have been informed and there is a plan to relocate them
TANESCO	Conflicts with customers may occur during relocation of electricity power poles. TANROADS must make payment before relocation of electricity power poles. Financial support should be enough and done early for the work to be effective. If there is limited time the contractor can be authorized to relocate the electricity power poles. If the contractor needs assistance the company will provide where necessary. There is a possibility of electric meters being destroyed during demolition of houses. Proposed design should be provided earlier by the surveyor to identify the location of the electricity power poles that need to be relocated.
DUWASA	Design should provide more space for other infrastructures such as water supply. Upgrading of the roads may cause serious disruption of water supply to the communities and other institutions. During construction, the Contractor should work closely with DUWASA to establish exact locations of these utilities. Before commencement of construction works. Careful attention should be given to existing utilities as there are several water supply pipelines along the project road.
TTCL	There are underground and above the ground copper and fibre optic cable networks, and their inspection chambers, and telecommunication poles. During construction the Contractor should work close with TTCL to establish locations of such utilities to avoid damages. The Contractor should provide ducts for crossing of the utilities and their future expansion. Excavation should not exceed 1m depth so as not to damage the underground cables. Excavation should be done by hand for the safety of the underground cable

Source: ESIA report (Environmental and Social Impact Assessment Report)

3) Comments from local residents

Stakeholder meeting for local residents around the target road was held from August 13 to 14, 2018 by TANROADS.

Table 40: Overview of stakeholder meetings for residents

Date	Place	Number of participants
14 Aug. 2018	MAKOLE	26 (Male : 17, Female : 9)
14 Aug. 2018	WAKAZI	43

14 Aug. 2018	MAKUZA	77
--------------	--------	----

Source: Survey Team

Hoping that the traffic congestion would be alleviated, the local residents expressed their willingness to welcome this project. The local residents' comments on the construction work are shown below.

Table : 41: Comments at stakeholder meetings for residents

Comment	Response
Relocation of infrastructure and facilities like water supply pipes and electricity poles	The relevant agencies will be responsible for the relocation and restoration of affected infrastructure / utilities.
Compensation should be done for people followed by the road and should be done in time	Compensation should be provided promptly after evaluation.
The surveyors should visit the site earlier prior to construction in order to demarcate boundaries of road reserve area	Prompt response is desirable.
The public should be informed earlier on the day/date of valuation exercise so that everyone can be on his/her property to attest and sign appropriate forms.	The public will be notified in advance.
Contractor should offer employment opportunities to the local people during implementation of the project	The policy is to prioritize the employment of local residents.
The road will lead to increased number of institutions and social services due to corporate responsibility	-
Graves and other properties such as land and plants should be compensated	Compensation should be provided immediately after the evaluation.
The road will greatly help to reduce traffic congestion that exists in the city	-
Land restoration should be done after excavations and other project activities	Land restoration and improvement will be planned.
The community should be informed early on the deadline (closing date) for removing / demolishing their properties	The community will be notified in advance. The transfer deadline is usually 90 days after compensation is paid.
The project will increase waste generation. Wastes should be managed safely during all phases of the project	Waste generated from construction-related facilities such as on-site construction offices is collected by a designated contractor and disposed of at a designated waste disposal site.
Loss of properties and business will occur during demolition for buildings in the road reserve areas	The structure will be covered at the replacement price.
Cultural interference and spread of diseases such as HIV/AIDS may occur. Education should be provided especially to young girls and boys	An HIV / AIDS prevention program will be implemented.
Dust emission should be controlled during construction activities by watering the road at least 2 times a day to reduce dust	Cover the material with a tarpaulin to prevent sand and dust from scattering from the equipment transportation vehicle during transportation. Sprinkle water according to the surrounding conditions so that sand and dust do not scatter as

	the construction vehicle and heavy machinery operate.
Road signs, bumps and lights should be placed where necessary to avoid accidents	Install signs, signal devices, signboards in English and Swahili, etc.

Source: Survey Team

4) Public consultation

The 2004 Environmental Management Act stipulates that all ESIA surveys should have public consultation as part of the survey. The purpose of public consultation is to ensure that all stakeholders involved in the proposed project are informed about the project content and its impact and mitigation measures, in particular compensation and transfer, and to obtain cooperation among stakeholders. In accordance with the prescribed requirements, the consulting team, in collaboration with TANROADS, conducted public consultations from February 20 to 21, 2020 in each district and community members in the entire project area.

Table 42: Outline of local residents consultation (public consultation)

Date	Place	Number of participants
21 Feb. 2020	Chinyoyo/Kilimani	31 (Male : 22 Female : 9)
21 Feb. 2020	Hazina	16 (Male : 11 Female : 5)

Source: Survey Team

The consultations were conducted in the form of questionnaires and open forums. The consultant prepared multiple forms of questionnaires / checklists for various stakeholder groups including community members (elders, adolescents, and women), local governments, districts and village (*mitaa*) officers. The questionnaire sample and interview list are attached. The interview survey in the socio-economic survey was conducted mainly in the target area. With the cooperation of regional leaders, discussions centred on the following agenda items (see Meeting Agenda).

- Meeting Agenda:
- 1) Project introduction
 - 2) Discussion on the socio-economic and environmental impacts of the project
 - 3) Questions and discussion sessions
 - 4) Closing



Public Consultation meeting in Chinyoyo sub ward



Public consultation meeting in Hazina ward



Female participants of public consultation in Chinyoyo Ward

Public consultation in Makulu Ward

Source: Survey Team

Photo 4: Public consultation

The following table shows the comments from the participants and the consultant's responses during the public consultation

Table 43: Comments and Response during the Consultative Meeting from Residents

S/N	Issues/Comment from community	Remarks by Consultant
1	People to be affected by the Project should be identified and compensated in accordance with laws and guidelines guiding compensation. It should be noted that the existing road has a width of 45m so the area which is due for compensation is 7.5m in both sides of the road	Those who will be identified to be affected by the project will be compensated. RoW of the existing road will be cross-checked in the TANROADS Regional Office before compensation. Transparency on the compensation process is critical if one has to avoid complaints and dissatisfaction.
2	The road will guarantee easy accessibility and therefore more physical development and investment opportunities. There will be relatively low transport and transportation costs and travelling time saving for passengers and goods	Tarmac road will attract more investors hence stimulate development in the project area especially cross-border trading.
3	We have heard about the construction of this road for more than five years now. Will this road be constructed for real or it is just another way of campaigning next general election. When will the construction start?	It is definite that the road is going to be constructed. However, the consultant cannot fix time as to when the construction is going to start. It should be well-known that this report will determine the actual cost for construction and it is from this report that the government will get the figure and start mobilising funds for construction.
4	The people in Chinyoyo sub-ward remarked that, they did not invade the road reserve because they were living in the area since 1974. The width of the road was 30m (15m from the centre)	The government and TANROADS in particular will be informed on this and note will be taken during compensations and demolition
5	Some houses need rehabilitation and yet according to your explanation no development can be done as the resettlement process has not been completed.	A quick action is desired. When compensation is completed any additional work on your property will not be allowed.
6	Compensation should be done promptly after valuation of people's properties.	To avoid the fluctuation of the price for the properties evaluated, the compensation will be

S/N	Issues/Comment from community	Remarks by Consultant
		implemented as soon as possible. If compensation is delayed due to the delay in project implementation for more than two years it will be restated.
7	People should be informed in advance so that they have time to demolish their house	The aim is to recover some materials from their house and reuse them. Time for salvage the properties will be provided.
8	Employment Opportunities. The contractor should give the priority of employment to the people hailing from the villages along the project site during the construction. The villagers may be involved in the some activities as labourers during the construction phase.	Road construction will stimulate individual's income for those who will be employed by the project. Skills acquired during recruitment and construction will remain an asset to community members. However, employment opportunities will only be provided to those people aged 18 years and above. The women are also encouraged to participate in the road construction activities
9	There will be spread of HIV/AIDS and other sexually transmitted infections.	The contractor will identify local capacity in dealing with HIV/AIDS and arrange for HIV/AIDS prevention programme targeting both the construction camp and local communities. Positive discrimination in favour of resident workers to minimize risk of increased infection among local population. Programme on HIV/AIDS will target groups at risk such as food vendors, and business women in the construction camp. There will be a separate consultant to implement and manage HIV/AIDS alleviation programs. The contractor will implement HIV/AIDS programs on his part by allowing his employees to attend awareness seminars and campaigns and carrying out any directives of the Consultant in this regard.
10	The project will be a facilitate business centres and growth. These centres should be assisted by the government in planning (e.g. land use and plot surveying) in order to curb/cut limit/control unplanned growth of settlements	The recommendation is acceptable. <i>Mitaa</i> (village) governments should consult City council for guidance on land use planning
11	The bus bays/stops should be placed in the areas where passengers wait the transport to other destinations.	Decision on final locations of bus bays will be decided by the designer in consultation with community members
12	Once the project is completed, structures like camps should be left to respective communities for development activities.	The contract will work together with the local leaders and communities. The campsites may be located in locations where at the end of the project they will cater for public use like schools, dispensaries or cereals.
13	It is feared that the tarmac road will claim people's lives through accidents. It was recommended to use road sign and speed humps to the places where there are many pedestrian such as at schools, markets at villages/ <i>mitaa</i> and mosques/churches.	Road safety education will be instituted during construction. The new road project includes safety measures such road sign, speed humps and pedestrians' crossings. Safety education will include communities, pupils and teachers.

Source: Survey Team

(14) Land acquisition / resettlement in the target area

1) Current status survey by target road section

In this project, residential areas are lined up in a part of the target section (mainly section 3a (Imagi–Ntyuka)) where roads are planned to be constructed, and commercial stores are scattered. There will be a need for involuntary resettlement of residents and relocation of commercial facilities prior to the start of construction. In addition, a new land acquisition procedure is required due to the change in the route of the 1km section at the end point. The results of the field survey for each road section are shown below.

1-1) Section 2-2

The existing right of way (ROW) in Section 2-2 has a width of 60m. There are several places in the ROW occupied by temporary blocks of unlicensed concrete block manufacturers and flower pot displays of florists, but voluntary removal before road construction has been agreed between TANROADS and PAPs which includes the business owners.

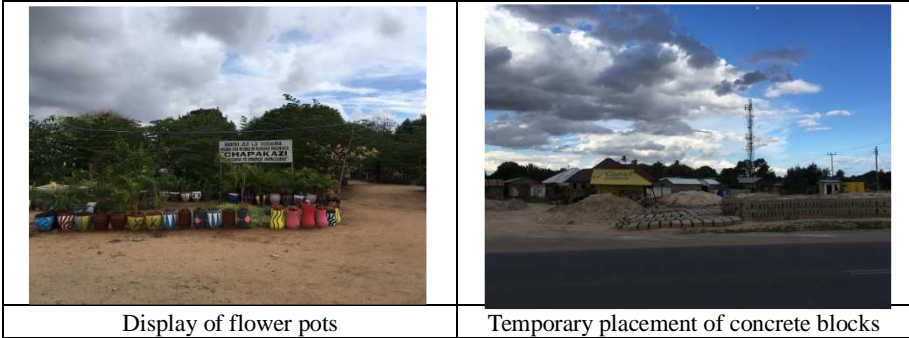
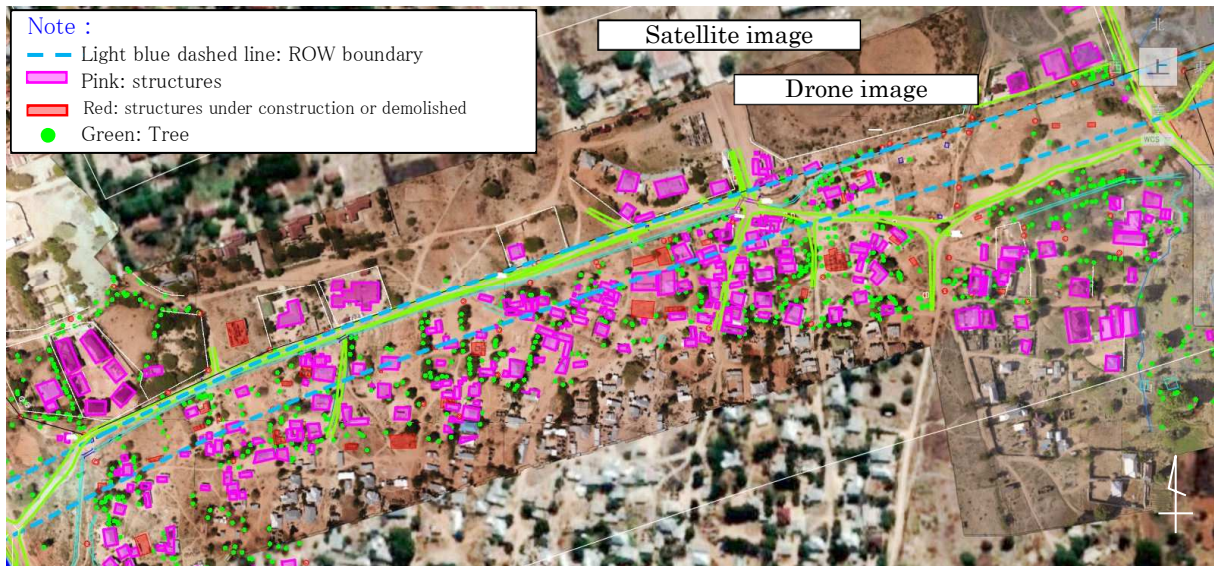


Photo 5: Current situation at the time of the survey (Section 2-2)

1-2) Section 3a (between Imagi R/A and Ntyuka junction)

Approximately 1km from Imagi intersection to Ntyuka intersection in section 3, where involuntary resettlement is concentrated in this project, is defined as section 3a. The ROW of section 3a, based on the F/S by TANROAD completed in May 2019, the concrete wall next to the relatively large concrete structure on the left side of the existing unpaved road is the left end of the ROW, and land acquisition process for 4ha is proceeded with the width of 40m is set on the right side. Within the ROW, green paint was placed on the walls of the target houses to be relocated. It should be noted that not only residences will be relocated, but compensation will also be incurred due to the relocation of several restaurants and shops that are operating near Ntyuka intersection (see the Census Survey section for details). If the entire existing building is inside the ROW or if it is difficult to use it if part of it is removed, the resident or user of the structure will be relocated, meanwhile the possibility of impact mitigation should be carefully considered to minimize the impact on users. Below is an overview of the current situation in Section 3a.



Source: Survey team Fig.23 : Status of existing houses in the road right-of-way (Section 3a)

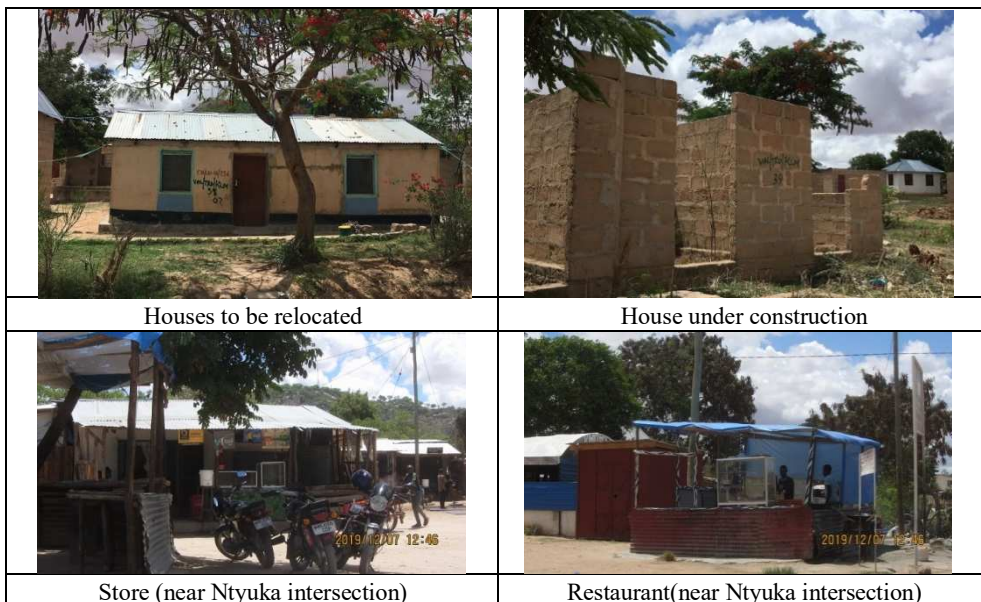


Photo 6: Current situation at the time of the survey (Section 3a)

1-3) Section 3b (between Ntyuka junction and Makulu junction)

An extension line of the left end of the ROW of the section 3a is set at the left end of the ROW of the section 3b, and a ROW having a width of 60 m is secured in the right direction. No structures newly affected by this project have been confirmed in the ROW. Approximately 1km at the end point was changed from the RC office that was originally assumed to be the end point of Section 3 to a new route plan to connect to the Makulu intersection on the north (left) Kikuyu road. Since this new route part is not included in the EIA survey by TANROADS F/S, an additional survey was conducted in February 2020 as a section for newly planning a road under the JICA project. The site is a state-owned land and no existing structures exist, but the land use plan was adjusted by Dodoma City and secured as a road site for the TANROADS new route by May/2020.

(15) Legal framework for land acquisition and resettlement

1) Overview of Tanzanian legal system for land acquisition and resettlement

The following are laws related to land acquisition and involuntary resettlement in Tanzania.

Table 44: Policies and legal systems of land acquisition and involuntary resettlement

Division	Name
Policy	National Environment Policy, 1997
	National Land Policy, 1997
	National Human Settlement Development Policy, 2007
Related legal system	The Land Act, 1999 and The Land (Amendment) Act, 2004
	Village Land Act, 1999
	The Land Acquisition Act (No. 47, 1967)
	Land Use Planning Act, 2007
	The Land (Compensation Claims) Regulations, 2001
	The Land (Assessment of Value for Compensation) Regulation, 2001
	Land Disputes and Courts Act, 2002
	National Road Act, 2007
	The Grave Removal Act, 1969
	The Village Land Regulations, 2001
	Local Government (District Authorities) Act, 1982 and The Local Government Laws (Miscellaneous Amendments) Act, 2006

Source: Survey Team

2) The Land Act (No. 6), 1999

Land acquisition in Tanzania is basically based on the Land Act, and by the MoWTC's road sector compensation / relocation outside line, the compensation / relocation plan is conducted in parallel with the EIA survey during the F/S survey of the target road conducted by TANROADS. Since the Compensation & Resettlement Plan has been implemented, this time the procedure for securing ROW will be handled by the additional implementation of the route change part. Under the Land Act, all land is owned by the entire nation, controlled by the president, who is a representative of the nation, and only the right to use the land (up to 99 years) is granted.

The main functions of the land law is the facilitation of the National Land Policy (1997) through the clear classification and ownership of land, administrative procedures related to land, land occupancy rights and their ancillary rights, grant of tenure, exchange and transfer of tenure, land lease, mortgage of land, easement and similar rights, co-occupation of land, division of land among co-owners, and resolution of land-related lawsuits. One of the problems that arises in the treatment of land is the right of ownership. Under Article 19 of The Land Act, 1999, the right of possession is divided into the following two categories: citizens and foreigners.

- ① Citizens, groups of two or more persons, unions, or corporations may have the right to own land or incidental rights.
- ② Foreign nationals or corporations organized under the *Companies Act*, or entities organized in any other way (including stakeholders or corporations where the majority of the owners are foreigners), may have the land possession right or the incidental right only for the purpose of investment specified by the Tanzania Investment Centre. (*Tanzania Investment Act*, 1997)

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

This regulation stipulates the following regulations concerning land evaluation and compensation.

- Asset valuation for land and attachments is based on market prices.
- The market value for land and adjuncts must be established using the actual sale of equivalent land in recent years, the income approach, or the comparative method proven by the replacement cost method.
- All land and residual value must be verified by a government evaluator representative or equivalent for payment by the government or local authorities.
- If immediate compensation benefits are not provided and interest rates on compensation arise, it should be paid by the government or local government.
- To calculate the interest rate paid for compensation, “quick compensation benefit” means payment within 6 months from the acquisition of the subject land or invalidation of the right.
- If the compensation benefit is not paid even after 6 months from the acquisition of land or the invalidation of the right, the interest rate using the standard rate of time deposits of commercial banks will be paid until the compensation benefit.

4) Land (Compensation Claims) Regulations, 2001

This provision applies to all claims and claims for compensation to governments and local governments, public bodies and public institutions. According to this regulation, the following persons can request compensation.

- Land Act (hereinafter referred to as “Act”) Article 5: Person who has an exclusive right granted to general land converted to village land or protected land; A person who has an exclusive right granted to the land expropriated by the President in the United States, or a person whose exclusive right has been revoked under Act 49.
- A person who possesses the Customary Exclusive Right 3 granted to the land designated as dangerous land in Act 7
- A person who owns the land by another person who has a customary right of ownership
- A person who occupies the land by grant or transfer from the holder of the customary right of ownership is denied the right of ownership under Act 54.
- Land occupants in urban areas and their surroundings, which were acquired by the President under Act 60

The Land (Assessment of Value for compensation) Regulation, 2001 applies to any claim or claim for compensation by any land occupant. The land manager or authorized official appointed by the director will post a notice on the public bulletin board when performing the land acquisition procedure, and notify all occupants of the following notification in the specified format.

- Notify the occupants of the land to be compensated.
- Ask the occupants to submit a compensation request.
- Ask the occupants to be present at the time and place where the assessment will take place on a given date and time.

In addition, the land administrator or authorized official will assess the amount of compensation to be paid. The Land Management Officer or an authorized official prepares a Compensation Schedule and submits it together with the compensation request to the fund (Land Compensation Fund established based on Act). In this regard, the following is specified.

- The fund is based on the compensation schedule established by the land manager or authorized official. Compensation payment must be decided 30 days before the scheduled date.
- This provision applies to any application or claim for compensation to the government, local governments, public bodies or public institutions.
- Compensation under Act 156 does not apply to non-governmental organizations or persons who have been granted public easement.

As the form of compensation, it shall be in the form of payment by money. In principle, payment by money is made, but depending on the government's choice, the payment of compensation shall be all or any combination of the following.

- Land with the same quality, size and potential productivity as the lost land
- A building with the same quality, size and usage as the lost building
- Plants and seedlings
- Cereal and basic food over a period of time

5) Compensation content

Under The Land Act (No.6), 1999 and Land (Assessment of the Value Land for Compensation) Regulation, 2001, the affected assets are assessed based on the market price and residual value of the land. When assessing the assets to be compensated, the compensation details shown in the table must be taken into consideration. If the compensation cost is not paid within 6 months from the date the land was acquired or the right was invalidated, the interest rate using the commercial bank's fixed deposit standard interest rate will be paid before the compensation benefits are paid.

Table 45: Compensation content

Items	Content
Real estate market price	Since the price of land varies from region to region, it is based on the average price of land in a specific region along the planned route.
Interference (relocation) allowance	It is based on the principle of "land price x 12-month normal interest rate for commercial bank time deposits".
Transportation cost	Actual cost of transporting 12 tonnes of luggage by rail or road within 20 km of the evacuation area (real cost of cheaper railway or road).
Accommodation fee	36 months' worth of market rent. These may be based on the actual rent declared by the owner, although investigations may be required to confirm credibility.
Loss of rent income	Price based on loss of rent income for 36 months per tenant.
Loss of profit	Calculated based on the monthly net profit (36 months) of the business conducted on the land.
Wage loss	The same amount of wages that will be incurred during reconstruction.

Source : Road Sector Compensation and Resettlement Guidelines, United Republic of Tanzania, February 2009

(16) JICA's policy regarding resettlement

The JICA Environmental and Social Consideration Guidelines (April 2010) establishes the following policies regarding involuntary resettlement.

The key principle of JICA policies on involuntary resettlement is summarized below.

- I. Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives.
- II. When, population displacement is unavoidable, effective measures to minimize the impact and to compensate for losses should be taken.
- III. People who must be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported, so that they can improve or at least restore their standard of living, income opportunities and production levels to pre-project levels.
- IV. Compensation must be based on the full replacement cost as much as possible.
- V. Compensation and other kinds of assistance must be provided prior to displacement.
- VI. For projects that entail large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. It is desirable that the resettlement action plan include elements laid out in the World Bank Safeguard Policy, OP 4.12, Annex A.
- VII. In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance. When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people.
- VIII. Appropriate participation of affected people must be promoted in planning, implementation, and monitoring of resettlement action plans.
- IX. Appropriate and accessible grievance mechanisms must be established for the affected people and their communities. Above principles are complemented by World Bank OP 4.12, since it is stated in JICA Guideline that "JICA confirms that projects do not deviate significantly from the World Bank's Safeguard Policies". Additional key principle based on World Bank OP 4.12 is as follows
- X. Affected people are to be identified and recorded as early as possible in order to establish their eligibility through an initial baseline survey (including population census that serves as an eligibility cut-off date, asset inventory, and socioeconomic survey), preferably at the project identification stage, to prevent a subsequent influx of encroachers of others who wish to take advance of such benefits.)
- XI. Eligibility of Benefits include, the PAPs who have formal legal rights to land (including customary and traditional land rights recognized under law), the PAPs who don't have formal legal rights to land at the time of census but have a claim to such land or assets and the PAPs who have no recognizable legal right to the land they are occupying.
- XII. Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are land-based.
- XIII. Provide support for the transition period (between displacement and livelihood restoration.
- XIV. Particular attention must be paid to the needs of the vulnerable groups among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities, etc.

XV. For projects that entail land acquisition or involuntary resettlement of fewer than 200 people, abbreviated resettlement plan is to be prepared.

In addition to the above core principles on the JICA policy, it also laid emphasis on a detailed resettlement policy inclusive of all the above points; project specific resettlement plan; institutional framework for implementation; monitoring and evaluation mechanism; time schedule for implementation; and, detailed financial plan etc.

(17) Comparison of JICA guidelines and Tanzanian legal system

The following table shows the results of comparison between the JICA guidelines and the legal systems for resettlement in Tanzania.

Table 46: Comparison between JICA guidelines & legal system for resettlement in Tanzania

No.	(A) JICA Guidelines	(B) Laws of the Tanzania	Gaps between (A) and (B)	Policy of this project
1.	Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives.	Tanzania policies also insist on looking for best alternatives when implementing involuntary resettlement and loss of means of livelihood	No gap between WB OP 4.12 and Tanzania policies. Thus WB OP 4.12 will be applied here	Consider alternatives to avoid unnecessary loss of livelihoods.
2.	When population displacement is unavoidable, effective measures to minimize impact and to compensate for losses should be taken.	The <i>Land Acquisition Act</i> , the <i>Land Act 1999</i> and the <i>Village Land Act 1999</i> have stated clearly that land owners, with or without formal legal rights, are entitled to full, fair and prompt compensation. They also get disturbance allowance, transport allowance, accommodation allowance and loss of profit if they were in actual occupation of the acquired property. Lost assets are limited to “unexhausted improvements”, that is the land and developments on the land. The law does not cover economic and social impacts of relocation and as such socio-economic surveys are not part of the land acquisition process	There is no gap between Tanzania and WB OP 4.12 as far as those with formal legal rights and those without formal legal rights are concerned. However, the lost assets in Tanzania are restricted to land and developments on land, and where relevant, loss of profits. The lost assets under WB OP 4.12 are much wider than land and include loss of access to livelihoods and standard of living and seeks to improve them or at least to restore them to pre-displacement levels	Consider the replacement cost (market price and procedure costs included in compensation).
3.	People who must be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported, so that they can improve or at least restore their standard of living, income opportunities and production levels to pre-project levels.	Tanzania law on compulsory acquisition and compensation is limited to those who can prove <i>de jure</i> or <i>de facto</i> land ownership. Users are not covered	Tanzania law makes no differentiation between owners of permanent and non-permanent buildings. Livelihood restoration is not specified in the legal system of Tanzania.	In this ARAP, compensation shall be taken for those affected by the project, such as houses partially affected by the project. In addition, in order to recover or improve the standard of living, a livelihood recovery plan including the period of resettlement will be

No.	(A) JICA Guidelines	(B) Laws of the Tanzania	Gaps between (A) and (B)	Policy of this project
				considered. For example, during the relocation period, support for employment of the relocated persons and provision of alternative access to social services can be considered.
4.	Compensation must be based on the full replacement cost as much as possible.	Tanzanian law requires that compensation be full, fair and prompt. Prompt means it should be paid within six months, failure to do which attracts an interest rate equivalent to the average rate offered by commercial banks on fixed deposits. Legally, compensation for the acquired land does not have to be paid before possession can be taken, but in current practice it is usually paid before existing occupiers are displaced	In practice, compensation is not paid promptly most of the time, and delays are not rectified by paying the interest rate as required by the law	Consider adopting reacquisition price (market price and cost required for procedure), instead of cost amortized price. Consider that compensation is paid promptly.
5.	Compensation and other kinds of assistance must be provided prior to displacement.	Compensation must be paid before relocation. (<i>Land Acquisition Act, 1967 (15- (1))</i> and <i>Land Act 1999- Cap 113</i>). Tanzania allows the government to own the acquired land before paying the compensation, but current practice is to make an effort to pay the compensation before owning the land.	There is no gap.	Monitor that compensation is paid reliably prior to relocation.
6.	For projects that entail large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public.	Compensation must be provided for large-scale resettlement (<i>Land Acquisition Act 1967 Part II Section 11</i> and <i>Land Cap 113, Part II Section 3 (1) (g)</i>)	The legal system of Tanzania does not require the formulation of resettlement plans.	In order to properly deal with the impact of resettlement, it is essential to prepare a resettlement plan based on JICA guidelines.

No.	(A) JICA Guidelines	(B) Laws of the Tanzania	Gaps between (A) and (B)	Policy of this project
7.	In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance.	There scanty provisions related to consultation and disclosure in Tanzanian law. The notice, under the <i>Land Acquisition Act</i> , informs land owners about the President's need to acquire their land, and their right to give objections. The <i>Land Act</i> allows displaced persons to fill in forms requiring that their land be valued, and giving their own opinion as to what their assets are worth. Since resettlement is not provided for legally, there are no provisions about informing the displaced persons about their options and rights; nor are they offered choice among feasible resettlement alternatives.	The provisions in WB OP 4.12 requiring consultation and disclosure have no equivalent in Tanzanian law and practice	Consider detailed and effective consultation and information sharing with affected persons.
8.	When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people.	Under the <i>Land Acquisition Act</i> , informs land owners about the President's need to acquire their land, and their right to give objections. The <i>Land Act</i> allows displaced persons to fill in forms (in Kiswahili) requiring that their land be valued, and giving their own opinion as to what their assets are worth.	There are no provisions about informing the displaced persons about their options and rights; nor are they offered choice among feasible resettlement alternatives.	Consider detailed and effective consultation and information sharing with affected persons in a language and format that they can understand.
9.	Appropriate participation of affected people must be promoted in planning, implementation, and monitoring of resettlement action plans.	Consultation with wide range of project stakeholders including individuals or groups affected by, the project, either positively or negatively also the host community are regularly held as a procedure towards resettlement exercise. Tanzania's law does not provide for the consideration of vulnerable groups.	Tanzanian law does not make provisions requiring the government to pay special attention to vulnerable groups in the administration of compensation despite the consultations	Consider appropriate and effective participation of affected persons during the planning, implementation and monitoring of resettlement plans. Also, consider the socially vulnerable.
10.	Appropriate and accessible grievance mechanisms must be established for	The legal system of Tanzania defines a mechanism for dealing with complaints, including complaining to the court. (<i>Land</i>	Tanzania's grievance mechanism is not easily accessible to affected people.	Provide a complaint handling mechanism that is

No.	(A) JICA Guidelines	(B) Laws of the Tanzania	Gaps between (A) and (B)	Policy of this project
	the affected people and their communities.	<i>Acquisition Act</i> 1967, Section 13 (1) and (2) and <i>Land Act</i> , Cap 113.Part XIII Section 167 (1)		easily accessible to all affected individuals.
11.	Affected people are to be identified and recorded as early as possible in order to establish their eligibility through an initial baseline survey (including population census that serves as an eligibility cut-off date, asset inventory, and socioeconomic survey), preferably at the project identification stage, to prevent a subsequent influx of encroachers of others who wish to take advance of such benefits. (WB OP4.12 Para.6)	Identification of affected people is done through census and surveys which assist to know the social structure of the population and their distribution to inform resettlement	There is no gap between Tanzania Resettlement Guideline and that of WB OP 4.12	Census surveys and socio-economic baseline data surveys shall be conducted early to prevent unreasonable inflows. In addition, compensation shall be provided promptly after the completion of the assessment.
12.	Eligibility of benefits includes, the PAPs who have formal legal rights to land (including customary and traditional land rights recognized under law), the PAPs who don't have formal legal rights to land at the time of census but have a claim to such land or assets and the PAPs who have no recognizable legal right to the land they are occupying. (WB OP4.12 Para.15)	<p> Holders of formal right to land/assets.</p> <p> Holders of land under customary law</p>	The assets lost in Tanzania are limited to land and land development and, where relevant, loss of profit. It does not deal with squatters.	Structures, whether permanent or not, will be covered if affected.

No.	(A) JICA Guidelines	(B) Laws of the Tanzania	Gaps between (A) and (B)	Policy of this project
13.	Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are land-based.	Tanzania law on compulsory acquisition and compensation is limited to those who can prove <i>de jure</i> or <i>de facto</i> land ownership. Users are not covered. Compensation for land can be in the form of either cash or land. <i>Land Act</i> Cap 113 Section 49 (3) and <i>Land Acquisition Act</i> , 1967 Section 11 (2)	There is no policy to prioritize land-based transfer strategies.	Considering the land conditions in Dodoma, a land-based relocation strategy will be adopted for places considered appropriate.
14.	Provide support for the transition period (between displacement and livelihood restoration).	Tanzanian law requires that compensation be full, fair and prompt. Prompt means it should be paid within six months, failure to do which attracts an interest rate equivalent to the average rate offered by commercial banks on fixed deposits. However PAPs are guaranteed 90 days to vacate after compensation.	The legal system of Tanzania does not mention assistance during the period of resettlement and livelihood restoration.	Consider support during the relocation period (support for new land acquisition, payment of land registration fees, provision of temporary social services, etc.) and recovery of livelihoods.
15.	Particular attention must be paid to the needs of the vulnerable groups among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities etc.	There are no legal provisions requiring the government to restore livelihood or to provide assistance towards the restoration of such livelihoods. Indeed, compensation is not payable in the case of restrictions to access to areas of livelihood opportunities. Moreover there are no provisions that require the government to pay special attention to vulnerable groups or indigenous peoples	The legal system of Tanzania does not provide for the consideration of the vulnerable groups affected by the project, and all affected persons are treated equally in the compensation process.	When the existence of the group is confirmed through the socio-economic survey at the planned site of the project, particular attention should be paid to landless residents, the elderly, women and children.
16.	For projects that entail land acquisition or involuntary resettlement of fewer than 200 people, abbreviated resettlement plan is to be prepared as the case of this ARAP.	Projects that affect a large number of people require that land use plans be included in the project. (<i>Land Use Planning Act</i> , 2007. Section 23, 32 and 35 and <i>Village Land Use Guidelines</i> , 2002)	In practice, both ARAP is done in small projects but is not reflected in Tanzania laws.	In this project, TANROADS plans to formulate a resettlement plan.

Source: Survey Team

(18) Land acquisition and resettlement policy for this project

As a result of a comparative study of the JICA Environmental Impact Assessment Guidelines and the Tanzanian legal system, the land acquisition and resettlement policies for this project are as follows.

- I. If there is a discrepancy between Tanzania's domestic environment-related laws and international regulations including JICA guidelines, the Government of Tanzania is required to take necessary actions to bridge the gap between domestic laws and JICA guidelines in order to implement this project.
- II. Land acquisition and involuntary resettlement will be avoided where feasible, or minimized, by identifying possible alternative project designs that have the least adverse impact on the communities in the project area.
- III. Where displacement of households is unavoidable, all PAPs (including communities) losing assets, livelihoods or resources will be fully compensated and assisted so that they can improve, or at least restore, their former economic and social conditions.
- IV. Compensation and rehabilitation support will be provided to any PAPs, that is, any person or household or business which on account of project implementation would have his, her or their:
 - Standard of living adversely affected;
 - Right, title or interest in any house, interest in, or right to use, any land (including premises, agricultural and grazing land, commercial properties, tenancy, or right in annual or perennial crops and trees or any other fixed or moveable assets, acquired or possessed, temporarily or permanently;
 - Income earning opportunities, business, occupation, work or place of residence or habitat adversely affected temporarily or permanently; or
 - Social and cultural activities and relationships affected or any other losses that may be identified during the process of resettlement planning.
- V. All PAPs residing, working, doing business and/or cultivating land within the project impacted areas as of the date of the latest census and inventory of lost assets, are entitled to compensation for their lost assets (land and/or non-land assets) regardless of ownership or social status,.
- VI. PAPs that lose only part of their physical assets will not be left with a portion that will be inadequate to sustain their current standard of living. The minimum size of remaining land and structures will be agreed during the resettlement planning process.
- VII. People temporarily affected are to be considered PAPs and resettlement plans address the issue of temporary acquisition.
- VIII. Where a host community is affected by the development of a resettlement site in that community, the host community shall be involved in any resettlement planning and decision making. All attempts shall be made to minimize the adverse impacts of resettlement upon host communities.
- IX. The resettlement plans will be designed in accordance with Tanzania's *National Involuntary Resettlement Policy* and JICA's *Policy on Involuntary Resettlement*.
- X. The Resettlement Plan will be translated into local languages and disclosed for the reference of PAPs as well as other interested groups.

- XI. Payment for land and/or non-land assets will be based on the principle of replacement cost.
- XII. Compensation for PAPs dependent on agricultural activities will be land-based wherever possible.
- XIII. Replacement lands, if the preferred option of PAPs, should be within the immediate vicinity of the affected lands wherever possible and be of comparable productive capacity and potential.
- XIV. Resettlement assistance will be provided not only for immediate loss, but also for a transition period needed to restore livelihood and standards of living of PAPs. Such support could take the form of short-term jobs, subsistence support, salary maintenance, or similar arrangements.
- XV. The resettlement plan must consider the needs of those most vulnerable to the adverse impacts of resettlement (including the poor, those without legal title to land, ethnic minorities, women, children, elderly and disabled) and ensure they are considered in resettlement planning and mitigation measures identified. Assistance should be provided to help them improve their socio-economic status.
- XVI. PAPs will be involved in the process of developing and implementing resettlement plans.
- XVII. PAPs and their communities will be consulted about the project, the rights and options available to them, and proposed mitigation measures for adverse effects, and to the extent possible be involved in the decisions that are made concerning their resettlement.
- XVIII. Adequate budgetary support will be fully committed and made available to cover the costs of land acquisition (including compensation and income restoration measures) within the agreed implementation period. The funds for all resettlement activities will come from the Government of Tanzania.
- XIX. Displacement does not occur before provision of compensation and of other assistance required for relocation. Sufficient civic infrastructure must be provided in resettlement site prior to relocation. Acquisition of assets, payment of compensation, and the resettlement and start of the livelihood rehabilitation activities of PAPs, will be completed prior to any construction activities, except when a court of law orders so in expropriation cases. (Livelihood restoration measures must also be in place but not necessarily completed prior to construction activities, as these may be ongoing activities.)
- XX. Organization and administrative arrangements for the effective preparation and implementation of the resettlement plan will be identified and in place prior to the commencement of the process; this will include the provision of adequate human resources for supervision, consultation, and monitoring of land acquisition and rehabilitation activities.
- XXI. Appropriate reporting (including auditing and redress functions), monitoring and evaluation mechanisms, will be identified and set in place as part of the resettlement management system by external monitoring personnel.

Cut-off date

In this project, the cut-off date was set on August 31, 2019 during the asset assessment conducted during the F/S investigation stage by TANROADS, and then, PAPs were notified to apply for compensation. This cut-off date determines whether or not compensation and relocation measures will be applied. New development activities within the project area after the cut-off date will not be covered.

Acquisition price

The acquisition price is set by the Land Law of Tanzania. Specifically:

Table47: Overview of reacquisition price

No.	Items	Content
1	Real estate market price	The value of the land is assessed based on the average price of the land per specific area and ranges from Tsh 70,000 to Tsh 3,000,000 per acre. Structures are paid at the market price.
2	Disturbance (transfer) allowance	Land price × 12-month regular interest rate on commercial bank time deposits. 5% interest rate is adopted
3	Transport cost	12 tonnes of luggage to be transported by railway or road within 20km of the affected area (actual cost of cheaper railway or road).
4	Accommodation allowance	Market rent per month of affected building × 36 months
5	Loss of rent income	Price based on loss of rent income for 36 months per tenant.
6	Loss of profit	monthly net profit × 36 months
7	Crops	Cash compensation equivalent to average of last 3 years' market value for the mature and harvested crop, or market value of the crop for the remaining period of tenancy/lease agreement, whichever is greater.

Source: Study Team

(19) Scale and scope of land acquisition and resettlement

1) Population census

As a result of the census survey conducted by the local subcontractor, the total number of indemnified persons in the project area is 187 (43 households). The number of affected people who need to be physically relocated is 169. The breakdown by category is shown in the table below.

Table 48: Number of Project Affected Units (PAUs) and Affected Persons (APs)

Type of loss	No. of PAUs			No. of APs		
	Regular	Non-regular	Total	Regular	Non-regular	Total
Displacement required	26	0	26	169	0	169
1. HH (Structure owner of Gov. land)	24	0	24	159	0	159
2. HH (Tenants)	-	-	-	-	-	-
3. CBEs (Structure owner of Gov. land)	2	0	2	10	0	10
4. CBEs (Tenants)	-	-	-	-	-	-
No displacement	17	0	18	18	0	18
5. Land owners	17	0	18	18	0	18
6. Wage earners	-	-	-	-	-	-
Grand Total	43	0	43	187	0	187

Source: Study Team (HH: House Hold CBEs: Commercial and Business Enterprises)

The PAPs interviewed are mainly residents of Chinyoyo Sub ward. The age composition of PAPs is 18-40 years (48%), 41-60 years (38%), and PAP over 60 years is 14%. In this project, this assessment was carried out at the stage of F/S survey by TANROADS. Prior to this assessment, a cut-off date was set

on August 31, 2019, and owners with affected assets within the project site were informed to apply for compensation. This cut-off date determines whether or not compensation and relocation measures will be applied. New development activities within the project area after the cut-off date will not be covered.

2) Property / site survey

In the project area 72% of PAPs' houses are semi-permanent houses consisted of cement floors, 24% are permanent houses and 4% of the houses are thatched with grass with earth floor (*tembe*). Most of the houses owned by PAPs 95% have brick walls and 5% have poles and mud. The variation in type of construction materials will imply variations in the compensation rates that PAPs will receive. Number of rooms in PAPs houses varies with most of the PAPs houses comprising 4 rooms (40%), 2 rooms (17%), 3 rooms (34%), 5 rooms (6%) or 6 rooms (3%). In addition, some structures are still under construction.

Table 49: Overview of land acquisition and resident relocation

Code	Items	Quantity	Amount (Tshs)
PA-N-01~05 ; PA-S-01~18 TA-N-01~04 ; TA-S-01~22	Buildings	49	334,045,985
	Foundations	3	39,234,200
	Crops	29	4,792,200
	Walls	1	1,624,000

Note : PA= Partially Affected; TA= Totally Affected; N= Northern part; S= Southern part

Source: Survey Team

3) Household and life survey

Most head of household in the project area have formal education with 62% of head of household having undertaken primary education, 35% ordinary secondary education and 3% having university education. None of them reported having no formal education. The census also showed that some PAPs are engaged in petty trade as primary economic activities (32.7%) that include petty business with most of the activities conducted along the proposed road. 64.5% of PAPs are engaging on farming and 2.8% of PAPs depend of casual employment as primary economic activity.

4) Socially vulnerable

Some PAPs in the RAP are considered vulnerable and will need support during and after the relocation process to enable them, maintain/improve their livelihoods or at least restore their livelihood to their pre-project conditions. The survey identified 5 people categorized as vulnerable; these constitute 2 owning no land, (a male and a female), one female elder and 2 persons (widows) with long illness. These are the people who will need special attention and assistance during RAP implementation DCC should ensure that social workers are involved in the compensation exercise to ensure that vulnerable people get special attention.

(20) Specific measures for compensation and support

1) Loss compensation

Due to the construction of this project, it is necessary to relocate utilities such as boreholes, pipe schemes, utility poles, and other infrastructure. Main affiliates, TANESCO, TTCL, DUWASA, etc. are notified at the time of stakeholder meetings. In addition, specific measures for compensation and support related to them will be planned and implemented based on the Land Law of Tanzania and the Road Sector Compensation and Relocation Guidelines prepared by the Ministry of Infrastructure Development.

Compensation for owners and residents of commercial structures in the target area will be determined by the registered assessor, and the details of compensation for each confirmed asset will be determined by individual compensation arrangements. In this project, the assessment was carried out at the stage of F/S survey by TANROADS. Prior to this assessment, a cut-off date was set on August 31, 2019, and owners with affected assets within the project site were informed to apply for compensation. This cut-off date determines whether or not compensation and relocation measures will be applied.

Compensation arrangements are signed by Ward Executive Officers and District Commissioners and Regional Commissioners in the area. In addition, it is necessary to submit the assessment document to the Chief Government Valuer for approval.

2) Life reconstruction measures

In order to support the livelihood recovery of affected people, the following mechanism is recommended for ARAP of this project.

- Provide counselling so that affected persons can adapt to the new environment of the relocation destination.
- Provide support for appropriate use of compensation funds
- Introduce the transfer destination to the affected people who are interested.
- Guarantee of basic social services and security at the relocation destination
- Consideration and direct support for the elderly and people with disabilities

3) Entitlement matrix

The entitlement matrix for the target people affected by this plan is shown below.

Table 50: Entitlement Matrix for the Dodoma Inner Ring Road

Land and Assets	Types of Impact	Person(s) Affected	Compensation/Entitlement/Benefits
Agricultural land	Loss of land rights.	Farmer/ title holder loosing less than 20% and the rest of the land is economically viable	Provision of In-kind with land of similar qualities or higher or Cash compensation for affected land at market value costs for the lost piece of land as per the preference of the PAP; Consultations and concurrence of both spouses in the process of land acquisition and provision of compensation. Notice to harvest standing seasonal crops and compensation
		Farmer/ title holder loosing greater than 20% and the rest of the land is not economically viable	Provision of In-kind with land of similar qualities or higher or Cash compensation for affected land at market value costs for the lost land as per the preference of the PAP; Consultations and concurrence of both spouses in the process of land acquisition and provision of compensation. Provide at least three (3) months advance notice to shift from occupied land. Cash compensation equivalent to average of last 3 years' market value for the mature and harvested crop, or market value of the crop for the remaining period of tenancy/lease agreement, whichever is greater. Cash compensation for structures and other land improvements at market value cost (if affected); Legal assistance, transaction costs for purchase such as registration, transfer taxes and/or customary fees will also be compensated for those opting for replacement land. .
		Tenant	Cash compensation for the harvest or produce from the affected land, structures and other assets owned or established by the tenant at full replacement costs.
		Squatter/informal occupant	Cash compensation for crops and trees planted by the occupant. Provision of advance notice of at least three (3) months to harvest and/or shift from the land. If the farmer without land title is classified as a vulnerable person, then additional assistance should be described in individual RAP/ARAP, and may include additional training on farming techniques, additional legal guidance on how to acquire title to land, and identification of financing options for acquiring land.
		Lease holder	Cash compensation at full replacement costs of the affected permanent crops or of the crops if seasonal crops will have to be harvested prior to maturity. Cash compensation for any unfulfilled lease prorated by the area lost.

Land and Assets	Types of Impact	Person(s) Affected	Compensation/Entitlement/Benefits
Commercial land	Loss of land	Business owner is lease holder (the person who is losing the income or business) Land used for business partially affected. Limited loss	Cash compensation for affected land at market value costs for the lost piece of land. Loss of Profit (Net profit/p.m. x 36 months) calculated based on loss by PAP. Consultations and concurrence of both spouses in the process of land acquisition and provision of compensation.
		Land used for business severely affected	Provision of In-kind or Cash compensation for affected land at market value costs for the lost land as per the preference of the PAP. Loss of Profit (Net profit/p.m. x 36 months). Cash compensation/refund of the any unfulfilled lease/rents. Support for transportation of business materials to relocation site and back to reconstructed facilities. Provide at least three (3) months advance notice to shift from occupied land. Consultations and concurrence of both spouses in the process of land acquisition and provision of compensation.
Business structure	Business structure	Owner occupied business structure owners	Choose between options such as: (i) Structure unit in chosen relocation site; (ii) Reconstruction of structure in adjacent unaffected lot or (iii) Cash compensation for the lost structure; and, Loss of profit as per the national legal requirements (Net profit/p.m. x 36 months). Consultations and concurrence of both spouses in the process of land acquisition and provision of compensation. Provide at least three (3) months' advance notice to shift from occupied property. Resettlement assistance in the form of: (a) transport allowance; (b) disturbance allowance; (c) accommodation allowance during reestablishment to new place; and, (d) livelihood development assistance (e) Legal assistance for purchase of land, transactional costs and taxes (f) Search assistance by the local land office.
		Tenant/Lessee of house	Cash compensation for affected assets (verifiable improvements to the property by the tenant); Loss of profit calculated at 36 months' net profit as per the legal requirement; Relocation assistance (costs of shifting + allowance equivalent to four months rental costs). Assistance to help find alternative rental arrangements. Livelihood Rehabilitation and Restoration assistance if required (assistance with job placement, skills training). Provide at least three (3) months advance notice to shift from occupied property.
Residential Land	Loss of portion of residential land	Owner occupied residential	Provision of options for Cash and In-kind compensation for affected land

Land and Assets	Types of Impact	Person(s) Affected	Compensation/Entitlement/Benefits
	Remaining land still viable for present use.	structure that will move - Legal (occupancy rights or residential license) holder	at market value costs with consultations and concurrence of both spouses; Provision of at least three (3) months' notice to vacate the land prior to land take; PAPs to be allowed to salvage remain of the affected property. Cash compensation for the affected structures and land improvements including trees; Resettlement assistance: (a) Legal assistance for purchase, (b) Search assistance, (c) complementary allowance for additional cost of living, (d) assistance to find alternative rental during the period of relocation.
		Owner occupied residential structure that may redevelop in the same plot - Legal (occupancy rights or residential license) holder	Cash compensation for affected land at market value costs for land acquired portion acquired; Cash compensation for the affected structures (if the whole structure will be lost) and land improvements including trees built/established and owned by the legal holder with consultations and concurrence of both spouses; If structure is affected but still usable, cash compensation for the lost section and compensation to repair the remainder of the usable structure.
		Lessee/Leaseholder	Cash compensation for any unfulfilled lease prorated by the area lost. Cash compensation at market value cost for affected structures and improvements, including economic trees, built or established and owned by the lessee. Search assistance for alternative land by linking to local government authority to allocate surveyed plots. If the renter or lease holder is classified as a vulnerable person, then additional assistance should be described in individual RAP/ARAPs and may include: additional legal guidance on terms/conditions to request in rental agreement, and identification of programs that specifically provide support to vulnerable people renting land.
		Squatter/informal settler	Cash compensation for affected structures and improvements, including economic trees, built or established and owned by the informal settler. Provide at least three (3) months' advance notice to shift from occupied land.
	Loss of all or major portion of residential land Remaining area insufficient for continued use or becomes uneconomically viable	Legal (occupancy rights/residential license holder)	Option for In-kind with land of similar qualities or higher or Cash compensation lost land at market value cost; Cash compensation of affected land improvements, structures, trees, crops owned by the legal holder at full replacement cost. Salvageable materials of demolished structures and cut trees. Provide at least three (3) months' advance notice to shift from occupied land. Legal assistance, transaction costs for purchase such as registration, transfer taxes and/or customary fees

Land and Assets	Types of Impact	Person(s) Affected	Compensation/Entitlement/Benefits
			will also be compensated for those opting for replacement land.
		Lessee/leaseholder of land	Cash compensation/refund of the any unfulfilled lease/rents. Cash compensation for land improvements, structures (including house) and trees established and owned by the Lessee. Salvageable materials of the structure or house;
		Squatter/informal settler into the land	Cash compensation for land improvements, structures (including house) and trees established and owned by the squatter. Salvageable materials of the structure or house
House/Abodes	Physical displacement of household (loss of dwelling), Loss of rental income	Homeowners and his family and members of households	Choose between options such as: (i) Housing unit in chosen relocation site; (ii) Reconstruction of house in adjacent unaffected lot or (iii) Cash compensation for the lost house; and, Resettlement assistance in the form of: (a) transport allowance; (b) disturbance allowance; (c) accommodation allowance during reestablishment to new place; and, (d) livelihood development assistance (e) Legal assistance for purchase (c) Search assistance
		Tenant/Lessee of house	Cash compensation for affected assets (verifiable improvements to the property by the tenant). Right to salvage materials without deduction from compensation. Relocation assistance (costs of shifting + allowance equivalent to four months' rental costs). Assistance to help find alternative rental arrangements. Rehabilitation assistance if required (assistance with job placement, skills training)
		Squatter of house/structure	Cash compensation for affected structure at market value cost. Right to salvage materials without deduction from compensation. Relocation assistance (costs of shifting + assistance to find alternative secure accommodation preferably in the community of residence through involvement of the project. Alternatively, assistance to find accommodation in rental housing or in a squatter settlement scheme, if available. Rehabilitation assistance if required assistance with job placement, skills training.
Buildings and structures other than the house	Loss of structures or portions of structures other than the house	Owner of structure	Cash compensation for affected structure based on market value cost without depreciation. Right to salvageable materials of demolished structure.
Business or access to livelihood	Loss of business of livelihood source	Street vendor (informal without title or lease to the	Opportunity cost compensation equivalent to 2 months' net income based on tax records for previous year (or tax records from comparable business,

Land and Assets	Types of Impact	Person(s) Affected	Compensation/Entitlement/Benefits
		stall or shop)	or estimates), or the relocation allowance, whichever is higher. Relocation assistance (costs of shifting). Assistance to obtain alternative site to re- establish the business.
		Business owners	Cash compensation for relocation cost and lost net income during the relocation period as per the national legal provisions of loss of profit allowance (Net profit/p.m. x 36 months). Alternative site within the area to continue business, transport cost where applicable, affected property where applicable, loss of business (3 months) where applicable
Seasonal crops	Loss of harvest	Verified owner of crops (whether land owner, tenant, or squatter)	No compensation. Provision of advance notice of at least three (3) months to harvest and/or shift from the land
Trees and perennial crops	Loss of trees or perennial crops	Verified owner of trees (whether landowner, tenant or squatter)	Cash compensation based on type, age and productive value of affected trees plus disturbance allowance
Temporary possession of land during construction	Interruption of economic activities	PAP (whether owner, tenant, or squatter)	Cash compensation for any loss of income, cash compensation for any temporary land possession (rental charges). Restoration of land to its original or better state.
Loss of livelihood (socially vulnerable)	Losses of any asset and disruption of lives	Vulnerable PAPs (Enumerate Categories), Household with PWDs, Single Women HH head, Poor households	Additional entitlements to be determined based on consultation with Vulnerable PAPs
Community facilities	Loss of community facility (church, halls, school, sports)	Community residents	Replacement/restoration at the cost of the project
Graves	Removal of graves	Relatives, community	Relocation or removal according to local customs and as per the provisions in the Graves removal act
Seasonal Land Users	Loss of use of land for seasonal activities	Affected persons	Assistance to help find alternative land for seasonal use

(21) Complaint handling mechanism

Article 13 (1) of the Land Acquisition Act 1967 stipulates the provisions in the case where a lawsuit occurs on the acquired land and the agreement cannot be obtained. The law details the litigation and offers a six-week period to resolve the parties before bringing them to court for resolution. The Land Act (1999) and its related provisions are a further refinement of the provisions of Article 13, Paragraph 1 of the Land Acquisition Act, and provide for the establishment of land courts at the ward and regional levels. If the land court is not satisfied with the decision, the party must bring the matter to the court. If the district court or district land court cannot resolve the issue, the issue is brought to the higher court. Appeals to the High Court and the Supreme Court are the highest appeals in this system, and the decision here is the final decision. Given that most affected individuals have limited knowledge of the law and their rights under the law, the process of resolving indemnity lawsuits described in the Land Act is cumbersome and costly. Therefore, it is necessary to establish a framework for complaint and litigation resolution at the local level so that it can be resolved before it is brought to court. In consideration of this, ARAP of this project plans a simple complaint handling mechanism for timely resolution of complaints of affected persons. Complaint handling procedures shall be managed mainly at the local level, shall be easy to access for all affected persons and shall be flexible and open. The grievance procedure is the most transparent and cost-effective for all affected persons, by conducting various meetings, involving Dodoma City Hall and other stakeholders, and recording the contents of the meetings to ensure the validity of the claims. At the time of the stakeholder meeting, the affected people were informed of the complaint handling procedure and mechanism. The specific procedure is as follows.

- a) Procedures for lodging complaints to the Grievance committee who will review the complaints prior to submitting the complaint to the village office and receive an acknowledgement from the village office.
- b) It was agreed by PAPs that chairman of the Mtaa also form part of the committee .Upon receipt of the grievance, the members shall try to mediate and resolve the problem amicably with the active participation of the aggrieved party within five working days from the date of the filing of the grievance. If the grievance is resolved and the PAP is satisfied, a report shall be prepared and copies given to the PAP and local authority leader for records and the case is closed.
- c) In the event that the PAP is not satisfied, with the assistance of the Village/mtaa leader, an appeal will be lodged and decision made within 10 days from the date of submission to this committee. If the PAP is still not satisfied, the issue will be taken to the existing Grievance Committee chaired by the Ward Executive Officer (WEO)
- d) In the event that the PAP is not satisfied, with the assistance of the Ward leader, an appeal will be lodged and decision made within 10 days from the date of submission to this committee. If the PAP is still not satisfied, the issue will be taken to the existing Grievance Committee chaired by the Respective District Council

- e) The committee under the respective District Commissioner shall serve as Grievance Redress Committee (GRC) and shall handle all complaints from the PAP, including decisions made by lower levels. The GRC shall make its decisions within 20 days from the date of receipt of each complaint. Beyond this level, the PAP may continue their appeal to the Regional Secretariat, or ultimately to the judiciary as per the legal framework presented above, if an amicable resolution can still not be reached.

(21) ARAP implementation system

1) ARAP implementation organization

The ARAP implementation structure for this project consists of several steps involving individual affected persons, affected communities, local government agencies, Dodoma City Hall, and TANROADS, the Ministry of Housing and Living, and the Ministry of Finance. TANROADS Dodoma Regional Office assesses the compensation, submits the assessment to the Chief Government Valuer, and after obtaining approval, the finance department will pay compensation to the target person.

Table 51: Committees and Responsibilities for RAP implementation

Unit	Responsibilities	Members
Resettlement Committee	<ul style="list-style-type: none"> ○ Oversight management and coordination of RAP implementation activities and teams ○ Liaison with municipalities, districts, government agencies and other stakeholders ○ Review of periodic progress report in accordance with RAP guidelines 	<ul style="list-style-type: none"> ○ Regional Commissioner (Chair) ○ District Commissioner ○ Representative of TANROADS ○ Representative of Ministry of Lands ○ Consultant ○ Representative of a Local NGO ○ Representative of PAPs
Compensation Committee	<ul style="list-style-type: none"> ○ Coordinate management of compensation process ○ Ensure compensation is consistent with RAP guidelines 	<ul style="list-style-type: none"> ○ District Commissioner (Chair) ○ Representative of TANROADS ○ Representative of Ministry of Lands ○ Consultant ○ Valuer ○ Representative of PAPs
Dispute Resolution Committee	<ul style="list-style-type: none"> ○ Address entitlement issues and other disputes and concerns among PAPs and other stakeholders ○ Advise PAPs and other stakeholders on redress mechanisms which cannot be resolved ○ Refer unresolved ○ Disputes to CSC ○ Liaise with other authorities and Resettlement Committee 	<ul style="list-style-type: none"> ○ District Commissioner (Chair) ○ Representative of TANROADS ○ Representative of Ministry of Lands ○ Valuer ○ Representative of PAPs ○ Representative of a Local NGO

Source: Study Team

(22) ARAP Implementation schedule

In order to maintain the openness and transparency of compensation payment procedures, TANROADS cooperates with Dodoma City Hall, each community, and local government agencies will notify the affected persons to receive compensation from the designated location (Dodoma City Hall or designated

bank). If the compensation is to be received by check, TANROADS will create a check in the name of the compensation fund and send it to Dodoma City Hall together with the compensation arrangement. In the presence of the regional leader, each indemnified person will sign the receipt of the compensation upon receipt according to the compensation arrangement. If the compensation is to be received at a designated bank, one will receive the transaction notification after the payment has been deposited in the account of the target person. In addition, support for opening an account will be provided to those who do not have a bank account. Demolition of buildings and removal of crops and trees will not begin until the compensation recipient receives the compensation. After receiving compensation, the subject will be notified to take out materials and assets from their place of residence and to harvest crops. TANROADS, in cooperation with the local administration, encourages affected persons to evacuate by the deadline agreed upon by both parties so that relocation activities can be completed in a timely manner. Basically, the move-out deadline is 90 days after receipt of compensation.

(23) Cost and financial resources

The costs required to implement resettlement are shown below. These costs are calculated based on the approved assessment and compensation arrangements and include various items such as house relocation costs, land market prices and transportation costs. TANROADS will bear the responsibility for the implementation cost based on ARAP.

Table 52: Breakdown of ARAP cost

SN	Item/Particular	Value in Tshs.
1	Structures	341,401,410.00
2	Plots	181,870,000.00
3	Crops	4,175,250.00
4	Graves	-
5	Accommodation allowance	80,316,000.00
6	Transport allowance	3,600,000.00
7	Disturbance allowance	42,532,053.00
8	Loss of rental	3,600,000.00
9	Total	657,494,713.00
11	10% Contingency	65,749,471.30
12	5% RAP implementation	32,874,735.65
13	Grand Total	756,118,919.95

Source: Valuation survey, September 2019

(24) Monitoring by the executing agency and monitoring form (draft)

Internal monitoring will be conducted by TANROADS's environmental department until the completion of all relocations. After the compensation procedure is completed, TANROADS and Dodoma City Hall need to agree on a move-out deadline. The maximum deadline is usually 3 months (90 days).

Based on the progress, every month, the executing agency will periodically compile a report including successful experiences and issues, and submit it to the Dodoma City Hall. Maximize efficiency by

facilitating monitoring and reporting activities by community development personnel in each district. In addition, the RAP implementation experts will conduct regular reviews and quality control.

Considering that the number of affected people is relatively small in the target area of this project, and most of the affected people will search for their own relocation destination, it may be a major issue in implementing monitoring of this project. Therefore, during the period of resettlement, the following items will be monitored by coordinating with the local community and having the monitoring staff permanently stationed at the site.

- Relocation will be done on time and issues will be dealt with in a timely manner
- It can be confirmed that the livelihood after the relocation will be restored to normal.
- Grave relocation is done properly and affected people are involved in the relocation process.
- Baseline socio-economic survey data will be provided as a monitoring benchmark to assess progress and success of RAP implementation. Monitoring also includes communication with affected persons, recording of feedback from affected persons, understanding of the relocation destination, and contents of affected community assets.

TANROADS and Dodoma City Hall will hire external monitoring personnel to verify that compensation has been paid properly. External monitors also assess affected people's livelihood recovery in terms of previous living standards, income, housing, access to basic equipment, and ownership of land and property. Approximately three months after the relocation is completed, the first monitoring will be carried out and a report detailing the assessment and its results will be submitted to Dodoma City Hall and Dodoma Region (RAS). The monitoring form and environmental checklist proposed based on the aforementioned environmental management and monitoring plan is attached at the end of this report.

(25) Points to be noted when implementing the Grant Aid Project

1) Matters to be paid special attention to by the Tanzania side

In order to ensure the smooth implementation of the project and to fully realize and sustain the project effects, the following matters should be paid special attention by the Government of Tanzania.

1-1) Land acquisition, relocation, and removal

After the signing of the Exchange of Notes, which officially decides the implementation of the project, TANROADS should promptly and reliably secure the project-related land, including target road construction area, borrow pit, disposal area, construction camp sites, etc., and relocate and remove any obstructions.

1-2) Expediting of tax exemption and customs clearance procedures

After the signing of the Exchange of Notes, TANROADS will promptly and reliably approach the relevant organizations and agencies for duty exemption and customs clearance.

1-3) Conducting project briefing sessions for residents along the project route

TANROADS need to carry out to conduct a project briefing session with residents or their representatives along the project area as soon as possible after the signing of the Exchange of Notes.

1-4) Traffic safety

Notify the road users to follow the instructions of traffic controllers during construction.

1-5) Thorough notification of inconveniences during construction

Notify the road users of the inconvenience through radio and other public relations media, since the construction work is expected to cause inconvenience to the passing traffic.

Chapter 2: Project Contents

Chapter2 Project Contents

2-1 Outline of the Project

(1) Objective of the project

The purpose of this project is to facilitate the traffic flow and improve the living environment in Dodoma City by constructing a new inner ring road and widening the existing road, thus contributing to the facilitation of logistics and economic development of the country.

(2) Outline of the Project

In order to achieve the above-mentioned objectives, the project involves widening of an additional two-lane road beside the existing two-lane road in section 2-2, which is part of the inner ring road in Dodoma City, and construction of a new two-lane road in section 3. The project is expected to contribute to the realization of FYDP2 and the government function relocation plan. The scope of the roads to be constructed by Japan's cooperation is as follows

- The target road section is about 6.53 km from Bahi intersection on Section 2-2 of the Inner Ring Road to Makulu intersection on Kikuyu Road through Section 3.
- Section 2-2 is the widening of an additional 2-lane road beside the existing 2-lane road between Bahi and Imagi intersections (3.401km), and Section 3 is the construction of a new 2-lane road between Imagi, Ntyuka and Makulu intersections (3.108km).
- There will be a 14m wide median strip to allow for future BRT applications.

The alignment and specifications of the new two-lane road will be set in anticipation of future four-lane construction.

- Improve intersections to ensure safe and smooth traffic flow.
- Install secondary roads and sidewalks to ensure the level of service and safety of the road.
- Establish road drainage facilities considering the watershed and local conditions, road ancillary facilities to ensure the functioning of the road, and road safety facilities to ensure traffic safety.

2-2 The Project Outline Design

2-2-1 Design policy

(1) Basic policy

The basic policy of the design is the expected functions of the target road (international highways, alleviation of traffic congestion in the city, detour of large vehicles), based on the request from the Government of Tanzania, the results of field surveys and discussions with related organizations. The structural type that can be achieved is considered. Furthermore, since the local consultant completed the basic design of the inner ring road including the target road section in May 2019 in the F/S conducted by TANROADS, this F/S design was reviewed and reflected in this project.

2-2-2 Basic plan

(1) Basic policy of road design

Currently, Section 2-2 is a part of international trunk road North-South Corridor and Section 3 is also expected to function as a large vehicle detour for the East-West Corridor. Both sections are expected to function as an international trunk road at the moment, but it is considered that when the northern section of the outer ring road of Dodoma City is completed in the future, the function will change from the international trunk road to the intra-city trunk line. In addition to understanding the positioning of these target roads, the number and lane composition of the target roads will be selected after surveying and analysing the quantity and quality of traffic and the maintenance status of related roads. For the existing 2-lane paved road in section 2-2, the current pavement structure and ground bearing capacity will be confirmed, and the load bearing capacity will be determined from future traffic loads, and recommendations and actions will be taken as necessary.

- ① The road will meet Tanzanian design criteria as a trunk road.
- ② The road will be planned to fit within the Dodoma road network including other sections.
- ③ Design in consideration of traffic volume and traffic characteristics (large vehicles, bus transportation, small vehicles, motorbikes, etc.).
- ④ The road plan will utilize the existing roads in Section 2-2.
- ⑤ Make an appropriate design in consideration of the results of the natural condition survey.
- ⑥ Design in consideration of traffic safety such as installation of safety facilities.
- ⑦ For crossings with existing railways, level crossings will be designed.
- ⑧ Make a construction plan that takes into account the weather conditions and minimize the influence of existing traffic.
- ⑨ Use local materials and products and select materials considering cost, workability, quality, and procurement reliability.
- ⑩ Reduce project costs while ensuring necessary functions and durability.
- ⑪ The road will be planned such that it can be maintained in a good condition in the long term by conducting simple maintenance.
- ⑫ Analyse the impact of related plans such as SGR plans and take necessary actions.
- ⑬ Consideration of median strips, etc. in consideration of large vehicle traffic and future public transport such as BRT.
- ⑭ Examine the necessity of bus stop for minibus operation and construction of a service road to prevent traffic jams and accidents

(2) Overall plan

1) Scope and scale of plan

In this project, a total of 6.509 km of 3.401 km in section 2-2 and 3.108 km in section 3 shown below are targeted. The main junction are the Bahi junction at the start of the project, the new Imagi junction planned to be relocated about 75 m before the existing Imagi junction, the Ntyuka junction at the 0.96 km point east from the Imagi junction, and the Makulu junction at the end point. The total length of the target road will increase by 209m from the initial required distance of 6.3km (see the figure below).



Source: Study Team Fig.24: Scope and Scale of Plan

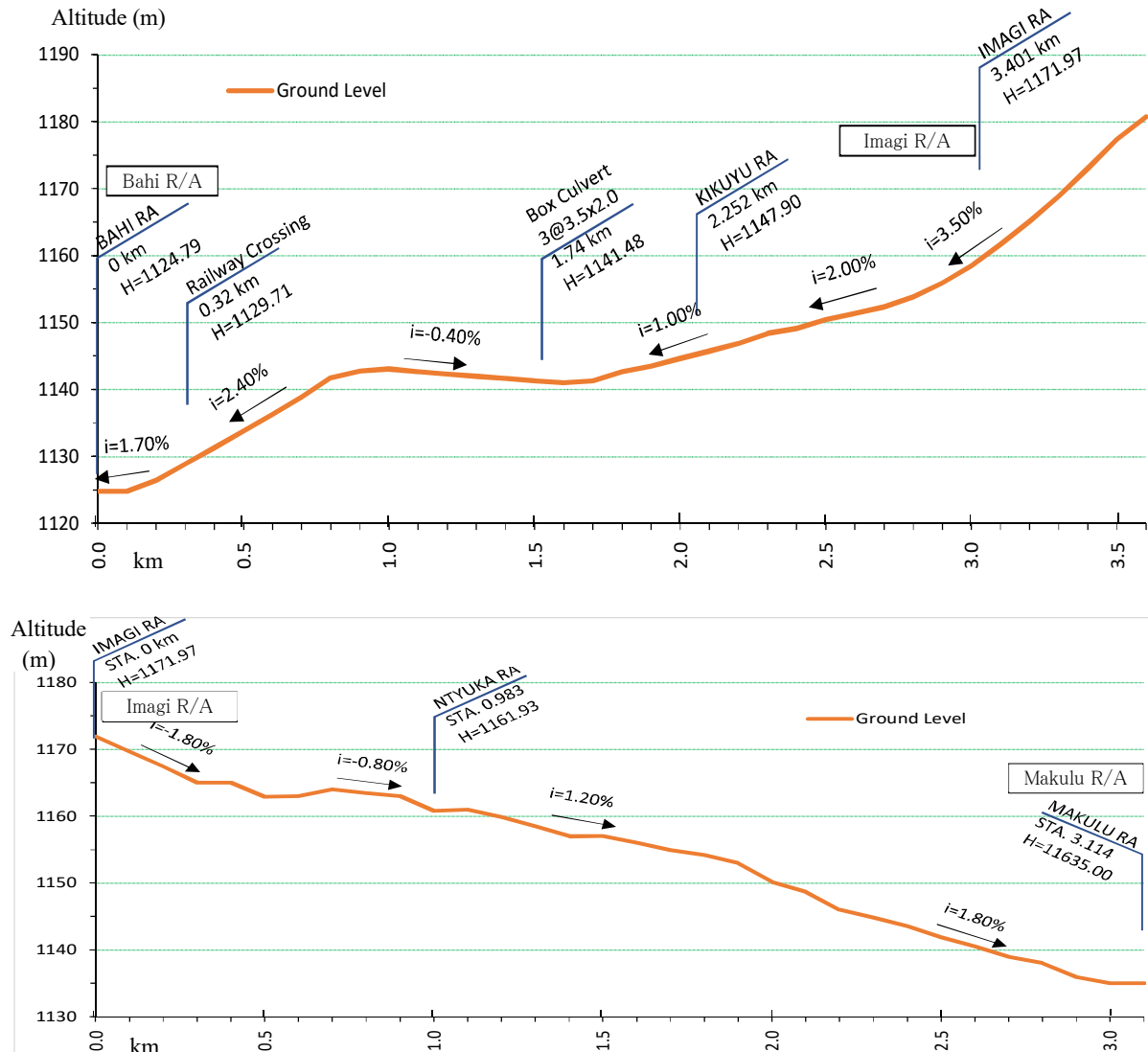
2) Section 2-2

In section 2-2, the existing 2-lane paved road on the right side of the ROW from the start point Bahi junction to the end point direction will be kept present function, and a 2-lane road will be additionally installed on the left side. The planned area for Section 2-2 is approximately 3.4 km from the starting Bahi junction to the ending Imagi junction, and both junctions are a roundabout (R/A) type. The horizontal alignment draws a gentle and good visibility S-shaped curve from the Bahi junction to the Imagi junction. New 2-lane road to be added is basically designed in the similar horizontal alignment. The vertical alignment has an upward slope of 2 to 3% overall from the Bahi junction to the Imagi junction except for some gentle downward slopes. The vertical alignment of the additional 2-lane road will be designed at the similar height as the existing road. After the additional 2-lane road is completed, the existing road will become a 2-lane road heading north and the additional 2-lane road will be a 2-lane road heading south. Therefore, the junction will be planned so as not to interfere with the traffic of 4 lanes. In this section, there is one R/A type Kikuyu junction and one railway crossing. The existing junction will be improved to 4 lane type R/A.

3) Section 3

For section 3, a new 2-lane road will be planned on the left side of the assumed ROW. The planned area of Section 3 is about 3.1km between the starting point of the Imagi junction and the ending point of the Makulu junction, about 1km from the starting point is residential area and the remaining section to pass through the wilderness. The horizontal alignment is almost straight from the Imagi junction to about

2km, and after passing the curve installed at about 2km, it becomes almost straight to the Makulu junction. The vertical alignment has a gentle downward slope of 1.2% to 1.8% from the Imagi junction to the Makulu junction. The start and end points and Ntyuka junction around 1 km are all planned as R/A type.



Source: Study Team

Fig.25: Longitudinal section of Section 2-2 and Section 3

4) Summary of basic plan

The outline of the plan examined and set based on the basic policy is shown below. In the field survey, the existing pavement, drainage facility, incidental facility, transportation, rainfall type, temperature / sunshine, vegetation, various existing information, the results of discussions with related organizations, etc. were analysed and arranged, and the contents of the plan were examined. Regarding the examination of the design specifications for road improvement, a technical note draft was submitted to TANROADS regarding the basic design specifications at the time of the 1st field survey, and it was confirmed by TANROADS. An update showing various design criteria applied to each numerical value was prepared, submitted with a letter to TANROADS on 17 February, and agreed on 30 March.

Table 53: Road Design Parameter

Item	Description	Ref. Standard	
Target road section	Approx. 6.5 km Start: Bahi Roundabout (R/A) – Imagi R/A – Makulu R/A		
Road Type	Trunk Road Class A	Road Geometric Design Manual 2011, Ministry of Works	
Design Class	Design Class 4		
Design speed	60 ~ 80 km/hr		
Number of lanes	2 Nos.		
Carriageway width	3.25~3.5m/ lane, 2 directions		
Shoulder width	1.0~2.0 m		
Central reserve width	14.0 m		
Service road width	5.0 m (including footpaths)		
Maximum cross fall	2.5%		
Maximum grade	5% ~ 4%		
Minimum radius of curves	150 m ~ 300 m		
Embankment slopes	Less than 1.0 m		1:4
	1.0 to 3.0		1:2
	Greater than 3.0		1:1.5
Excavation slopes	Hard Rock	1:1 ~ 4:1	
	Decomposed rock and compacted soils	1:1 ~ 1:2	
	Ordinary soils	1:1.2~1.5	
Pavement design life	20 years		
Pavement structures	Carriageways	Wearing/ Binder: AC Base: DBM40 Subbase: C1	Pavement and Material Design Manual 1999- MOW, Interim Guideline for the Design of Hot Mix Asphalt, MOWTC 2018, Standard Specifications for Road Works 2000 – MOW, Central Materials Laboratory Testing Manual, 2000- MOW
	Service roads	Wearing: AC Base: Crushed material (CRS) Subbase: G45	
	Bus Stops	Concrete	AASHTO
Return periods for drainage	Major culverts	25 years	Hydrology and Hydraulics: TRRL East Africa Flood Modal / SANRAL Drainage Manual (2013)
	Minor culverts	10 years	
	Side drainage	5 years	
Drainage structures	Transversal	Concrete culvert (box, pipe)	
	Roadside	Concrete ditch (U type with covers, concrete lining type)	
	Access/Entrance	Concrete ditch (culvert type, U type with covers, slab type)	

Source: Study Team

(3) Design condition**1) Design standard**

The design standards of Tanzania commonly used “Road Geometric Design Manual 2011” of the former Ministry of Infrastructure Development will therefore be applied to the design of the Project in principle.

In addition, regarding matters not stated in the above standards, it is supposed to be complemented by Japanese standards ("Commentary and Application on the Road Structure Ordinance, June 2015, The Japan Road Association"), British Standard (BS) and American Association of State Highway and Transport Officials (AASHTO).

Table 54: Adopted design standards

Road design	<ul style="list-style-type: none"> • Road Geometric Design Manual 2011 (MoID) • Japanese Standard (Commentary and Application on the Road Structure Ordinance, June 2015)
Drainage design	<ul style="list-style-type: none"> • Drainage Manual 6th Edition (South African) • Japanese Standard (Road Earthwork Guidelines)
Pavement design	<ul style="list-style-type: none"> • PMDM1999 (Pavement and Materials Design Manual) • AASHTO (GUIDELINES FOR 1993 AASHTO PAVEMENT DESIGN)
Structure design	<ul style="list-style-type: none"> • Structure Design Manual-1999 (Mow)、 Structural Design Standard (AASHTO)
Traffic sign	<ul style="list-style-type: none"> • A guide to traffic signing 2009 (MoID)

Source: Study Team

2) Road standard, design speed

The road standard will be Trunk Road Class A and the design class will be Design Class 4 based on the discussions with TANROADS. Regarding the design speed, Section 2-2 will have a design speed of 80 km / hr due to its function as an international highway, and Section 3 will have a design speed of 60 km / hr due to its function as an urban road.

(4) Future traffic volume

1) Results of traffic volume survey on the target road

The target area is expected to have an effect on measures against the inflow of large vehicles into the city by forming a detour for the main transit route in the east-west direction by this project. A traffic survey conducted in December 2019 to understand the current situation confirmed the following characteristics of Dodoma City's traffic.

- > Dodoma City has a large amount of traffic on the route connecting the east and west directions, and also has a large number of heavy vehicles.
- > Currently, the route for large vehicles through the city observe about 20,000 daily traffic volume and about 40% of large vehicles (about 7,700 vehicles) are using as their passage route.
- > It should be noted that peaks occur at 19:00 and 20:00pm (about 1,600 vehicles) and large vehicles have a high night-time driving ratio.
- > Section 2-2 as the north-south route has less traffic than the east-west route and about 800 cars in both directions even at the traffic peak at 11:00 am.

Table 55: Traffic volume survey results (PCU conversion)

Item		Moto.	Car	Large	Total	Item		Moto.	Car	Large	Total
W→E	Daily	2,334	3,561	3,802	9,697	S→N	Daily	1,211	3,491	1,525	6,228
	Avg.	98	148	158	404		Avg.	50	145	64	259
E→W	Daily	2,835	4,084	3,889	10,808	N→S	Daily	886	4,439	1,240	6,565
	Avg.	118	170	162	450		Avg.	37	185	52	274

Both	Daily	5,169	7,645	7,691	20,505	Both	Daily	2,097	7,930	2,766	12,793
	Avg.	215	319	320	854		Avg.	87	330	115	533

Source: Study Team Note: Avg.= hourly average, Moto.= Motorcycle, Large= Truck/Trailer, E/W/S/N= east/west/south/north

2) Future traffic demand forecast

2-1) Viewpoint of estimating future traffic volume

The perspectives for estimating future traffic volume in this project are shown below.

- > In the previous JICA study, demand forecasts were carried out in wide area in order to explore the possibilities of various anticipated projects, and then this project was formulated. Therefore, future prediction analysis will be performed under the conditions set specifically for this project.
- > The main purpose of this demand forecast is to show the effects of the project on the inner ring (south-western section) where the direction of development is clearly shown. Specifically, the expected effects of this project are detouring large vehicles and alleviating congestion in the city, and these will be evaluated.

2-2) Scenario settings

Other development projects currently underway besides this project are as follows. These are considered as basic conditions in future forecasts.

- > Construction of north section of outer ring road
- > Widening of 4 lanes on the east side of the inner ring road
- > 4-lane widening of Dar es Salaam Road

Other than the above, the inner ring road north section, middle ring road, outer ring road south section and Dodoma University bound road are considered priority road development projects for Dodoma City M/P in 2019. Since there is no clear development at this time, cases both with and without the inner ring road north section, middle ring road and outer ring road south section will be considered.

Furthermore, in Dodoma City, where a significant population increase is expected, it is feared that an excessive burden will be placed on future road traffic if the means of transportation grows in the current pattern. Although there is no specific information on the bus transport improvement plan at this time, an evaluation scenario was also set for when switching to public transport such as buses. Based on these, the assumed scenario settings are shown in the table below. The following are assumed to be the impact of the scenario evaluation contents and the target section this time.


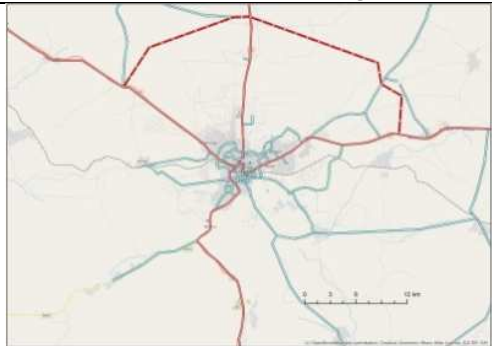
- Case a: Traffic in Dodoma city is diverted to the outer ring road to alleviate congestion in the centre of the city.
- Case b: Bypassing the traffic in Dodoma city to the target section and the outer ring road to alleviate the congestion in the centre of the city. Moreover, the role of the target section this time is evaluated by comparing with Case a.
- Case c: As a measure to concentrate on road traffic, the effect of public transport conversion will be evaluated by sensitivity analysis.
- Case d: The outer ring, middle ring, and inner ring function together to alleviate congestion in the

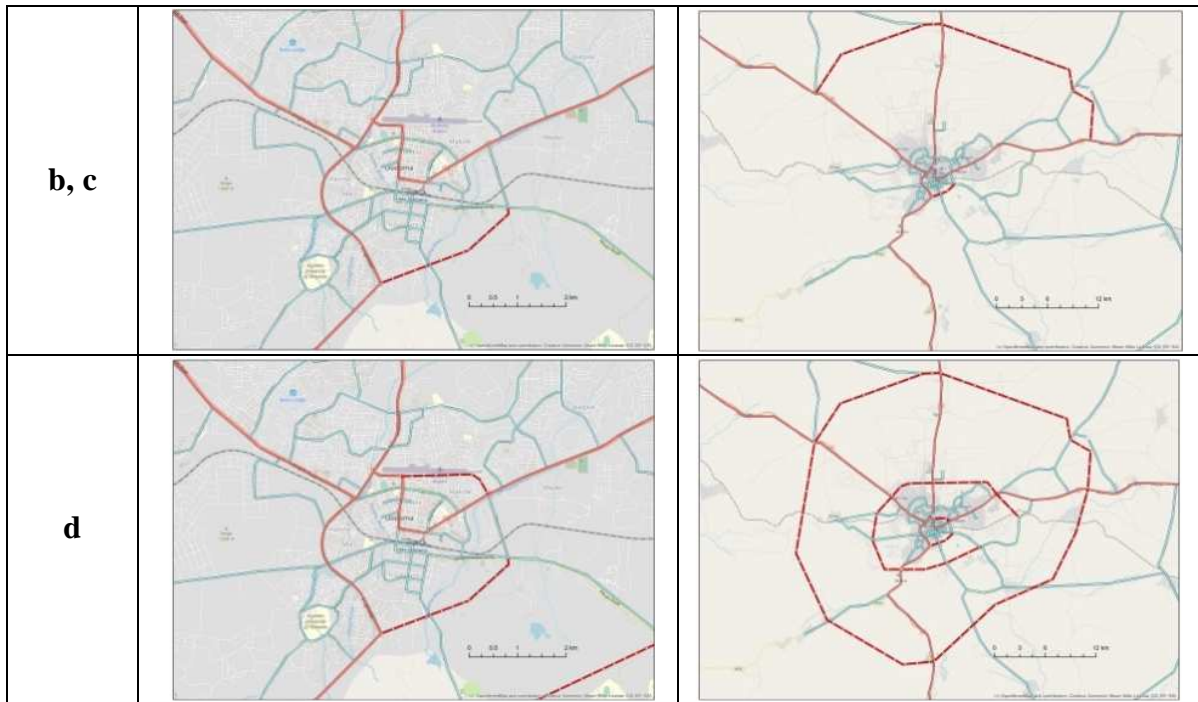
city centre and enable route selection in the east-west direction and north-south direction. This target section will be one of the options for transit traffic.

Table 56: Demand forecast scenario settings and network diagram

Case	Present	a (plan not to carry out the project)	b	c	d
Study contents	Reproducibility confirmation of current traffic distribution	Traffic conditions examination on the current road network	Traffic condition examination with inner ring road completion (west, south, east)	Traffic condition examination with inner ring road (west, south, east) completion and conversion to public transportation	Traffic condition examination with completion of road network
A	Inner ring (W·S Sec.)	No	No	Yes	
	Inner ring (E Sec. widening)	No	Yes		
	Inner ring (N Sec.)	No	No	Yes	
	Middle ring	No	No	Yes	
	Outer ring (N Sec.)	No	Yes		
	Outer ring (S Sec.)	No	No	Yes	
	Dar es Salaam road widening	No	Yes		
	Public Transport conversion	No	No	Yes	No
Note		Comparison	Effect confirmation of this project	Reference case	Reference case
Case0 (2019/Present)	Case0				
Case1 (2029年/10 years)		Case1-a	Case1-b	Case1-c	Case1-d
Case2 (2039年/20 years)		Case2-a	Case2-b	Case2-c	Case2-d

Note: E= east, W= west, N= north, S= south, A= condition

Case	Narrow area map (Central Dodoma)	Wide area map (around the outer ring road)
a		



Source: Study Team

2-3) Traffic demand forecast

i) Condition setting

For forecasting demand, conditions were set for ① OD table, ② road network specifications, ③ vehicle model, and ④ future OD table. Details are described below.

① OD Table

The current OD table utilized all 47 zones used in the “Dodoma City Road Sector Information Collection / Confirmation Survey (2018, JICA), (OD table is a matrix format showing the amount of movement between zones)”.

② Road network specifications

Road network specifications (traffic capacity and passing speed) are set as shown in the table below for each type.

Table 57: Road network specifications in demand forecast

Type	Capacity (pcu/lane/day)	Speed (km/h)
Trunk road (CBD)	8,000	40
Trunk road (City)	8,000	60
Trunk road (Suburbs)	10,000	60
Other road (Paved)	4,200	35
Other road (Unpaved)	3,800	15
Outer ring road	10,000	80

③ Vehicle type

There are eight vehicle types as shown in the table below and the number of sedan cars converted (PCU) is set for each type.

Table 58: Vehicle classification and sedan car conversion factor (PCU) in demand forecast

Vehicle type	PCU	Vehicle type	PCU
Sedan	1.0	Motorcycle	0.3
Minibus	1.3	Truck 2 axles	1.7
Large bus	1.6	Truck 3-4 axles	2.2
Tricycle	0.5	Trailer	2.5

④ Future OD Table

The growth rate of traffic volume at the design life of 20 years is set as follows.

⇒ Assumed growth rate of traffic volume: ⇒ 3.44 times after 20 years (2.02 times after 10 years, assuming Case b), annual growth rate is about 6.4-6.5%.

Remarks: The growth rate of traffic volume is set to be 3.44 times 20 years later in consideration of the population growth rate (5.5%) and the ratio of increase in traffic demand to population growth (1.18).

Supplement: Complies with the “Dodoma City Road Sector Information Collection / Confirmation Survey”. Details are as follows.

- The population increase of 5.5% is set from the "Dodoma National Capital City Master Plan".
- The increase in transportation demand to population growth of 1.18 times is set from the "Dar es Salaam Transport policy and System Development Master Plan (2007, JICA)" and "Project for Revision of Dar es Salaam Urban Transport Master Plan (2018, JICA)".

The following is set for the public transport conversion scenario.

- 50% of passenger, tricycle and motorbike users will switch to bus use
- A bus route connecting all ODs and can access to the transportation node (bus stop) by foot.
- The bus is for 40 people and the occupancy rate is 80%

ii) Demand forecast result

The scenarios with and without inner ring road project (Case a, b) were created for the purpose of verifying the project effect. The verification results assuming public transport conversion and completion of the Dodoma area road network are shown below. In addition to the above, no construction of the outer ring (north section) project case was added in order to understand the impact of the outer ring project. The resulting indicator has targeted the roads inside the inner ring road.

Table 59: Demand forecast results

Case	a (plan not to carry out the project)	b	c	d	a (No outer ring road)	b (No outer ring road)
Study contents	Traffic conditions	Traffic condition	Traffic condition	Traffic condition	Same condition as	Same condition as

		examination on the current road network	examination with inner ring road completion (west, south, east)	examination with inner ring road (west, south, east) completion and conversion to public transportation	examination with completion of road network	Case a, but outer ring is not yet developed	Case b, but outer ring is not yet developed
A	Inner ring (W + S Sec.)	No	Yes			No	Yes
	Inner ring (N Sec.), Middle ring, Outer ring (S Sec.)	No			Yes	No	
	Outer ring (N Sec.)	Yes				No	
	Public Transport conversion	No		Yes	No	No	
Note	Comparison	Effect confirmation of this project	Reference case	Reference case	Reference case	Reference case	Reference case
B	2029/10 years later						
	Total travelling vehicle km	115,044 (1.00)	81,121 (0.71)	53,799 (0.47)	65,637 (0.57)	133,851 (1.16)	82,929 (0.72)
	Total travelling vehicle hour	6,868 (1.00)	4,428 (0.64)	2,403 (0.35)	2,825 (0.41)	9,727 (1.42)	4,656 (0.68)
	Average congestion	0.57	0.40	0.27	0.33	0.67	0.41
	Average speed	16.8	18.3	22.4	23.2	13.8	17.8
	Average speed (CBD)	25.0	29.4	32.4	29.4	25.0	29.4
	2039/20 years later						
	Total vehicle driven	196,415 (1.00)	138,479 (0.71)	91,827 (0.47)	112,071 (0.57)	228,463 (1.16)	141,565 (0.72)
	Total hours driven	16,297 (1.00)	10,585 (0.65)	5,751 (0.35)	6,716 (0.41)	22,532 (1.38)	11,108 (0.68)
	Average congestion	0.98	0.69	0.46	0.56	1.14	0.71
	Average speed	12.1	13.1	16.0	16.7	10.1	12.7
	Average speed (CBD)	18.6	23.0	27.6	23.0	18.6	23.0

Note: E= east, W= west, N= north, S= south, A= condition, B= result

【Effect of inner ring road project】

a) A comparison of the above results for traffic volume (total vehicle mileage) inside the inner ring of Case a and Case b shows that Case b has decreased traffic volume by 29%. Moreover, when focusing only on the central part of the city (CBD), traffic volume decreased by 41% (Case a: 58,395 → Case b: 34,655). In other words, the traffic volume in the inner area of the inner ring is expected to decrease by 30-40% due to the inner ring project.

b) Comparing the average speeds, the traveling speed increases by about 5 km/hr in the centre of the city (CBD) (2029: 25 km /hr → 29 km /hr, 2039: 19 km /hr → 23 km) /hr).

【Effect of outer ring road project】

a) The traffic volume of the city centre road decreases by 38% with inner ring road construction, and it decreases by 14% when only the outer ring is constructed. In other words, the inner ring road project is more effective than the outer ring road project in reducing the traffic volume in the city centre.

Therefore, even if the outer ring is constructed, the traffic volume can be further reduced by constructing the inner ring road.

b) Focusing on the current urban transit route, the traffic volume with only inner ring road construction can achieve 36% reduction compared to not constructing the inner ring road. If only the outer ring road is constructed, it will be reduced by 25%. Therefore, the effect of the inner ring road development is greater.

【Effect of conversion to public transportation】

a) The conversion scenario to public transport, Case c, shows that the average congestion level and average speed are similar to Case d. In other words, this shows that the same effect as road improvement can be obtained by suppressing road traffic demand.

b) On the other hand, it was found that the traffic volume on the inner ring road is similar when compared to scenarios with or without conversion to public transportation. This indicates that the inner ring road is a basic road necessary to meet the traffic demand. In other words, it can be said that road development is necessary to realize the conversion of public transport.

【Future tasks】

a) Due to the development of the south-east section of the inner ring road of this project, large vehicles in the north-south direction as well as the north-south direction will travel on section 2-2. When the above growth rate and the setting that all large vehicles in the east and west directions are detoured, the road capacity is sufficient to meet the current traffic demand. Therefore, it is considered that the addition of 2-lane roads to the 4-lane structure in this project will not cause any problems in the traffic capacity during the planned period.

b) On the other hand, there is a possibility that the Bahi R/A will not be compatible with the R/A type by 2039 (according to the Tanzania Road Geometric Design Manual (2012)). It is a forecast 20 years ahead, and since it is possible to handle it by R/A up to about 2035, it is necessary to deal with this project in R/A format and review the junction shape while looking at the future situation.

c) Furthermore, the 2039 forecast predicts that traffic volume will be saturated on the Arusha road north of Arusha R/A, so it is considered necessary to strengthen the function of the Arusha road.

3) Effect of the project

The target road is expected to be effective in the short term as a large vehicle detour that is currently passing through the central city area. In addition, it is expected to contribute to the alleviation of traffic congestion in the city centre from a long-term perspective, and the effect is to reduce the traffic volume in the city centre by about 40% and increase the traveling speed by 5 km/hr. On the other hand, because it is a bypass route located at the outer edge of the city centre, the use of public transport vehicles such

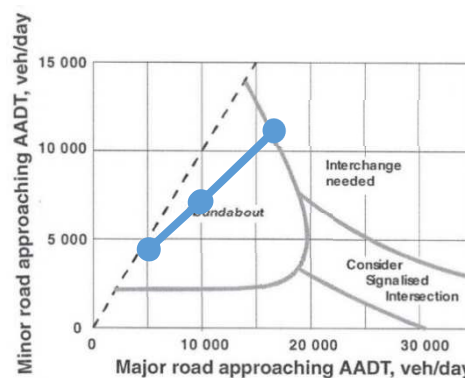


Fig.26: Traffic transition of Bahia R/A & intersection type judgment area

Source: Study Team

as general vehicles and minibuses is expected to increase with the progress of urban development in the surrounding areas in the medium to long term. This road is expected to function as part of the basic road network required for cities, and is expected to serve as a transit route for public transport vehicles and at the same time promote conversion to public transport vehicles.

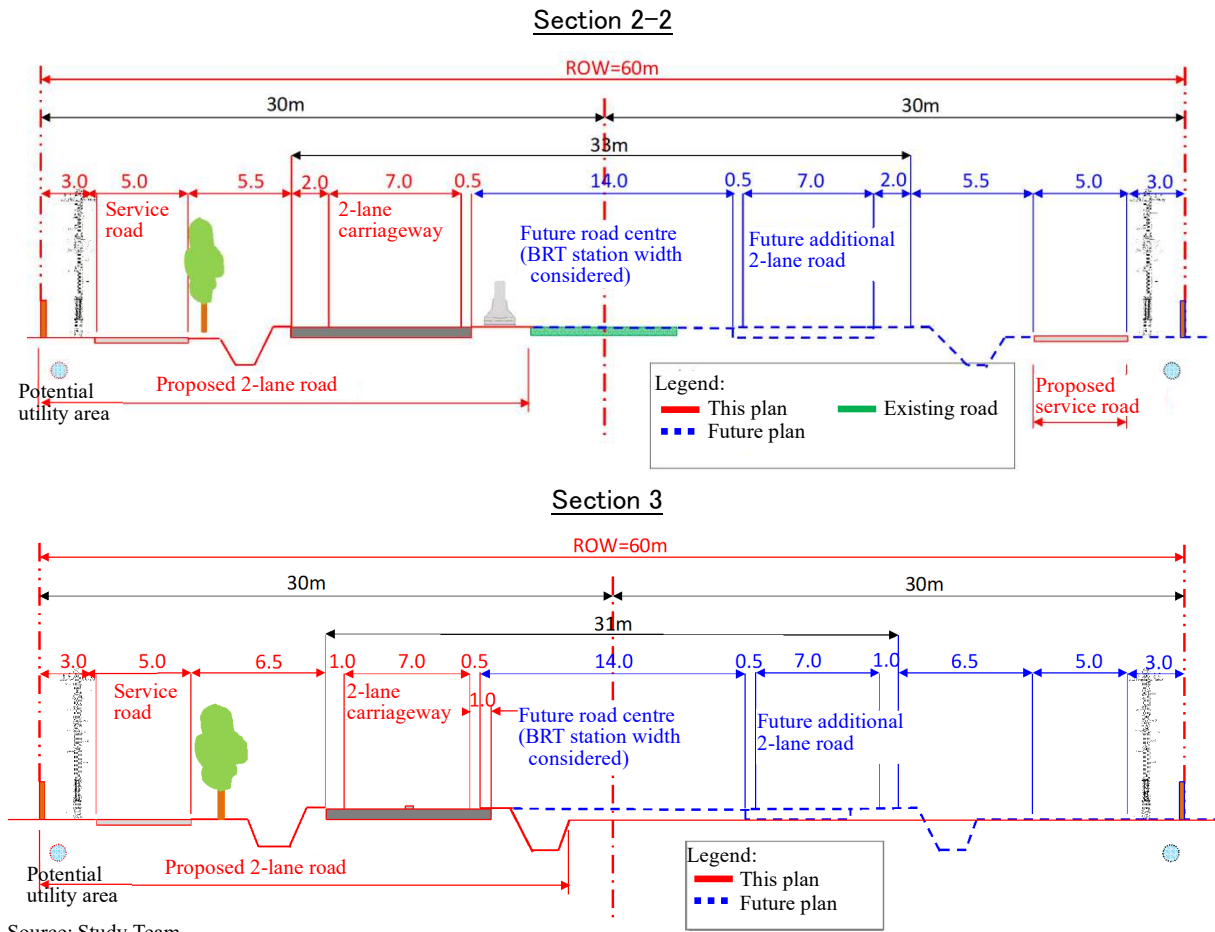
(5) Geometric condition

1) Longitudinal / vertical alignment

The geometrical structure of section 2-2 is designed to meet the function of an international trunk road at a design speed of 80 km / hr, and it conforms to the Road Geometric Design Manual 2011-Ministry of Works of Tanzania and the Road Structure Ordinance of Japan. The geometrical structure of section 3 has a design speed of 60 km/hr in order to fulfil the function of urban road / international highway and conforms to the Road Geometric Design Manual 2011-Ministry of Works of Tanzania and the Road Structure Ordinance of Japan.

2) Standard road cross section

For the standard road cross section, a 4-lane completed cross section was set in anticipation of future plans, and a 2-lane cross section based on this design was planned. The standard cross section is shown below.



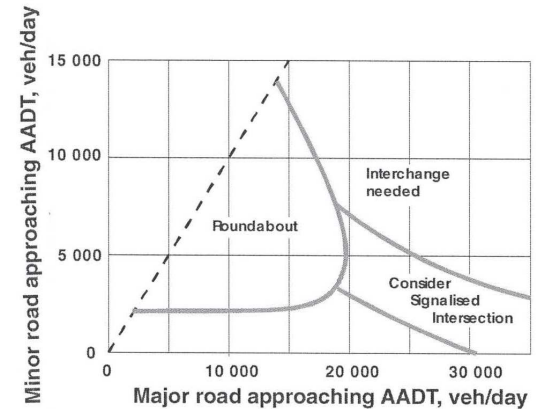
Source: Study Team

Fig.27: Standard road cross section (Section 2 and 3)

3) Junction

The major intersections in sections 2-2 and 3 are shown in the table below. The shape of the intersection will be planned by referring to the future traffic volume estimated from the traffic volume survey conducted in this study and the Tanzania Road Geometric Design Manual (2012). From the intersection selection diagram in the same manual, the R/A shape can be applied for daily traffic of about 15,000 to 20,000 vehicles (Refer to the table below and Chapter 4-2-4 Future traffic volume, section (2) 3-2 Demand forecast result).

- For Bahi R/A at the starting point, the size of the roundabout and widening of the lanes will be planned with consideration of the situation of the existing intersection and the traffic flow of the Singida Road heading west and the Iringa Road of Section 2-2.
- The existing Kikuyu R/A will be removed and a new R/A will be planned.
- The existing Imagi R/A will be relocated further north and a new R/A will be planned to facilitate the connection with Section 3.
- The Ntyuka junction and the Makulu junction at the end of section 3 will be planned as R/A type by changing the existing cross shape type.



Source: Tanzania Road Geometric Design Manual (2012)
Fig.28: Selection of junction type

Table 60: Intersection type in the target section

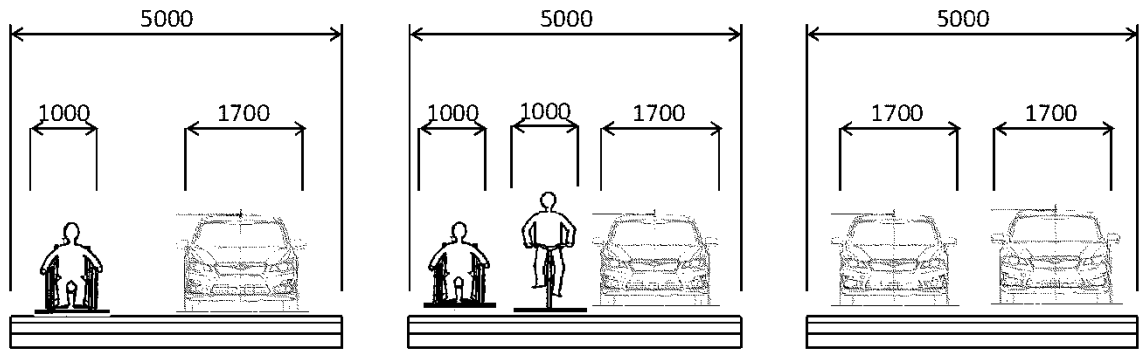
Section	Junction	Location (km)	Type	Connecting road	Remarks
2-2	Bahi R/A	0.000	R/A (4 Dir.)	Arusha, Bahi, Iringa road	Widening
	Kikuyu R/A	2.260	R/A (4 Dir.)	Iringa and Kikuyu road	New
	Imagi R/A	3.460	R/A (3 Dir.)	Iringa road	New
3	Ntyuka	0.990	R/A (4 Dir.)	Ntyuka road	New
	Makulu	3.100	R/A (4 or 5 Dir.)	Mkapa/Kikuyu road	New

Source: Study Team Note: Dir.= direction

4) Service road

The service road will be installed for people, wheelchairs, bicycles, motorcycles, and small cars. The service road will apply one-way traffic control except for people, wheelchairs, and bicycles and traffic signs will also be provided. The service road has a width of 5 m and is designed to allow people (wheelchairs) and small cars to pass through even if a broken car stops.

In section 2-2, existing houses, hospitals, universities, etc. on both sides of the road will be divided by a new 4-lane road (composed of existing 2 lanes and adding 2 lanes by this project). After completing the installation of a 4-lane road, a right turn will be necessary at the 5 R/A points to connect each other (see the figure below).



Source: Study Team

Fig.29: Service road width arrangement

In addition, the section has the function of an international trunk road mainly for large vehicles, and the service road is important from the viewpoint of preventing traffic jams and accidents due to an access from the roadside. At present, only the north side of section 3 is being developed for government offices and international conference halls, so service road will be installed only on the north side, and the south side should be planned by the future development to four lanes.



Source: Study Team

Fig.30: Service road layout plan

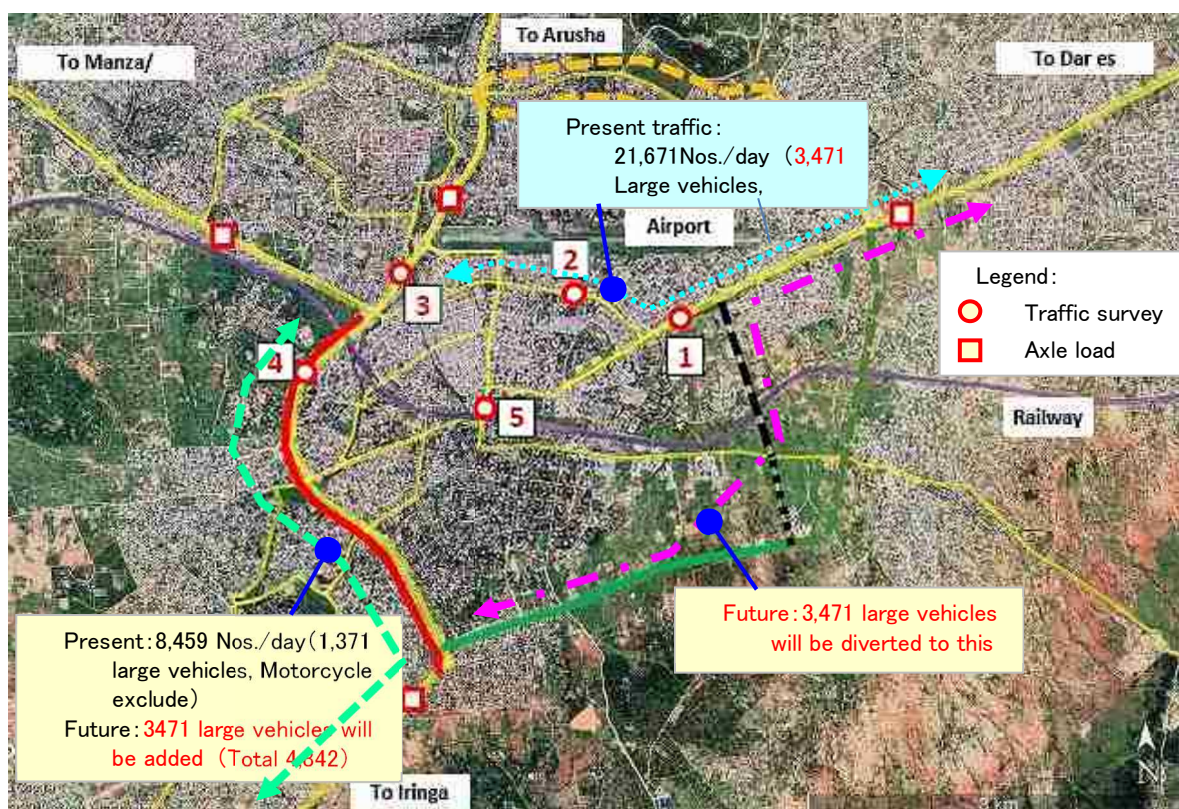
(6) Pavement design

1) Planning policy and applicable standards

The pavement design standard of this project is based on the “Pavement and Materials Design Manual 1999, PMDM” issued by the Ministry of Infrastructure Development, which is the standard of Tanzania. In addition, the policy of verification of pavement composition was compared and confirmed by

referring to the American standard (AASHTO) and Japan's pavement ordinance. The pavement design is based on the traffic volume and axle load measurement results of the target section obtained by the field survey, the growth rate of GDP in Tanzania and the growth rate of traffic on similar roads, etc. The cumulative value of the traffic load for 20 years of the design period was converted into the standard axle load (8.16t axis) for further study. In addition, consideration was given to materials that may be applied from the viewpoint of material procurement conditions and cost reduction in the target area. The outline of each main plan item is shown below.

- Design life of 20 years was selected after consultation with Tanzanian stakeholders.
- The allowable traffic load takes into account the results of the traffic volume survey and axle load survey conducted in Dodoma City.
- For section 2-2, confirm the durability of the existing pavement and recommend future assumptions.
- The type of pavement surface layer takes into consideration local performance and maintainability.



Source: Study Team

Fig.31: Traffic volume of large vehicles expected to pass the target road

In this project, since the conditions of traffic load are different between section 2-2 and section 3 for the following reasons, the preconditions for each section were set and the pavement structure was studied.

> Section 2-2: The target road is a section of the north-south corridor, and Iringa-Dodoma traffic (1,371 large vehicles/day) is passing on the existing 2-lane paved road. With the opening of Section 3, large vehicles (3,471 vehicles/day) will merge from the direction of Dar es Salaam, resulting in a total of 4,842 large vehicles/day, which means the road needs to withstand a larger traffic load (see the figure

below). For existing 2-lane pavement roads, desirable countermeasures against traffic load increase will be recommended based on the traffic load resistance expected from the existing pavement structure.

> Section 3: Currently there is only a narrow earth road with almost no vehicle traffic. However, after the opening of Section 3 road, sufficient design resistance to traffic load is required for large vehicles (3,471 large vehicles/day) currently passing through the Dodoma City centre will flow in from Dar es Salaam Road.

> Furthermore, a loan from the African Development Bank (AfDB) was signed in August 2019, and it is currently in the bid stage of design. Assuming that the opening of the north section of the outer ring road is about 2028 based on the length of the proposed construction, it is assumed that large vehicles from the direction of Dar es Salaam will be detoured to that section.

2) Design traffic

2-1) Section 2-2

The daily traffic volume on both sides of the Iringa-Dodoma road in section 2-2 is about 15,500 vehicles/day (the actual number of traffic volume measurement (without PCU conversion)) according to results of the traffic volume survey conducted at the time of the field survey. The traffic volume excluding motorcycles and tricycle was about 8,500 vehicles/day, and the mixture ratio of large vehicles was 10%. The outline of each vehicle type is shown below.

Since there is a large amount of traffic travelling from south to north toward the city, the examination of the pavement plan was using the traffic travelling in the direction of the city. Traffic volume of trucks and trailers (heavy traffic load) is 941 vehicles/day. Furthermore, considering the inflow of large vehicles from section 3 below, $941 + 1,632 = 2,573$ vehicles/day was adopted for the study.

2-2) Section 3

In section 3, the daily traffic volume on both sides of the Dar es Salaam-Dodoma road, which is expected to be detoured after Section 3 road construction, is about 45,000 vehicles/day and vehicles other than motorcycles and tricycles are about 22,000 vehicles/day, and the mixture ratio of large vehicles was 8.9%. In addition, the bidirectional traffic volume of large vehicle that is expected to be detoured to section 3 is 3,471 vehicles/day. A traffic volume of 1,632 vehicles/day in the inland lane with a high trailer ratio and a high traffic load was adopted for the pavement structure study.

Table 61: Traffic volume on Section 2-2 and Dar es Salaam Road

Application	Vehicle type	Daily traffic	%	Remarks
Section 2-2	1. Sedan	6,471	41.6%	
	2. Minibus	529	3.4%	
	3. Bus	88	0.6%	
	4. Truck/Trailer	1,371	8.8%	941 North and 430 Nos. South Direction
	5. Other	7,083	45.6%	Motorcycle, Tricycle, etc.
	Total	15,542		Large vehicle 9.4% (3.+4. above)
Dar es Salaam road	1. Sedan	13,889	30.9%	
	2. Minibus	3,761	8.4%	
	3. Bus	540	1.2%	
	4. Truck/Trailer	3,471	7.7%	1,632 West and 1,839 Nos. East Direction

	5. Other	23,234	51.8%	Motorcycle, Tricycle, etc.
	Total	44,904		Large vehicle 8.9% (3.+4. above)

Source: Study Team Remarks: Large vehicles on Dar es Salaam Road are expected to bypass section 3

3) Axle load survey

3-1) Axle load survey result and VEF

Axle load measurement was carried out on major roads in Dodoma City in December 2019 and January 2020 with a total of 696 trucks and trailers (large vehicles) and 3,441 axles. The measurement results were converted to 8.16 tonnes standard axis conversion value (VEF) per vehicle and used as basic data for pavement design. In addition, comparing with the VEF obtained from the measurement results this time and the axle load measurement result in Dar es Salaam in 2017, it is considered that measures against overloading of large vehicles by TANROADS have had a certain effect, because the number was low with only 3.5% of exceeding 10 ton per axis (6-axle cars often overloaded). In addition, in Tanzania under the East African Joint Vehicle Management Act 2016, the limit axle load was 10 tonnes from March 2019, and all vehicles over 3.5 tonnes were subject to weighing. Thorough and strengthening of loading measures is expected.

Table 62: Standard axis conversion values (VEF)

Vehicle type	VEF	Ref.
Truck 2 axle	1.58	0.58
Truck 3 axle	1.82	1.23
Trailer 4 axle/more	3.90	5.77

Note: VEF=Vehicle Equivalent Facto
Ref.: VEF medium-sized vehicles with a similar survey, conducted in Dar es Salaam in 2017, have slightly increased loading, but large-sized vehicles have been moderated (it is considered that there was some effect in overload countermeasures)

3-2) Traffic growth rate

The growth rate of future traffic in the 20-year design life is set to 6.5% as per the average GDP of Tanzania in the last 10 years and considering the traffic demand forecast examination result.

3-3) Design period traffic volume and traffic load

As for the axle load setting for each vehicle type, the standard axle conversion value (VEF) per vehicle obtained from the results of traffic volume measurement and axle load measurement is applied, and it is assumed that the target road will be in service from 2024 to 2043. As a result of calculating the load for the planned period of 20 years by standard axis load conversion (18kip (8.16ton) conversion single axis load, ESAL), the design traffic load was 51.8 million axles in section 2-2 and 28.1 million in section 3. This value slightly exceeds the TLC50 and TLC20 traffic load classes (TLC) of the Tanzania standard, and the pavement structure was studied considering this result and the following pavement materials.

4) Natural ground and pavement materials

4-1) Survey results of existing 2-lane paved road and natural foundation

i) Existing 2-lane paved road survey

As a result of the test pit excavation of the existing paved road in section 2-2, the existing road was confirmed as total pavement thickness 45 cm with 5 cm Asphaltic Concrete (AC) surface layer, 15 cm base course (crushed stone base (CRR)), and 25 cm subbase (granular material, G45). It should be noted

that the traffic volume survey results show that the mixture ratio of large vehicles is as low as 9-10% and the axle load measurement results are not extremely large. However, since it is assumed that large vehicles currently passing through the city centre will be diverted, consideration was given to these conditions. The existing AC pavement in section 2-2 is considered to be compatible with the design life by adding an overlay of AC layer in the future.

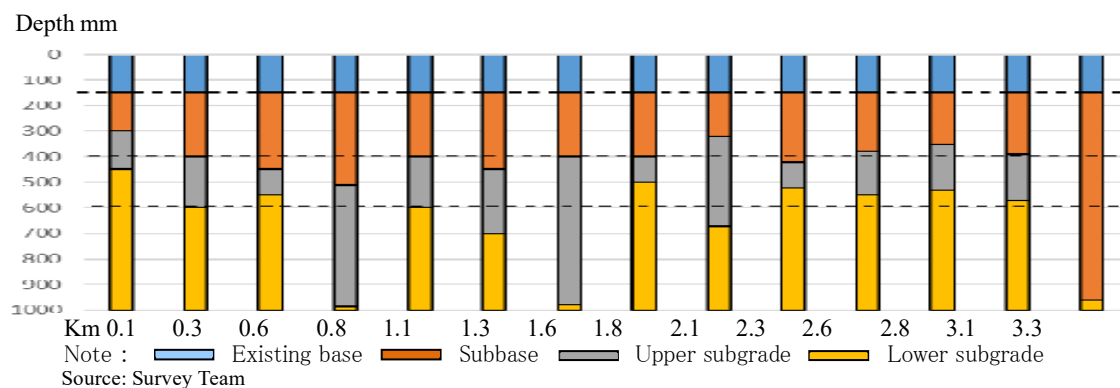


Fig.32: Results of trial excavation of existing 2-lane paved road in Section 2-2

ii) Existing ground survey

In this project, a new two-lane road is expected to be installed on the left side of the existing road site (ROW). Therefore, along with the estimated road location, 19 locations of the site trial pit confirmation and 104 dynamic penetration tests (DCP) were conducted. The results of these field surveys and tests are shown below. From the figure, there is a section with low bearing capacity around 150m at the starting point of section 2-2 (about CBR 2), and other sections show a general bearing value of CBR 7-18. CBR 7 for the subgrade in design section was evaluated for further study. Furthermore, the material of the ground at the target site tended to show a significant decrease in bearing capacity when disturbed. Therefore, it is considered desirable to replace the low bearing capacity area with good quality materials and other areas need to construct good quality upper and lower roadbeds by about 25 cm each without disturbing the road foundations. The results of the field survey are summarized below.

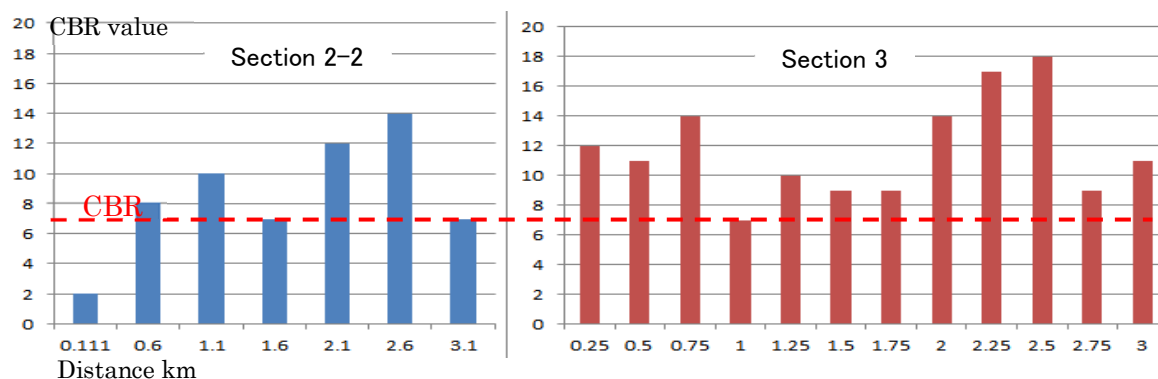


Fig.33: Field bearing test results (CBR values for Section 2-2 and Section 3)

4-2) Pavement material

The Tanzania Pavement Design Standard has the following options in consideration of the TLC class for the material of each pavement layer. In addition, there are examples of pavement type options other than these being selected for each project.

Table 63: Material type of each pavement layer

Item	Surface	Base	Subbase
Pavement material alternatives	AC 5cm AC 10cm Surface dressing	Crushed rock (CRR) Natural aggregate (CRS) Asphalt stabilizing (DBM) Cement stabilizing (C1, C2)	Granular Cement stabilizing (C1, CM)

Note : AC= Asphaltic concrete

5) Unsuitable soil

10 cm below the topsoil and about 30 cm thick dumped trash near the starting point and defective soil about 50 cm thick was found in some places along the target road by excavation and dynamic penetration test (DCP) survey. The results of the investigation were judged based on the criteria shown below and the range of defective soil and countermeasures were examined.

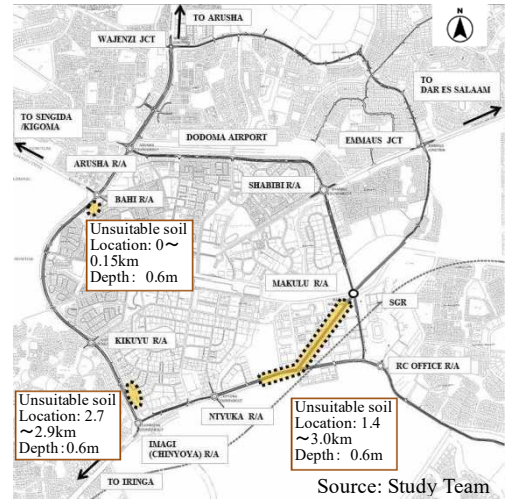


Fig.34: Area of unsuitable soil

5-1) Unsuitable soil evaluation

Evaluation of defective soil was based on the Tanzania standard (Pavement and Materials Design Manual, PMDM), the criteria shown in the table below.

5-2) Estimating the extent of unsuitable soil

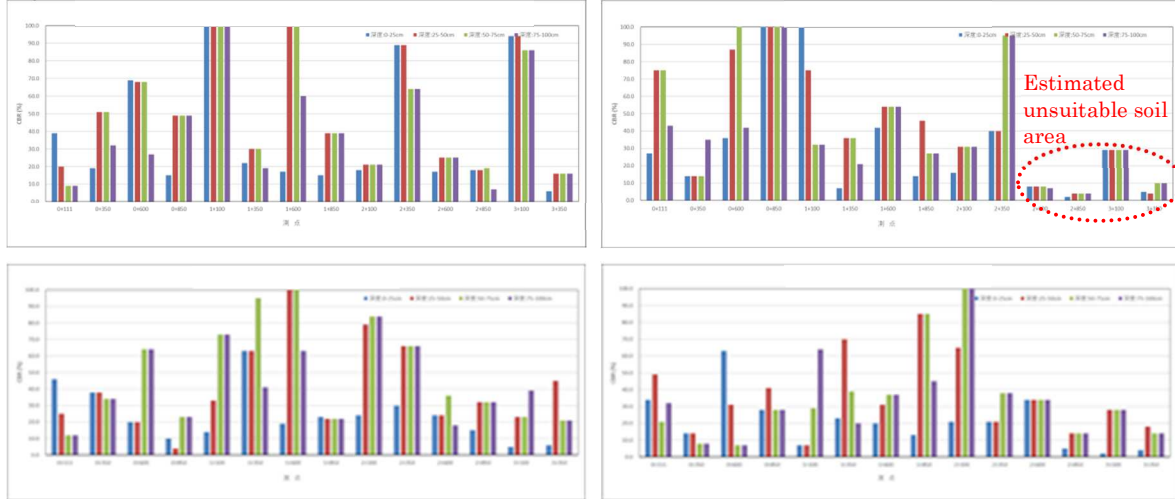
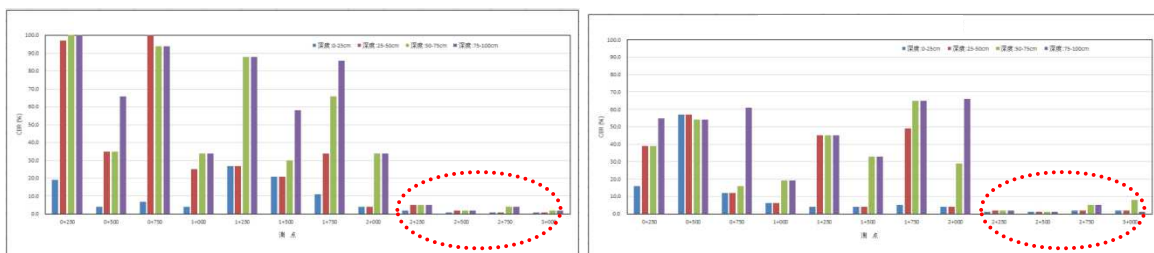


Fig.35: Section 2-2 CBR value for each depth



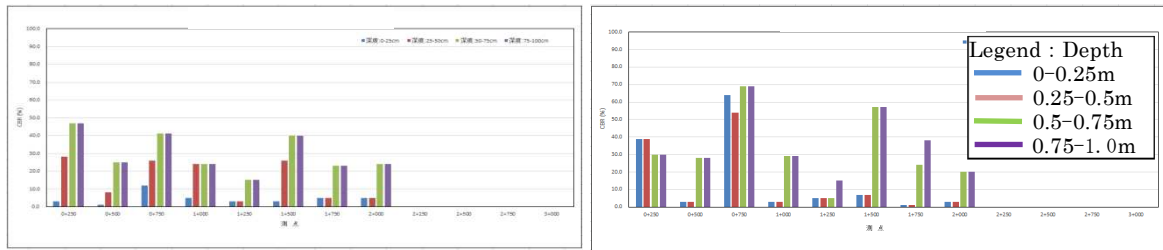


Fig.36: Section 3 CBR value for each depth

Table 64: Criteria for unsuitable soil

Soil type	Criteria of evaluation
Weak soil	PMDM "6.1 Low-Strength Soils" judgment criteria CBR value less than 3% is applied.
Expansive soil	Liquid plasticity limit and more than 20% of PIw value (plasticity index by 425 μ m sieve passing sample) obtained from particle size test under the PMDM "6.2 Expansive Soils" criteria is used for evaluation of expanded soil.
Soil mixed with garbage	Locations that are considered to be waste dump sites containing a large amount of dust will be removed and replaced as soil mixed with dust from the viewpoint of quality assurance regardless of the CBR value of the existing ground.

5-3) Unsuitable soil treatment

The replacement work was selected as appropriate as a result of examining the countermeasure work by setting the following comparative items such as site conditions, economic efficiency and workability for selecting unsuitable soil countermeasure work.

Table 65: Comparative examination of unsuitable soil countermeasure works

Item	Replacement	Ground improvement
Countermeasure work outline	Defective soil is removed, and good quality material is levelled and compacted. Defective soil will be discarded.	Cement-based and lime-based solidifying materials are used and mixed with on-site generated materials to improve the ground.
Suitability for the site	There is a track record of similar examples. If groundwater is found, replace about 60 cm of excavated material with crushed stone and replace the top with good quality material. Flexible response to the condition of bad soil.	Not suitable for groundwater or soil mixed with garbage. Since small rivers are scattered in Section 3, sufficient consideration for water is required for application in this section.
Workability	The construction machine and procedure are the same as those for normal earthwork. Since quality control is the same as earthwork, ordinary quality pipes can be used.	Construction will be started after confirmation in advance, such as setting the target strength, determining the type of solidifying material, performing the test, and determining the amount of solidifying material mixed. In order to ensure stable quality, careful mixing of solidifying materials is necessary. Quality control requires prior quality control and daily quality control, and a solidifying material mixture amount test and test construction are required every time the quality of defective soil

		changes.
Economic deficiency	It is considered to be about 20% cheaper than ground improvement works (relatively short distance of 20km to the borrow pit for replacement materials).	Tends to be relatively expensive
Comparison	○	×

6) Pavement composition

6-1) Design criteria and design conditions

For the pavement design of this project, the pavement composition was confirmed using the AASHTO Guide for Design of Pavement Structures 1993 in the United States and Japan's pavement ordinance. The design conditions used for pavement design are shown below.

• Design period	: 20 years, 2024~2043
• Design traffic load (W18)	: Number of passing equivalent single axle loads (ESAL) converted to 18 kip(kilo pounds) during the service life= 51.8million axles for Section 2-2, 28.1 million axles for Section 3. It is expected that large vehicles will be diverted to the outer ring north section (currently in the tender stage and will be completed in 2028).
• Reliability (R)	: apply 85% from the target road rating (trunk road), (Standard deviation ZR = -1.037, standard deviation of load and paving strength S0 = 0.40)
• Serviceability index(dPSI)	: Initial serviceability index P0 = 4.2 (AASHTO road test results), Ultimate serviceability index Pt = 2.5 (AASHTO standard value for trunk road)
• Paving course coefficient(a)	: AC surface a = 0.44 Asphalt stabilized base course a = 0.34 Cement stabilized base course a = 0.12
• Subgrade resilient modulus (MR)	: 14,300 (equivalent to CBR9.5)
• Drainage coefficient(m)	: Base course m = 1.0, Sub base course m = 1.0 (Standard value of AASHTO).

6-2) Pavement composition

In the examination of the pavement structure, the ground bearing capacity of the target road, the regional characteristics (condition in the rainy season), the traffic volume of the target road section, the mixture ratio of large vehicles, the traffic growth rate, etc. were taken into consideration. Furthermore, the implementation status of other similar projects and the results of interviews with the Tanzanian stakeholders were comprehensively evaluated, and the traffic load categories defined by the Pavement and Materials Design Manual of Tanzania were considered. Based on the above, it is judged that a pavement structure using asphalt concrete surface layer, asphalt stabilization (DBM) for base course and cement stabilization (C1) for subbase course is suitable (see figure below).

4cm AC wearing
6cm AC binder
15cm Base Asphalt stabilized, DBM
23(16)cm Subbase Cement stabilized, C1
25cm Upper subgrade CBR 15
25cm Lower subgrade CBR 7

Note : () =Value for Sec. 3
Fig.37: Pavement structure

Table 66: Examination of pavement structure (section 2-2)

Layer	Material	Thickness (cm)	AASHTO		TA method	
			Layer coefficient	Structure index (SN)	Equivalent coefficient	TA value
Wearing	Asphaltic Concrete	4	0.44	0.693	1	4
Binder	Asphaltic Concrete	6	0.44	1.039	1	6
Base	Asphalt stabilization	15	0.34	2.008	0.8	12
Subbase	Cement stabilization	23	0.12	1.087	0.25	5.8
Total			a. Total SN	4.827	a. Total TA	27.8
			b. Necessary SN	4.799	b. Necessary TA	26.0
Judgment			$a \geq b$	OK	$a \geq b$	OK

Source: JICA Survey Team Note: Design of Subgrade CBR=9.5

Table 67: Examination of pavement structure (section 3)

Layer	Material	Thickness (cm)	AASHTO		TA method	
			Layer coefficient	Structure index (SN)	Equivalent coefficient	TA value
Wearing	Asphaltic Concrete	4	0.44	0.693	1	4
Binder	Asphaltic Concrete	6	0.44	1.039	1	6
Base	Asphalt stabilization	15	0.34	2.008	0.8	12
Subbase	Cement stabilization	16	0.12	0.756	0.25	4
Total			a. Total SN	4.496	a. Total TA	26.0
			b. Necessary SN	4.383	b. Necessary TA	26.0
Judgment			$a \geq b$	OK	$a \geq b$	OK

Source: JICA Survey Team Note: Design of Subgrade CBR=9.5

(7) Drainage facility plan

1) Policy of Drainage plan

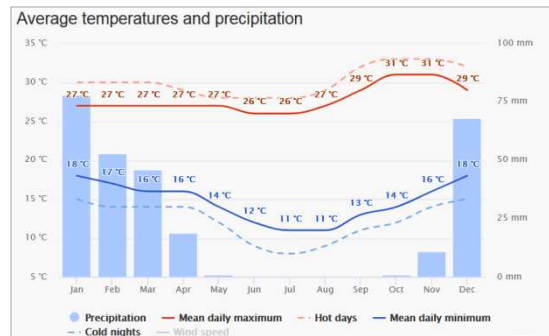
The drainage plan was examined based on the situation of target area and the following basic policy.

- ① The plan will be based on Tanzania's national standards and basically not changing the existing catchment area.
- ② In order to make the best use of the existing drainage facilities on the target road, confirm the allowable flow rate and the soundness of the structure, and also check the minimum dimensions in consideration of maintainability.
- ③ Examine drainage facilities in consideration of future urbanization.

2) Current situation of the target road

2-1) Regional overview

The average annual rainfall in Dodoma is relatively low at 500-1000 mm, but the rainfall is concentrated during the rainy season from December to April, and there is almost no rainfall during the half year from May to November. In the drainage system of the target road section, running water from the south passes through the city centre and is drained to the Hombolo Dam in the northern suburbs. The existing culverts and bridges in the city centre downstream of the study area have a small cross section of water flow in the city planning M/P2019 of Dodoma City. In addition, sediment from the hilly areas around Dodoma City is deposited in the drainage facility, which causes the function of the drainage facility to deteriorate.



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

Fig.38: Dodoma rain fall and temperatures

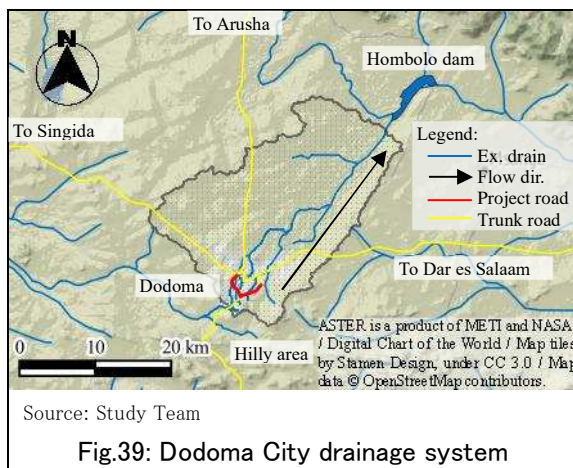


Fig.39: Dodoma City drainage system

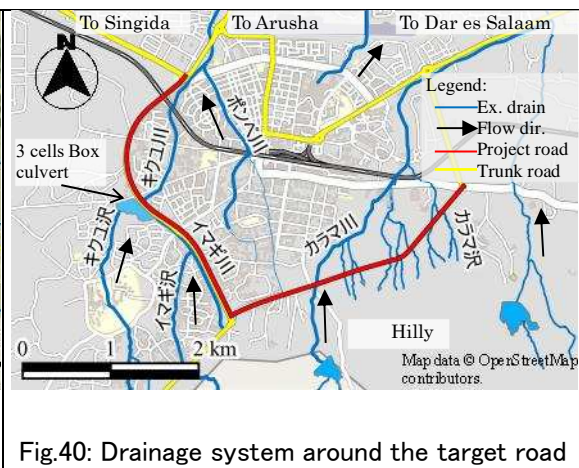


Fig.40: Drainage system around the target road

2-2) Existing drainage facility

As for the cross-drainage facilities of the target road section, 4 box culverts are installed in section 2-2. On the right side of the existing road on the upstream side, a 1.7 km-long large soil ditch has been installed from the 3.4 km Imagi intersection to existing large 3 cell box culvert installed at 1.7 km, forming a regional rainwater drainage network. In Section 3, a concrete stone-pitched gutter has been installed by Dodoma City on the south side (right side) of the existing earth road in the settlement, and it crosses the road at the 0.7km point and flows down to the north. Some existing culverts had some sediment, but none were completely buried. In addition, according to the field interview, there was no history of flooding or overtopping along the target road. After Ntyuka intersection on section 3, there are 7 natural streams that flow down from the south cross the dirt road, and concrete protection work to prevent erosion is provided up/downstream of the road crossings (fords). In addition, it is necessary to match the drainage plan with the SGR side because the flow scheme may change due to the SGR

drainage plan that passes through the upstream part of the section 3 road. The drainage plan (draft) of the project was presented to the SGR side and encouraged for consideration by the SGR side.

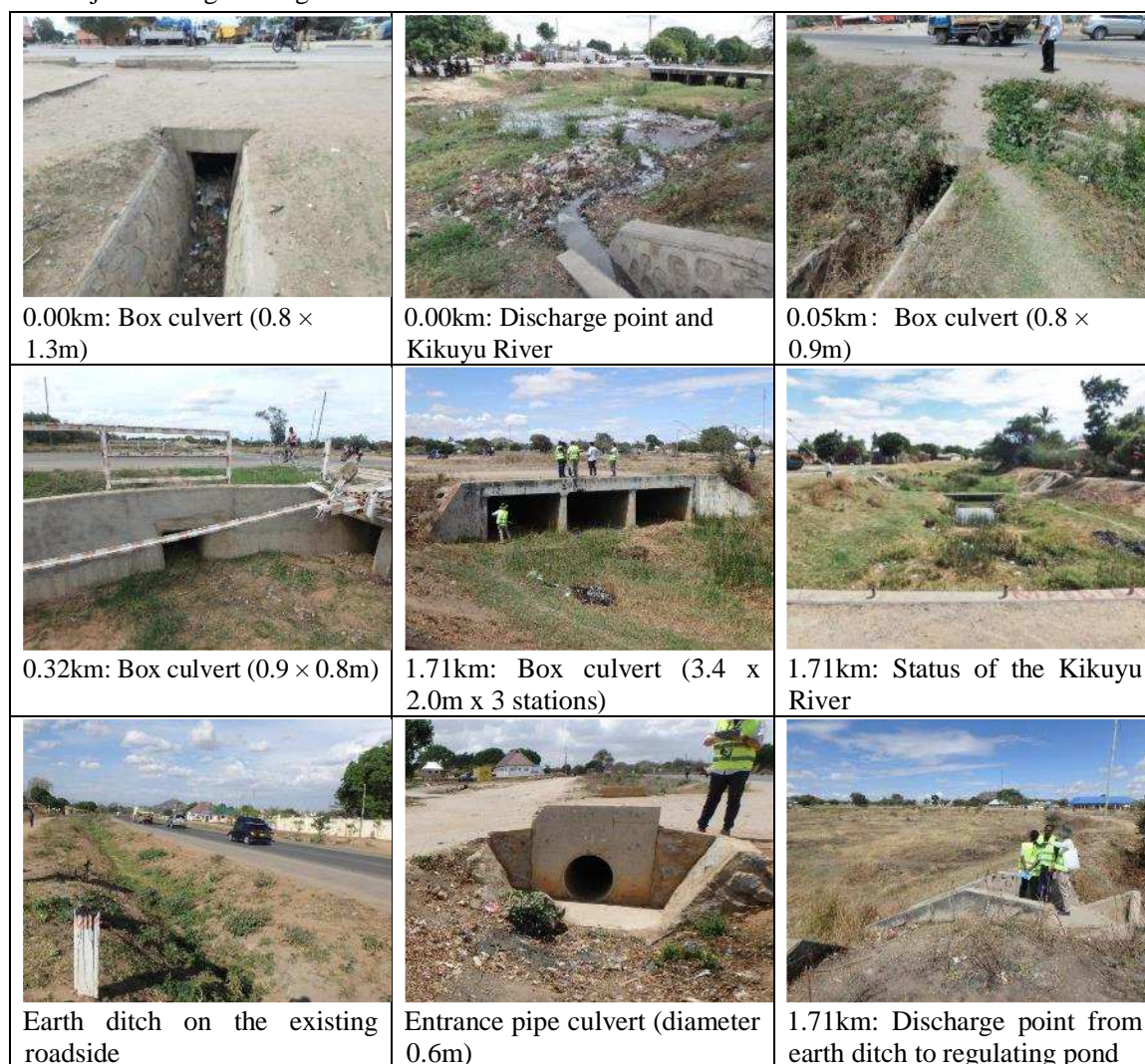
Table 68: Existing drainage facilities

Section	No.	Location (km)	Existing drainage facilities	
2-2	1	-0.060	0.8×1.3m concrete box culvert	16.5m
	2	0.050	0.8×0.9m concrete box culvert	19.0m
	3	0.320	0.9×0.8m concrete box culvert	20.5m
	4	1.720	3.4×2.0m×3 concrete box culvert	80.0m
3	1	0.640	φ1.2m concrete pipe culvert	16.5m
	2	1.000	Natural stream (concrete protection)	W30m, H0.3m
	3	1.940	Natural stream (concrete protection)	W13m, H0.4m
	4	2.010	Natural stream (concrete protection)	W12m, H0.5m
	5	2.300	Natural stream (concrete protection)	W13m, H0.5m
	6	2.350	Natural stream (concrete protection)	W15m, H0.5m
	7	2.580	Natural stream (concrete protection)	W 5m, H0.6m

Source: Survey team Note: Location= distance from the starting point

i) Section 2-2 drainage facility

The major existing drainage facilities in Section 2-2 are shown below.

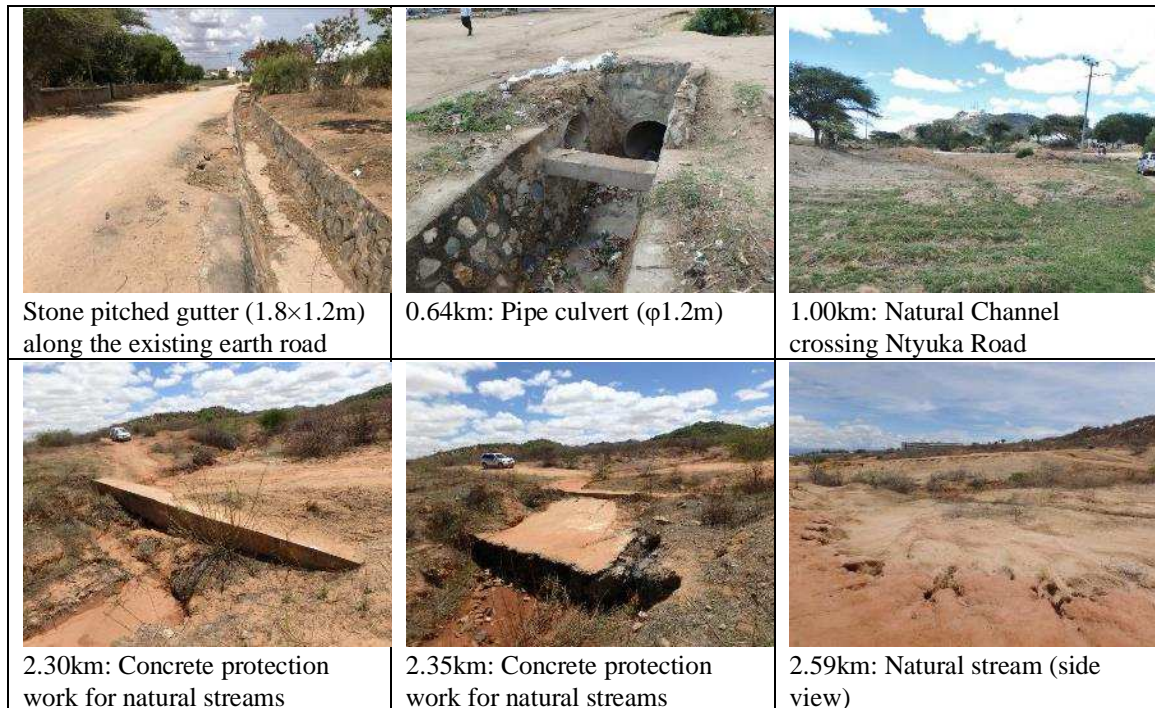


Source: Survey team

Photo 7: Existing drainage facilities in Section 2-2

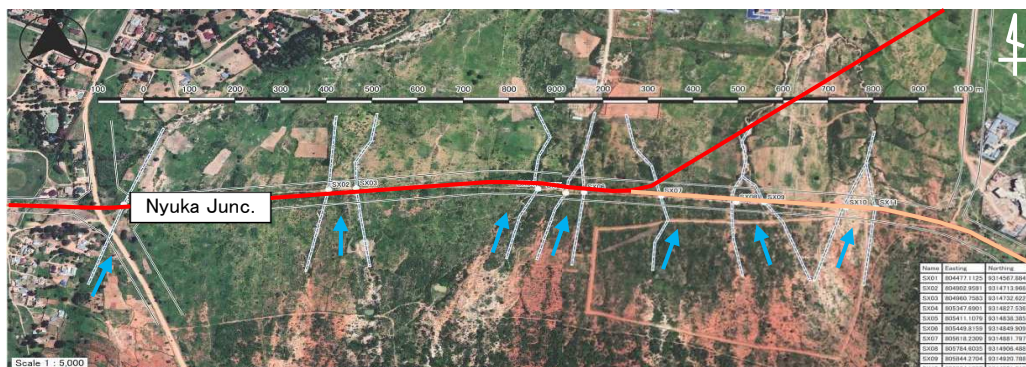
ii) Section 3 drainage facility

The major existing drainage facilities in Section 3 are shown below.



Source: Survey team

Photo 8: Existing drainage facilities in Section 3



Source: Survey team

Fig.41: Rainwater inflow from the hill area of section 3

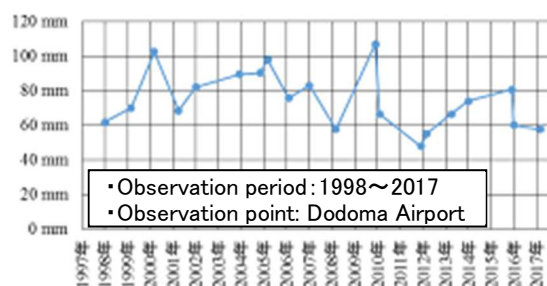
3) Confirmation of flow capacity of existing cross drainage facility

3-1) Basic conditions related to drainage

The basic conditions for drainage facility planning such as rainfall, drainage basin, runoff, etc. in the project target area confirmed by the field survey and the collected data are shown below. Restoration of flow paths is an urgent issue and it is recommended that the Tanzanian stakeholders promptly implements the fixation of river position and cross sections of the 4 main rivers in the target area prior to development. In particular, downstream of discharge point 8 on the target road, the existing stream channel was filled up and destroyed when new buildings were constructed, so the flow path to the existing culvert under the Kikuyu road is unclear and there is potential risk of heavy flooding in that neighbourhood.

3-2) Rainfall

The right figure shows recent rainfall data (1998-2017) at the observatory (Dodoma Airport) near the target section. The annual maximum daily rainfall in the target area is below 100 mm / day every year (observation of 100 mm / day or more only in 2000 and 2009). Probability rainfall intensity was calculated using the above observation data (annual daily maximum rainfall) obtained from TANROADS Dodoma.



Source: TANROADS (F/S report)

Fig.42: Annual daily max. rainfall (mm/day)

3-3) Calculation of rainfall intensity

For the rainfall return period for each facility applied to the drainage facility plan, the values from the South African Drainage Manual applied to other major roads in Tanzania were applied (see the table below).

Table 69: Rainfall return periods by drainage facility

Drainage facility	Return period	Reference standard	Japan standard (reference)
Major road drainage facility	25 years	Road Class 2, SANRAL Drainage Manual (2013)	5~30 years※
Other drainage facilities	10 years		5~30 years※
Roadside ditch	5 years	SANRAL Drainage Manual	3 years

Note : SANRAL=South Africa standard. Japanese standards= according to the importance of drainage facilities.

Source: Study team

The design rainfall intensity is calculated based on the local observation data. The TRRL model, the Gumbel formula, and the log-normal distribution formula were used to calculate the design rainfall intensity. The calculation results show that the Gumbel rainfall intensity was the highest in each design planning year. Therefore, the safe side Gumbel formula was adopted for the calculation of the probable rainfall.

Table 70: Annual maximum daily rainfall for each probability year

Calculation method	Maximum annual rainfall for each return period (mm)				
	5 years	10 years	20 years	25 years	50 years
TRRL model	78.0	89.4	—	104.4	114.6
Gumbel formula	87.6	98.1	108.1	111.3	121.1
Lognormal distribution formula	88.6	98.1	106.7	109.3	117.2

Source: Study team

3-4) Outflow calculation formula

In the runoff calculation, the runoff was calculated by the TRRL model for the river basins and calculated by the rational formula for basins with no river.

Formula for calculating outflow (TRRL model)

Outflow (m³/s), $Q = F \times Q_{av}$

F = Coefficient of maximum runoff = 2.8 (K<0.5case)

Q_{av} = Average outflow within the reference time (m³/s)

$$Q_{av} = \left(0.93 \times \left(R_{TB} \times \left(1 - 0.04 \times T_B^{-\frac{1}{3}} \times A^{\frac{1}{2}} \right) - Y \right) \times C_A \times A \times 10^3 \right) / (3600 \times T_B)$$

R_{TB} = Precipitation within standard time (mm), $R_{TB} = \frac{T_B}{24} \times \left(\frac{24.33}{T_B + 0.33} \right)^n \times R_{24}$

A = Catchment area (km²)

Y = Initial water retention (mm) = 0mm ("other zones")

C_A = Composite coefficient (dimensionless number) = C_s × C_w × C_L = 0.375

C_s = Outflow contribution area ratio (ditto) = 0.5 ("rolling catchment slope" and "impeded drainage")

C_w = Basin wetness index (ditto) = 0.5 ("dry zones" and "ephemeral streams")

C_L = Land use index (ditto) = 1.5 ("largely bare soil")

R₂₄ = Maximum 24-hour precipitation (mm) n = zone index = 0.96 ("inland zone")

T_b = Reference time (hr), $T_B = T_P + 2.3 \times K + (0.028 \times L) / \left(Q_{av}^{\frac{1}{2}} \times S^{\frac{1}{2}} \right)$

T_P = Rainfall time = 0.75hr ("inland zone") K = Basin delay time = 0.3hr ("semi-arid scrub")

L = River flow length (km)

S = River slope (m/m)

Formula for calculating outflow (Rational formula)

Rational formula : $Q = \frac{1}{3.6} \times C \times I \times A$

Q : Outflow (m³/sec) A : Catchment area (km²)

C : Coefficient of run off (Runoff coefficient in case of applying the South African rational formula: road surface 0.95, light industrial area 0.50, residential area 0.40, Steep open space (sandy soil) 0.20, flat open space (sandy soil) 0.10)

$I = \frac{1}{T_C} \times \frac{T_C}{24} \times \left(\frac{24.33}{T_C + 0.33} \right)^n \times R_{24}$ I : Design rainfall intensity (mm/hr),

$= 0.604 \times \left(\frac{r \times L}{S^{0.5}} \right)^{0.467}$ T_c: Time of concentration (hours), T_c = T_{c1} + T_{c2}

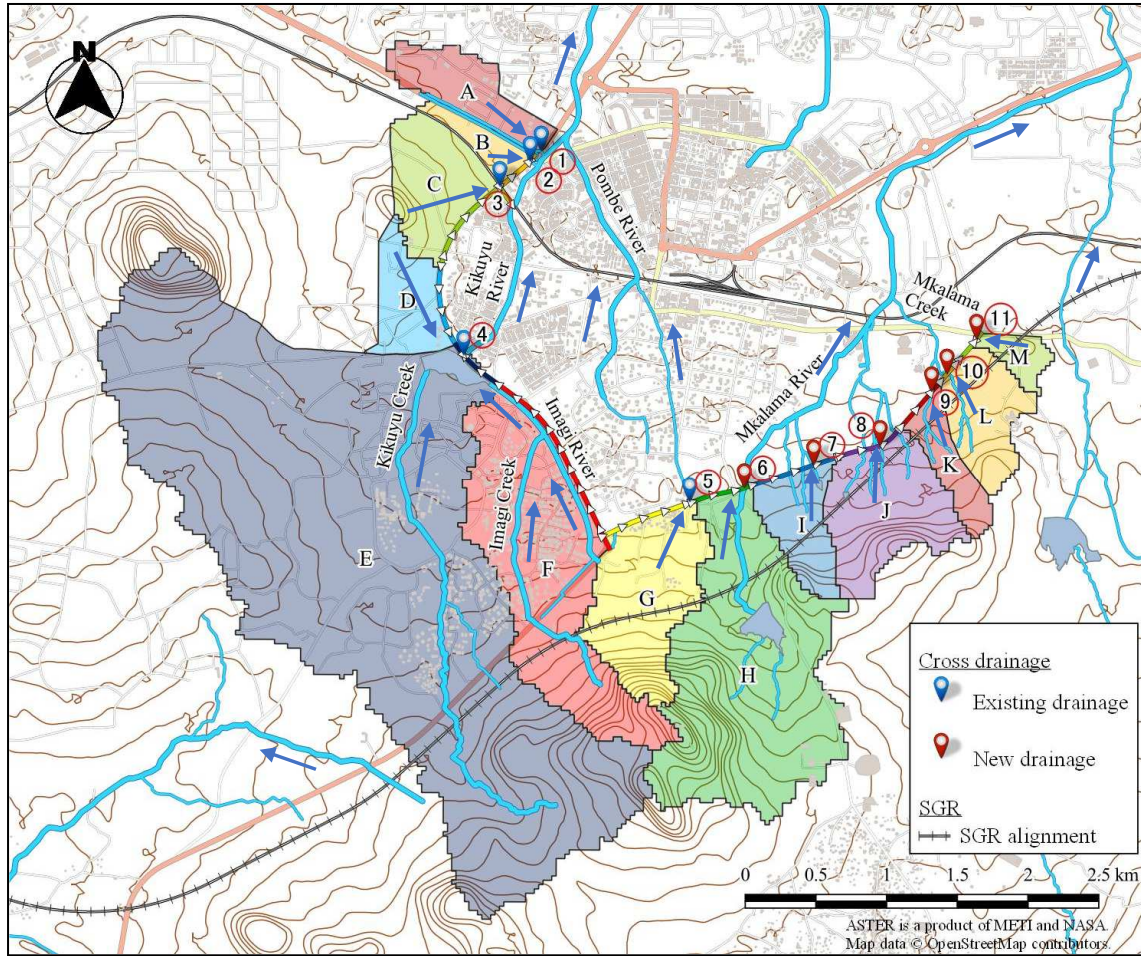
$T_{C2} = L_C / \left(3.6 \times \left(\left(\frac{A_X}{P} \right)^{\frac{2}{3}} \times S_C^{\frac{1}{2}} \right) / n \right)$ (Kerby formula for overland flow),

(Manning formula for channel flow)

n: zone index, R₂₄: daily rainfall intensity (mm/day), L : overland flow length (m), S : overland slope, r: roughness coefficient
L_C : channel flow length (m), A_X: area of channel (m²), P: perimeter of channel (m), S_C : channel slope, n: roughness coefficient

3-5) Major rivers and basins in the target area

The major river of the target road Section 2-2 is the Kikuyu River, which flows from the southwest side to the north. In section 3a, there is a stone pitched drainage channel on the south side of the existing earth road, which crosses the dirt road about 0.7km from the starting point of Section 3 and flows down to the main river Pombe in the area. In Section 3b, there are 7 streams that flow down from the south side, crossing the Section 3b road and flowing down to the Mkalama River, which is the main river in the area. The basin of the entire target road section is approximately 16.61 km² and is divided into 13 basins. The basins and major rivers in the study area are shown below.



Source: Study Team Fig.43: Catchment area and major rivers in the study area

Table 71: Catchment area of Sections 2-2 and 3 and design runoff

Section	Catchment area	Area (km ²)	Outflow (m ³ /s)	D-point	Coefficient of runoff	C, total (km ²)	Design outflow (25 years probability m ³ /s)
2-2	A	0.39	4.97	1	0.40	0.39	4.97
	B	0.16	2.28	2	0.40	0.16	2.28
	C	0.46	5.83	3	0.40	0.46	5.83
	D	0.33	4.37	4	0.40		
	E	7.43	91.27	4	0.375	9.36	116.99
	F	1.60	21.35	4	0.375		
3	G	0.77	8.44	5	0.40	0.77	8.44
	H	2.07	29.10	6	0.375	2.07	29.10
	I	0.36	5.37	7-1,2,3	0.375	0.36	5.37
	J	0.80	11.82	8-1,2,3	0.375	0.80	11.82
	K	0.30	4.42	9	0.375	0.30	4.42
	L	0.50	7.32	10	0.375	0.50	7.32
	M	0.12	1.46	11	0.40	0.12	1.46
Total		15.29	198.00	-	-	15.29	198.00

Source: Study Team Note: Runoff = TRRL method for a basin with river or stream, rational formula for others, D-point= Discharge point

3-6) Drainage capacity of the existing transverse culvert

The results of checking the drainage capacity of the existing drainage facilities in Section 2-2 and Section 3 are shown.

Table 72: Flow capacity of existing drainage facilities

Sec.	Area	DP	km	Culvert size (W x H m)	L (m)	i (m/m)	Roughness (s/m ³)	Capacity (m ³ /s)	Flow (m ³ /s)	Remarks
2-2	A	1	-0.06	Box 0.8×1.3	16.5	0.0243	0.015	3.22	4.97	NG
	B	2	0.05	Box 0.8×0.9	19.0	0.0163	0.015	1.68	2.28	NG
	C	3	0.32	Box 0.9×0.8	20.5	0.0163	0.015	1.70	5.83	NG
	D E F	4	1.72	3×Box ≧ 3.4×2.0	80.0	0.0150	0.015	117.14	116.99	OK
3	G	5	0.64	Pipe D1.2	16.5	0.0288	0.012	4.30	8.44	NG

Source: Study Team Note: Sec.= Section, Area= Catchment area, DP= Discharge point, km= distance from the starting point, L= length, i= gradient, Roughness= roughness coefficient, Capacity= Flow capacity, Flow= Design flow, Box= Box culvert, Pipe= Pipe culvert

4) Road drainage facility plan

4-1) Confirmation of outflow and examination of drainage facility

The results of the drainage facility plan in this project for section 2-2 and section 3 are shown.

Table 73: Drainage facility plan

Sec.	Area	DP	km	Culvert size (W x H m)	L (m)	i (m/m)	Roughness (s/m ³)	Capacity (m ³ /s)	Flow (m ³ /s)	Remarks
2-2	A	1	-0.06	2x Box 1.2×1.2	16.5	0.0050	0.013	6.45	4.97	OK
	B	2	0.05	Box 1.2×1.2	60	0.0050	0.013	3.22	2.28	OK
	C	3	0.32	Box 1.5×1.5	60	0.0050	0.013	5.85	5.83	OK
3	G	5	0.64	Box 2.0×2.0	30	0.0030	0.015	8.45	8.44	OK
	H	6	1.05	2×Box 3.5×2.0	50	0.0030	0.015	36.29	29.10	OK
	I	7-1	1.38	Box 1.2 x 1.2	30	0.0020	0.013	10.98	5.37	OK
		7-2	1.48	Box 1.2 x 1.2	30	0.0020	0.013			
		7-3	1.56	Box 2.0×2.0	30	0.0020	0.015			
	J	8-1	1.92	Box 1.5×1.5	30	0.0020	0.013	17.80	11.82	OK
		8-2	2.05	Box 3.0×2.0	30	0.0020	0.015			
		8-3	2.21	Box 1.2 x 1.2	30	0.0020	0.013			
K	9	2.58	Box 2.0×2.0	30	0.0020	0.013	7.96	4.42	OK	
L	10	2.76	2×Box 1.5×1.5	30	0.0020	0.013	9.06	7.32	OK	
M	11	3.06	Box 1.2×1.2	30	0.0020	0.013	2.50	1.46	OK	

Source: Study Team Note: Sec.= Section, Area= Catchment area, DP= Discharge point, km= distance from the starting point, L= length, i= gradient, Roughness= roughness coefficient, Capacity= Flow capacity, Flow= Design flow, Roughness coefficient > Precast=0.013、In-situ=0.015、Minimum culvert height= Maintainability consideration, Box= Box culvert

4-2) Judgment of existing cross-drainage facilities and application of this plan

The outline of the existing drainage facilities in Section 2-2 and Section 3 and the correspondence in this project are shown below.

Table 74: Outline of Road Drainage Facility Plan

Sec.	Area	DP	km	Existing drainage facility (W x H m)	Drainage facility design (W x H m)	Remarks
2-2	A	1	-0.06	Box 0.8×1.3 16.5	2xBox 1.2x1.2 16.5	Replacement
	B	2	0.05	Box 0.8×0.9 19.0	Box 1.2x1.2 60	Replacement
	C	3	0.32	Box 0.9×0.8 20.5	Box 1.5×1.5 60	Replacement
	DE F	4	1.72	3×Box 3.4×2.0 80.0	No change	Enough capacity
3	G	5	0.64	Pipe φ1.2 16.5	Box 2.0×2.0 30	Replacement
	H	6	1.05	Natural stream	2×Box 3.5×2.0 50	New construction
	I	7-1	1.38	Natural stream	Box 1.2x1.2 30	New construction
		7-2	1.48		Box 1.2x1.2 30	New construction
		7-3	1.56		Box 2.0×2.0 30	New construction
	J	8-1	1.92	Natural stream	Box 1.5×1.5 30	New construction
		8-2	2.05		Box 3.0×2.0 30	New construction
		8-3	2.21		Box 1.2x1.2 30	New construction
	K	9	2.58	Natural stream	2×Box 1.5×1.5 30	New construction
	L	10	2.76	Natural stream	2×Box 1.5×1.5 30	New construction
	M	11	3.06	Surface flow	Box 1.2×1.2 30	New construction

Note: The section 3 drainage plan was presented to the SGR side in March 2020. As soon as the SGR plan is available, the contents will be confirmed and examined. The minimum cross-drainage facility is 1.2 m in consideration of maintainability.

Source: Study Team

4-3) Recommendations for existing drainage facilities in the upper and lower drainage basin

This project does not have a large impact on the downstream area since the project makes small change only by adding 2 lane paved road to the target section with extremely limited flow rate change. The main rivers that cross the target road section are the Kikuyu River, the Pombe River, the Mkalama River, and several natural small rivers and streams that have rainwater flow only in the rainy season and the drainage structures installed in the downstream areas of these rivers did not have a serious shortage of discharge as confirmed by this survey. However, the city plan of Dodoma City may change from the initial plan at any time, and there is a possibility of development that was not initially planned. Therefore, a study by the Tanzanian stakeholders to respond to unexpected changes in runoff recommended.

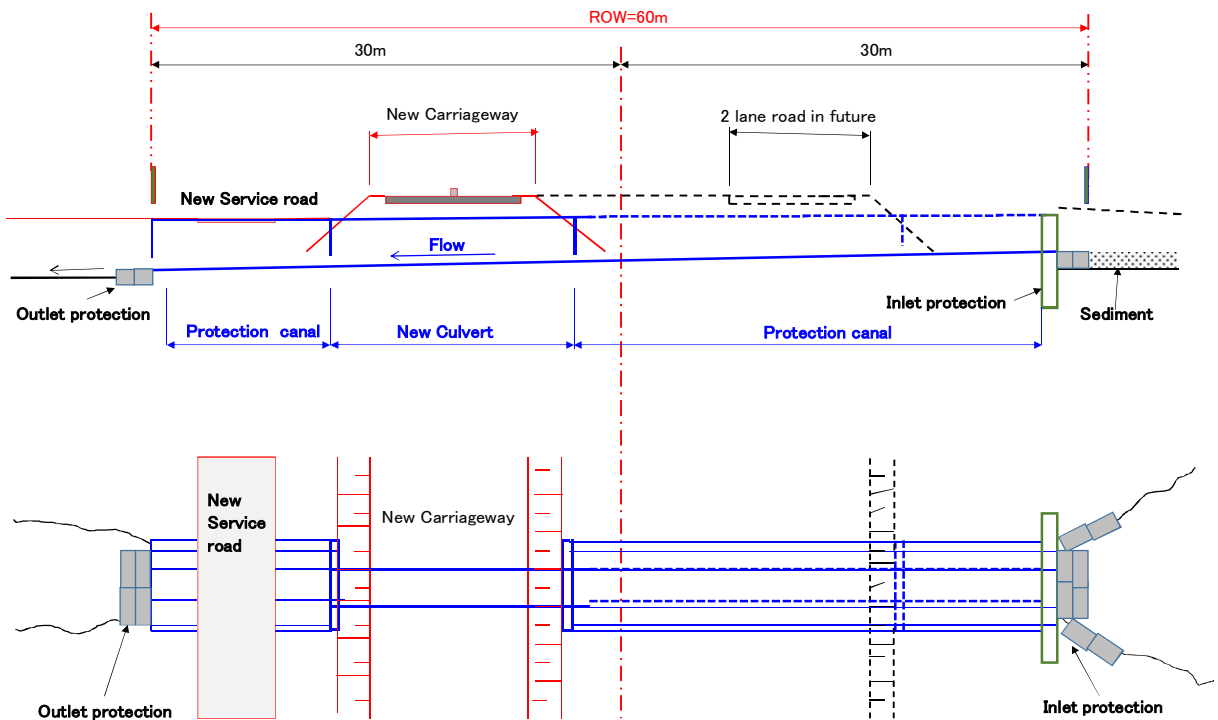
5) Inlet/Outlet protection

Some of the target small rivers, protection work is installed for preventing erosion and stabilizing the riverbed. On the other hand, the riverbed of a stream flowing from the hills on the south side is eroded and deposited on the downstream side in some part of Section 3 road. Therefore, the culverts planned in Section 3 have considered a gentle slope to prevent riverbed erosion and



Fig.44: Riverbed protection example

plan riverbed erosion prevention facilities. The facility plan was comprehensively judged based on topographical conditions, runoff, riverbed slope, etc., and the installation location and scale were examined. The plan (draft) of culvert including riverbed protection work is shown below. In addition, in order to minimize the flow velocity in the roadside drain as well as to suppress the influence on the sediment accumulation on the downstream side, a stairway, check dam, etc. were examined.



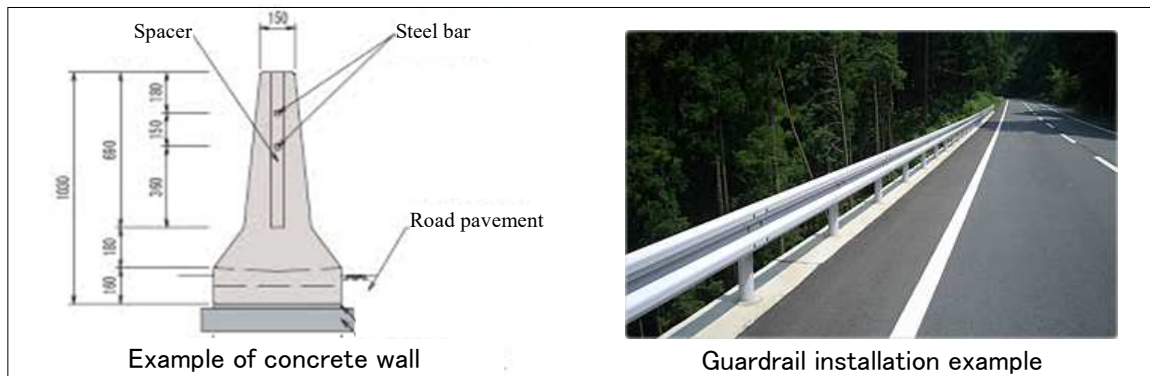
Source: Study Team

Fig.45: Culvert's plan including riverbed protection (draft)

(8) Road incidental facility plan

1) Protection facilities

Guardrails will be installed where the embankment height is 2 m or more. In Section 2-2, the existing 2 lane road and new 2 lane road will be separated by the concrete protection wall shown in the figure below at the point where the existing road and the new road are close to each other.



Source: Study Team

Fig.46: Protection facilities

2) Road ancillaries

Since section 3 is a 2-lane road with 2-way traffic, reflective road studs are planned as a line-of-sight guidance measure as shown in the figure below.



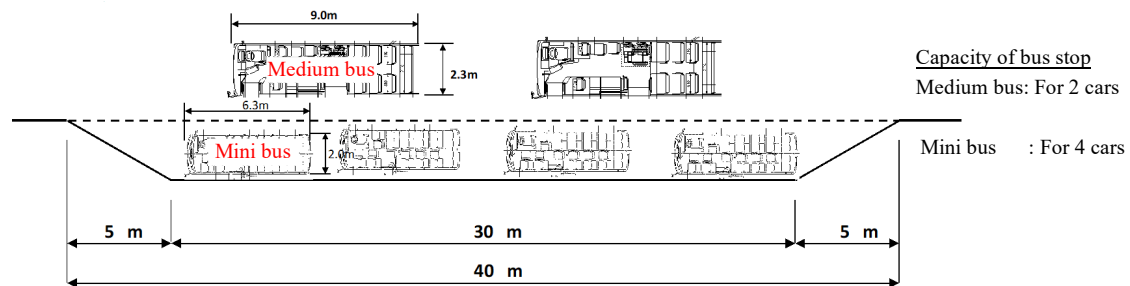
Fig.47: Reflective stud

3) Road signs and information boards

Traffic sign board and information board installation was planned at dangerous points for preventing traffic accidents and at necessary place for road users to ensure smooth traffic.

4) Bus stop

Facilities similar to the bus stop installed on the existing road in section 2-2 will be installed on the new road under this project. Currently, minibuses (Dara dara) are mainly used for existing bus stops, but they will be converted to larger buses as the population grows and urbanization progresses like Dar es Salaam in the future, the bus stop under this plan will have a size that allows small and medium-sized buses to stop. The installation location will be planned at major locations (existing bus stops, schools, hospitals, churches, near junctions) according to the F/S implemented by TANROADS.



Source: Study Team

Fig.48: Bus stop image

5) Streetlight

Streetlight will be installed for nighttime traffic safety because the area along Section 2-2 is a living area for houses, hospitals, universities, etc. and also has the function of an international highway through which large vehicles pass. Streetlights have already been installed on EU roads (section 1') similar to this project, and streetlight installation works have also been started on Dar es Salaam Road. The streetlights will be installed in Section 2-2 on the left side of the new 2 lane road and the main junctions. The installation of streetlight for the existing 2-lane paved road on the right side of the ROW will be recommended for arrangement by Tanzanian stakeholders at the time of road renovation. On the north side of section 3, offices of government agencies and international conference centres are being developed, and office buildings under construction and future development are planned. In addition, Street lights for Section 3 will be installed to ensure traffic safety especially for large vehicles currently passing through Dodoma city centre will flow in from Dar es Salaam Road when Section 3 road opens.

6) Existing railway intersection

The project road intersects the existing railway at about 320m from the starting point of section 2-2 (Bahi R/A), and a railway crossing facility is installed on the existing two-lane road.

A new railway crossing facility similar to the existing facility will be installed on the new two-lane road to be constructed by this project, based on the assumption that railway traffic does not change significantly. Along with the installation of traffic signs, a warning facility (rumble strip) on the railway crossing will be installed on the road surface where vehicles enter the railway crossing to call attention to the hazard.

2-2-3 Outline Design Drawing

The outline design drawings prepared based on the basic plan are as indicated below. The drawings are attached to the appendices.

Table 75: List of Basic design drawing

Item	Contents of drawing	Number of drawing
1	Road standard cross sections, road plan and profile	13
2	Drainage facilities structural drawing	1
3	Incidental facilities structural drawing	1

Source: JICA Survey Team

2-2-4 Implementation/Procurement Plan

(1) Implementation/Procurement policy

Since the Project will be implemented under the grant aid scheme of the government of Japan (GOJ), the following points have to be taken into consideration as a guideline for construction and procurement.

- ① Formulate the construction method and construction schedule in the reflection of the local natural conditions such as weather, terrain, and local features and current traffic conditions on the target road.
- ② In consideration of maintenance capacity on the Tanzanian stakeholders, adopt common construction methods that do not require special construction machinery or technology following construction.
- ③ In compiling the construction plan, give ample consideration to the social environment and traffic safety.
- ④ Utilize locally procurable materials as much as possible in order to contribute to the vitalization of the local economy.

(2) Notes on construction / procurement

1) Adherence to Labour Standards

The contractor will comply with appropriate labour conditions and customs in line with employment based on the existing construction legislation in Tanzania and will strive to prevent disputes with workers and secure safety during the works period.

2) Social and environmental consideration during the construction period

- ① Transport waste materials that arise as a result of construction to an appropriate site that does not affect the surrounding environment for landfill disposal, etc.
- ② Appropriate treatment of sewage generated from the construction site and temporary yard will be performed to reduce or mitigate the impact on the surrounding environment.
- ③ Take measures to reduce the generation of dust, noise and vibration, and also monitor once a month to continuously grasp and improve the situation.

3) Securing of safety during construction

- ① Install safety equipment (barricades, colour cones, revolving lights) and guides at major intersections. In addition, since the traffic of construction vehicles will increase, signboards and construction information boards will be installed at construction sites to make them fully known to local residents and ensure safety and prevent troubles. The study will also proceed with reference to the safety measures standards for road construction in Japan.
- ② Since traffic of construction vehicles will increase, the installation of signboards and construction information boards at construction sites will be arranged to keep local residents informed and ensure safety and prevent troubles.
- ③ In this plan, the current condition is very different for Section 2-2, where 2 lanes will be added to the side of the existing 2 lane paved road, and Section 3 where a new 2 lane road will be installed on the existing almost no traffic earth road. It is necessary to respond with due consideration of these different conditions.
- ④ Thoroughly raise awareness of traffic safety measures in ① to ③ above for contractors and local workers.

4) Need for means of communication on site

- ① Since mobile phones can be used in the project section, construction staff will use mobile phones.
- ② Establish a traffic safety management system for the purpose of ensuring the safety of general traffic and local residents by portable transceiver equipped traffic guides.

5) Observance of local customs

A construction time schedule in accordance with the local religious customs (Ramadan, Christmas, etc.) and daily habits will be considered when formulating the construction plan.

6) Ensuring traffic safety

Consider an efficient and rational traffic routing plan within the road occupancy (ROW) with considering the safety and efficiency.

7) Customs clearance

The construction plan will be formulated upon considering the number of days required for importing, unloading and clearing customs, etc.

8) Secure land

Confirm that the prior agreement, payment of deposit, etc. are properly implemented by Tanzania.

9) Schedule adjustment

Sufficiently check and adjust the implementation policy of the burden on Tanzania.

(3) Construction category

The outline of the burdens on the Japanese stakeholders and the Tanzanian stakeholders is shown below.

1) Scope of burden on the Japanese stakeholders

- Necessary temporary work and main work for road construction
- Installation of temporary facilities (base camp, office, warehouse, etc.)
- Procurement of labour, construction materials, and construction machinery required for construction
- Safety management and measures related to construction implementation
- Implementation design, draft tender and contract document preparation, bidding assistance, construction supervision, and defect inspection

2) Scope of burden on the Tanzanian stakeholders

- Support for securing road occupancy land (ROW) and securing base camp site / leased land cost
- Support for obtaining various permits and licenses for disposal of waste and residual soil generated by construction
- Secure and implement costs for land acquisition
- Relocation of obstacles and allocation of Tanzanian stakeholders supervisors and securing of related costs due to relocation
- Assistance for prompt customs clearance and tax exemption at the port of unloading of materials and equipment
- Convenience provision for Japanese people entering and staying engaged in this project
- Nominate a counterpart and secure related costs

(4) Detailed Design and Consultant Supervision Plan

1) Implementation schedule of consulting service

In an implementation of the Project, it is premised that the exchange of note (E/N) concerning Grant Aid for this project will be concluded between the Governments of Japan and Tanzania (GoT), followed by Grant agreement (G/A) which will be concluded between JICA and GoT. After concluding the E/N and G/A, the consultant will conclude a consulting contract with TANROADS which is executing agency of GoT in accordance with the scope and procedure of Japan's grant aid based on the recommendation letter issued by JICA. After concluding the contract, detailed design, tender assistance work, and construction supervision will be implemented. The following is the main service contents included in the consulting contract.

2) Detailed design and tender document preparation stage

The implementation design of each facility will be carried out based on the preparatory survey result and design documents, specifications and documents necessary for tender will be prepared for approval by the Tanzanian stakeholders.

3) Tender stage

Assist Tanzanian stakeholders with public notice of tender, prequalification (PQ), distribution of tender documents, bidding, and bid evaluation and support contract negotiation.

Table 76: Personnel and roles for the implementation design and tender stage

Item	Role
Project manager	Control implementation design and tender work
Road design I (Road geometry)	Detailed design of the road and management of topographic survey
Road design II (drainage/other)	Detailed design for drainage and incidental structures
Road design III (Pavement)	Pavement planning / design, specification preparation
Social & environmental expert	Monitoring and support of implementation status of resident relocation plan
Constriction Planner	Procurement plan, reviewing project costs, and organizing survey prices
Tender document preparation	Tender documents preparation, PQ and tender assistance

Source: Study Team

4) Construction supervision stage (Consultant task)

After the contract is signed by the contractor, the consultant issues a construction start instruction and resides locally to start construction supervision work. In the construction supervision work, the work will be implemented based on the construction supervision plan and the progress of construction work will be reported to the Tanzanian stakeholders and instruction of work improvement, quality, safety, payment related work and construction improvement proposal will be made to the contractor.

One year after the completion of construction, a defect liability inspection will be conducted. In addition, regular reports will be made to the Embassy of Japan and JICA offices. The resident engineer will dispatch a civil engineer with experience in similar work and consultant project manager will be dispatched at the milestones of the construction stage to carry out construction quality control meetings, work coordination and construction supervision. In addition, as a pavement-related spot engineer will be dispatched to carry out asphalt testing and inspection and pavement construction supervision. The following table shows the personnel involved in construction supervision and their roles. In addition to the above-mentioned Japanese engineer, a local construction supervision engineer and office clerk who assist resident engineer will be assigned.

Table 77: Construction supervision personnel and roles

Item	Role
Project Manager	Coordination work and technical management for smooth execution of construction
Resident Engineer	Daily management work and process management work
Pavement Engineer	Pavement quality supervision
Engineer for defect final inspection	Final inspection work before delivery of completed facilities

Source: Study Team

(5) Quality Control Plan

The contractor establishes a test room in the camp yard and procures quality control test equipment for materials necessary for construction work such as soil quality, crushed stone, asphalt material, concrete material, etc., and conducts related tests. The main quality control items associated with the construction

of the Project are shown in the table below. The consultant confirms the test results of the contractor and lets them achieve the construction quality as described in the contract.

Table 78 Lists of items of quality control

Item		Test method	Test frequency	
Base course (granular material)	Mixing material	Liquid Limit, Plasticity Index	Every mixture	
		Grain Size Distribution		
		Aggregate Strength Test		
		Unconfined Compression Test (Regeneration Method Material)		
		Compaction Test		
Laying	Density Test (Compaction Rate)	1time/day		
	Pavement Thickness	By Spec./ standards		
Prime coat	Material	Bituminous material	Quality Certificate	Every material
		Temperature and amount during storage / spraying	Every distribution	
Pavement surface	Material	Bituminous material	Quality Certificate/Component Analysis Table	every material
		Aggregate	Grain Size Distribution	Every mixture, 1time/Month
	Water Absorption rate		Every material	
	Aggregate Strength Test			
	Mixing test		Stability	Each mix
			Flow value	
			Porosity	
			Design asphalt value	
	Paving installation		Stability	Each mix
			Set temperature during mixing	Appropriately
			Temperature during laying	For each delivery
			Sampling Marshall test	Roughly once/day
Concrete	Materials	Cement	Certificate of quality, Physics / chemical test result	For each material
		Water	Ingredient test result	For each material
		Additive agent	Certificate of quality, Ingredient analysis list	For each material
		Fine aggregate	Absolutely dry specific gravity	For each material
			Grain size distribution, coarse grain ratio	
			Silt mixture rate for clayey and silty materials	
		Coarse aggregate	Absolutely dry specific gravity	For each material
			Grain size distribution	For each material
			Certificate of quality, Physics / chemical test result	
		Cement mix	Compressive strength test	Alkali / aggregate reactivity test
	For each mix			Cement mix
	When placing		Slump (concrete)	For each material
			Air contents	For each material
Temperature			For each material	
Pavement Thickness			By Spec./ standards	

Item		Test method	Test frequency
	Strength	Compressive strength test (7th day, 28th day)	For each material
Reinforcement bar	Materials	Certificate of quality, Tension strength test result	Each lot unit

Source: Study team

(6) Procurement Plan of Materials and Equipment

1) Policy for procurement

1-1) Labour

With a view to creating employment opportunities, promoting technology transfer, and vitalizing the local economy, local engineers and labourers will be utilized to the fullest extent; however, for jobs beyond the local technical level, skilled workers will be dispatched from Japan or third countries.

1-2) Construction materials

The field survey found that the general materials (cement, aggregate, timber, etc.) for use in the construction works are produced in Tanzania. Imported reinforcing bars and shape steels are available on the local market and can be procured in Tanzania. Considering the above points, procurement source has been planned as shown in the table below based on the following principles.

- ① Procure locally produced items as much as possible.
- ② Procure imported products in cases where they are constantly available on the local market.
- ③ Concerning materials that cannot be procured locally, procure from Japan or third countries upon considering ease of procurement, price, quality, delivery time and other relevant issues.

Table 79: Procurement of Main Material

Material name	Procurement source			Remark
	Tanzania	Japan	3 rd country	
< General material >				
Asphalt	●			
Cement	●			
Aggregate for pavement	●			
Aggregate for concrete	●			
Reinforcing bar	●			
Crushed stone	●			
Wood (plywood, plate material, etc.)	●			
Oil paint	●			
Steel pipe, H beam	●			
< Ancillaries >				
Streetlight	●			
Bus stop shelter	●			

Source: Study Team

1-3) Construction Machinery

According to the results of the field survey, the major local contractors own most of the road construction equipment and can lease it. Asphalt plants and concrete plants may be owned by local construction companies in some cases, but due to concerns over deterioration and poor maintenance, procurement from Japan will be considered. The machines that are expected to be procured from Japan are used in work types that are critical to progress, so in principle, procurement of new or equivalent machines with less risk of trouble is expected. In addition, machines manufactured in neighbouring countries (Kenya or South Africa) will not be procured, and machines with a track record of being manufactured in Japan will be procured. Based on the above, the main procurement categories for construction machinery are planned as shown in the table below.

Table 80: Main Works Machinery Procurement Sources

Equipment name	Standards & Specifications etc.	Procurement source			Remark
		Tanzania	Japan	3 rd country	
Bulldozer	15t~21t	●			
Backhoe	0.28m ³ ~1.6m ³	●			
Wheel loader	0.8m ³ ~2.1m ³	●			
Motor grader	3.1m	●			
Road roller	Macadam 10t-12t	●			
Vibrating roller	0.8t~1.1t, 3t~4t、	●			
Tire roller	8t~20t	●			
Tamper	40kg~100kg	●			
Asphalt finisher	2.4m~6.0m	●			
Asphalt distributor	6,000lit	●			
Line marker	Hand type	●			
Concrete cutter		●			
Concrete mixing car	5500l~6000l	●			
Concrete breaker	20kg~1300kg	●			
compressor	3.5m ³ ~5.0m ³	●			
Dump truck	10t	●			
Semi-trailer	15t~30t	●			
Truck crane	11t~25t	●			
Rough terrain crane	20t~50t	●			
Concrete pump truck	Boom type, 70m ³ /h	●			
Sprinkler	11,000lit	●			
Concrete plant	30m ³ /h		●		
Asphalt plant	60ton/h		●		
Stabilizer	W2.0m, Depth 0.6m		●		

Source: Study Team

2) Transportation route

Imported materials and equipment to Tanzania are unloaded at Dar es Salaam Port and are connected by national road from the port to Dodoma City (transportation distance 486km, about one day by truck). Therefore, it takes about 3 months to transport materials and equipment from Japan (50 days for sea transportation, 1 month for unloading and customs clearance, and 1 day for domestic transportation).

3) Quarry, Borrow pit and Disposal area

Materials related to soil and crushed stone required for the project are fine aggregate / coarse aggregate for concrete, fine aggregate / coarse aggregate for paving, roadbed material, and embankment material. For a fine and coarse aggregate procurement was planned from a quarry near Dodoma City. The candidate sites for the quarry were CHENENE Quarry approximately 100km northwest of the site and CHIGONGWE Quarry approximately 30km northwest of the site. For the embankment and unsuitable soil replacement material, a government-designated soil borrow pit located about 20 km from the site along the national trunk road to Dar es Salaam (about 1.7 km away from the trunk road). In addition, the Dodoma City designated waste disposal site located approximately 10 km south of the site was confirmed as a dumping site for discarding concrete waste materials and construction residual soil generated during construction work. The above is summarized as shown in the table below.



Source: Study Team

Photo 9: Candidate borrow pit, quarry and disposal area

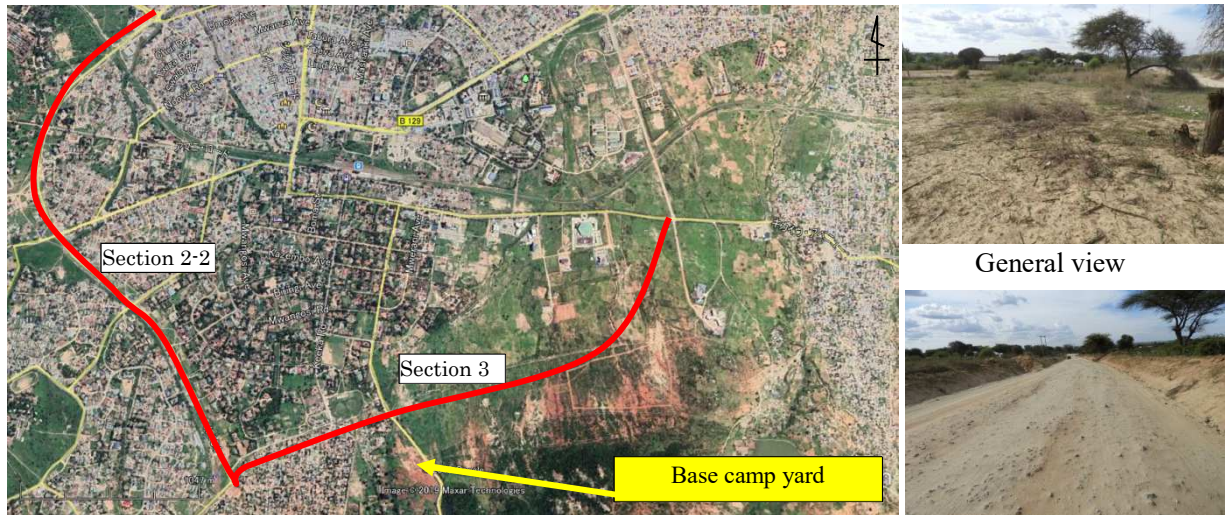
Table 81: Candidate borrow pit, quarry, disposal area and distance to the project site

Name	Candidate site	Material	Use	Distance
Borrow pit	88 Borrow Pit	Laterite	Fill material	20 km
Quarry ①	CHENENE Quarry	Corse, Fine material	Aggregate for concrete and paving	100 km
Quarry ②	CHIGONGWE Quarry	Corse, Fine material	Aggregate for concrete and paving	30 km
Disposal area	CHIDAYA Sanitary Landfill	The estimated capacity of approx. 200,000 m ³ is sufficient to cover the estimated amount of 15,000 m ³ of disposal soil of the project.	Waste disposal site designated by Dodoma City	10 km

Source: Study Team Note: Distance= distance to the project site

4) Base camp yard

The temporary yard of the contractor was confirmed as a candidate site on a flat land about 300 m south of the Ntyuka junction in Section 3. Electricity and water are also supplied nearby, and the site has a sufficient area (see the figure below). Since the land confirmed as TANROADS is private land, it is not necessary to acquire the land as a matter of TANROADS, but it is necessary to estimate the leased land cost during the construction period.



Source: Study Team

Fig.49: Location map of base camp yard candidate site

5) Important points to consider in Procurement

The important points to consider in procurement are as follows.

- ① Compile a procurement schedule that does not put pressure on the overall construction schedule.
- ② Procure local products as far as possible in order to contribute to local economic vitalization.
- ③ Concerning materials that cannot be procured locally procure from Japan or third countries upon considering quality reliability, ease of procurement, available quantities, and economy.
- ④ Concerning products procured from Japan or third countries, consider transportation from Dar es Salaam port. For inland transportation from ports, use trailer trucks for construction machinery and trucks for general goods (materials).

(7) Customs Procedures

1) Customs Clearance

Imports of equipment and materials to Tanzania are mainly handled at Dar es Salaam Port, but this port is currently unable to cope with the volume of incoming imports. In particular, large numbers of ships need to wait offshore before they can unload containers. Accordingly, it is necessary to depend on imports by bulk vessels that allow faster unloading, however, bulk cargoes tend to be unloaded in disparate locations and take longer to pass through customs. Since there is little possibility that functions at Dar es Salaam Port will be improved in the near future, it will be necessary to devise a procurement plan that allows ample scope for manoeuvre.

(8) Soft Component Plan

This is not applicable in the Project.

(9) Implementation Schedule

The Cabinet meeting of Japan assumes February 2021 as the implementation of detailed design, tendering and project road construction. The estimated total construction period is about 34 months in

Machinery and Construction Association)

- Construction Cost, March 2019 (issued by Construction Research Institute)
- Cost estimation research, March 2019 (issued by Economic Research Association)
- Manual of Design and Cost estimation for Preparatory Survey (Trial version), March 2009 (issued by Japan International Cooperation Agency)
- Complementary edition for Manual of Design and Cost estimation for Preparatory Survey (Civil engineering), April 2017 (issued by Japan International Cooperation Agency)

4) Correction of labour productivity per unit

The correction of quantity per unit will be implemented as follows based on complementary edition of design / cost estimation manual for preparatory survey (civil engineering field).

- Coefficient of correction of labour productivity per unit for unskilled labor : 2.5
- Coefficient of correction of labour productivity per unit for skilled labor : 4.5
- Coefficient of correction of labour productivity per unit for simple machine construction : 55%
- Coefficient of correction of labour productivity per unit for general machine construction : 60%

5) Price fluctuation coefficient

To estimate the cost amount taking into consideration price fluctuation prediction (both price increase and decrease) capable of predicting from the past economic trend, based on complementary edition of design / cost estimation manual for preparatory survey (civil engineering), the price fluctuation coefficient from the cost estimation time point to the assumed tender time point is set.

The above estimation conditions and methods do not take into account the construction period and the impact on estimation associated with the new corona virus (COVID-19).

2-3 Obligations of Recipient Country

2-3-1 General Items in the Government of Japan's Grant Aid Scheme

The following lists the general scope of works of the Tanzanian side confirmed in the minutes of meeting agreed upon by both governments.

- Secure the land needed for the Project before the commencement of construction work.
- Exempt Japanese nationals from customs tax, domestic tax, and other forms of public charges for service and materials that are supplied under approved contracts.
- Provide necessary convenience and assistance to the Japanese nationals who enter and reside in Tanzania for the Project implementation in order to facilitate the supply of service and materials under approved contracts.
- Complete the environmental and social consideration procedures and necessary surveys required under Tanzanian environmental and social consideration procedures.

2-3-2 Specific requirements for the project

The items undertaken by the Tanzanian side that are specific to this project and are not included in the general requirements are as follows.

(1) Securing of land for the road works and demolition/relocation of existing structures

1) Cost born by Tanzanian stakeholders

In line with Project implementation, it will be necessary to secure land and demolish/relocate existing structures. Since structures have been confirmed alongside the target road, it will be necessary to identify the fiscal year of works and appropriate the necessary budget.

As is shown in the following table, the budget required by Tanzanian stakeholders for the project is 5,535 million Tshs, and since this is equivalent to roughly 0.7% of the TANROADS budget of 5 years annual average from 2015 of approximately 848,510 million Tshs, it is affordable for the Tanzanian side. Moreover, it has been confirmed with TANROADS that these budgets will be secured in fiscal 2021.

Table 83: Outline of the Scope of Works on the Tanzanian Side (Unit: million Tshs)

Item	Contents	Cost burden
1	Construction related company registration	Costs of registration of construction contractor (CRB) and consultant (ERB) 138 (\$60,000)
2	A/P, B/A cost	Authorization for payment (A/P) and opening of Bank Account (B/A) expenses 42
3	Relocation of existing public service structures	Relocation of water pipes, power lines, communications lines 5,355
Total (budget required by Tanzania site)		5,535
4	VAT refund	VAT18% refund fee 4,234
Reference Total		9,768

Note: Relocation of communication line (optical fibre) will be done at owner's expense. CRB = Contractor Registration Board, ERB = Engineer Registration Board. Approximate refund amount when using local subcontractors is not included.
Source: Study Team

2) Securing land for camp yards and disposal area

The following sites were examined as candidate sites for construction camp yards and disposal area for road construction.

- Assumed location and size of temporary yard
 - > Base camp yard : 100m x 150m, a candidate site is flat land and about 300m south of the Ntyuka junction of Section 3.
 - > Concrete plant : 30m x 70m, 2 places near start and end points
 - > Soil dump : Approximately 10km from the target road, a disposal area designated by Dodoma City (width 60m x 5000m)
- Use period : about 2 years

(2) Implementation of project briefing sessions for residents along the project road

The executing agency is promptly required to implement a project briefing meeting with residents and their representatives along the project road after the signing of the exchange of note that officially decides the implementation of this project and make them fully aware of safety management measures during construction, noise countermeasures, construction methods, etc.

(3) Traffic safety measures

The Tanzanian stakeholders are requested to implement safety awareness-raising measures for road users and traffic safety education (road signs, pedestrian crossings, etc.) for local residents in order to ensure the safety of local residents and promote smooth traffic control by the project staff during the construction.

1) Road operation during construction

Sufficient measure required in accordance with the characteristics of project road sections because of current status of Section 2-2, where a new 2 lane road going to be added on the left side of the existing 2 lane paved road and Section 3 where 2 lanes road is newly installed on existing earth road are greatly different.

Section 2-2: Large-scale detour road is not required during construction because traffic on existing roads will not be obstructed during construction, but sufficient consideration for traffic safety as minibus parking and people getting on and off near the shoulders of existing roads are necessary.

Section 3: Construction of new 2-lane paved road on the left side of the existing earth road where there is almost no traffic at present. Therefore, detour road during the construction is not required, but since residential areas are adjacent along the outside of the ROW in section 3a, sufficient consideration must be given to the access of residents during construction. A specific measure will be assignment of security personnel near the doorway to guide safe passage.

2) Safety measures during construction

Since this target route includes the work at junctions, sufficient safety equipment (barricades, revolving lights) and guides must be arranged at major junctions. In addition, since the traffic of construction vehicles will increase, the study of safety measures by referring to the standards for safety measures for road construction in Japan, etc. was proceeded.

(4) Thorough notification of inconvenience during construction

Since many inconveniences to passing traffic due to construction are expected, thorough notification arranged by TANROADS of inconvenience during construction to road users through public relations media such as TV, radio, SNS and newspapers will be requested.

2-4 Project Operation and Maintenance Plan

The following work is required for maintenance of facilities after the implementation of the project. A daily and periodic inspections and prompt maintenance response to problem areas are extremely important. Since the existing paved road is maintained in good condition, it is important to maintain the current condition and establish a maintenance plan and system to prepare for future load increase.

(1) Routine maintenance

- Routine road patrol and inspection
- Sealing and patching of road surfaces (pot hole filling)
- Maintenance and repair of road shoulders

- Cleaning and repairing gutters and drainage structures

(2) Periodic maintenance work

- Road surface repairs
- Sub-base repairs
- Repairs of structures

Currently, the TANROADS Dodoma regional office conducts the above maintenance work and there are no operational problems. Since it will be especially important to repair damaged parts immediately, to conduct regular monitoring and checking at sufficient intervals for early detection is required.

2-5 Project Cost Estimation

2-5-1 Initial Cost Estimation

(1) Costs borne by Japan

The project will be implemented in accordance with Japan’s Grant Aid scheme and the costs will be determined before concluding the Exchange of Note for the project.

(2) Costs borne by Tanzanian

① Cost of registering construction company	: Million Tshs	138	(approximately 6.6 million yen)
② Cost for issuing A/P and opening B/A	: Million Tshs	42	(approximately 2.0 million yen)
③ Cost for relocation of existing structures	: Million Tshs	4,599	(approximately 218.8 million yen)
④ ARAP cost	: Million Tshs	756	(approximately 36.0 million yen)
Total	: Million Tshs	5,535	(approximately 263.4 million yen)

(3) Estimation conditions

The conditions at the point of estimation in December 2019 were as follows.

1) Exchange rate

US\$1 = ¥109.17 (Ref.: Tshs 1 = Yen 0.048)

2) Implementation period

The Project intends for 33.5 months being set aside for the detailed design, tender assistance and construction work as shown in the implementation schedule.

3) Other

The Project will be implemented in accordance with the grant aid scheme of Government of Japan.

2-5-2 Operation and Maintenance Cost

As is shown in the following table, the average annual operation and maintenance cost for routine and periodic maintenance for the target road is estimated to be approximately 8 million yen during the Project life. Since this is equivalent to 0.03% of the annual average maintenance budget of past 5 years up to 2019, Tshs 514 billion (24.4 billion yen) of Tanzania and this cost is considered to be easily affordable for the Tanzanian stakeholders.

Table 84: Main maintenance Items and Costs

(1 Tshs= 0.048 yen) Source: Survey Team

Type	Cycle	Maintenance contents	Specifications	Unit	Unit cost (Tshs)	Work quantity	Frequency	Cost (Tshs)
Routine	Every year	Patching	1 % of road area	m ²	35,000	930	16	520,800,000
		Roadbed repair	1 % of road area	m ²	96,460	930	16	1,435,324,800
		Shoulder repair	1 % of footpath area	m ²	29,790	70	16	33,364,800
		Clearing structure	5 % of side ditch length	m	2,500	30	16	1,200,000
		Subtotal-I				20-years total=		
Periodic	Every 5 years	Roadbed repair	2 % of road area	m ²	96,460	1,850	4	713,804,000
		Overlay	2 % of road area	m ²	35,000	1,850	4	259,000,000
		Shoulder repair	2 % of footpath area	m ²	29,790	130	4	15,490,800
		Repair of structure	1 % of the length of side ditches	m	305,210	90	4	109,875,600
		Subtotal-II				20-years total=		
			Total routine and periodic maintenance III (=I+II)					3,088,860,000
Operation and maintenance cost			10 % of III	Set	-	-		308,886,000
Total								3,397,746,000
Cost per year								169,887,300

Source: Study Team