The United Republic of Tanzania
Ministry of Works (MoW)

PREPARATORY SURVEY REPORT
ON
THE PROJECT FOR IMPROVEMENT OF TRANSPORT CAPACITY IN DAR ES SALAAM
IN
THE UNITED REPUBLIC OF TANZANIA

MARCH 2011

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

INGÉROSEC CORPORATION

EID
JR
11-042

PREFACE

Japan International Cooperation Agency (JICA) decided to conduct the preparatory survey on the Project for Improvement of Transport Capacity in Dar es Salaam in the United Republic of Tanzania, and organized a survey team headed by Hideaki Morita of Ingérosec Corporation between June, 2010 to March, 2011.

The survey team held a series of discussions with the officials concerned of the Government of Tanzania, and conducted a field investigation. As a result of further studies in Japan, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our 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 extended to the survey team.

March, 2011

Kiyofumi Konishi
Director General,
Economic Infrastructure Department
Japan International Cooperation Agency

SUMMARY

1. Overview of the Country

The United Republic of Tanzania (hereinafter referred to as "Tanzania") is situated half way up the African continent's east coast, facing the Indian Ocean. It has a total land area of approximately 945,000 km^2 and a population of some 42.48 million (2008, World Bank). Highlands with an elevation of 1,000 ~ 2,000 m dominate the inland and Mt. Kilimanjaro (EL. 5,895 m) rises high in the north. Tanzania is bordered by Kenya to the north and Mozambique to the south, as well as Uganda, Rwanda, Zambia and Malawi, etc. to the west (inland side), and it represents an important transportation route for these inland neighbours. In particular, Dar es Salaam Port in Tanzania is becoming more and more important in recent years. The prevailing climate is characterized by high temperature and high humidity as is typical of coastal regions in Tanzania. There are two rainy seasons: a major rainy season from late March to late May and a minor rainy season from the end of November to early December. The period from June to September is relatively cool with temperatures at around 22°C, but extremely hot weather continues from December to February with temperatures exceeding 30°C. Rainfall is observed all year round although half of the annual rainfall is recorded during the three months of the major rainy season.

After independence, Tanzania actively implemented socialist economic policies but its economy reached a crisis point in the 1980's due to oil shocks, the war with Uganda and severe drought. To improve the situation, the Government of Tanzania commenced economic reform in 1986 with the assistance of the World Bank and IMF. The economic growth rate in recent years has been improving and has fluctuated between 5~7% in recent years (7.4% in fiscal 2008 and 5.5% in 2009). Moreover, the GNP per capita has been steadily increasing from US$ 210 in 1997 to US$ 509 in 2009. The main industries are agriculture (46% of GDP), manufacturing based primarily on food processing (7%) and mining (2%). Primary industry accounts for 43%, secondary industry for 18%, and tertiary industry for 39% (2006, World Bank).

2. Background of the Requested Project

In the National Strategic Poverty Reduction Plan (NSGRP), the Government of Tanzania is striving to promote economic growth and mitigate poverty under the banner of 'Growth and reduction of income poverty.' It has placed emphasis on infrastructure development, especially development of the road sector, which is indispensible for economic growth, and is striving to connect the country's major cities and improve access to markets under the National Transport Policy (NTC) that has been compiled as the policy for the road sector. In 2007, the Government of Tanzania formulated the Transport Sector Investment Program (TSIP Phase II: 2007~2016), and based on this is advancing

comprehensive development plans covering trunk roads, local roads, airways and marine transport, etc.

Dar es Salaam, where the Project road is situated, plays a central role in the economy and physical distribution of Tanzania. As the city is the starting point for all transport systems, including the road, rail, air and maritime transport systems, it is truly a strategic point for transport in Tanzania.

Concerning road traffic in Dar es Salaam, in the last 10 years, the number of registered vehicles in the city has grown at an annual rate of 7% which is higher than the population growth rate. As a result, the traffic congestion along trunk roads has been worsening every year, thereby hampering economic activities. Furthermore, since population in Dar es Salaam has displayed a high growth rate of 4% in recent years, it is forecast that traffic congestion in the urban area will continue to deteriorate from now on.

Under the TSIP, improvement of trunk roads through widening to four-lane roads is being advanced, while the Bus Rapid Transit (hereafter referred to as the BRT) Program has been formulated with a view to encouraging people to use public transport rather than private vehicles. Works have been commenced on the Phase I sections of the BRT Program with a view to relieving traffic congestion in the Dar es Salaam urban area. Gerezani Road is regarded as a priority section within this urban trunk road development program.

Against such a background, the Government of Tanzania issued a request to the Government of Japan for implementation of the Urban Transport Policy and System Development Master Plan Study for the City of Dar es Salaam aimed at improving the transport network in the city.

In response, the Government of Japan consigned the Japan International Cooperation Agency (hereafter referred to as JICA) to implement this study from April 2007 to June 2008, and it formulated the Transport Master Plan (M/P) having 2030 as the target year. In the M/P, among priority projects that have been selected for implementation between 2008 and 2015, the widening of Gerezani Road, targeted under the Project for Improvement of Transport capacity in Dar es Salaam, will connect to the end point of the Kilwa Road Widening Project, which aims to widen the said road to a four-lane highway under Japan’s grant aid. Since the existing two-lane Gerezani Road is a major hindrance to smooth traffic between the city center and suburbs, it is regarded as a high priority project.

Taking the findings of the above development survey into consideration, the Government of Tanzania made a request for further survey implementation to the Government of Japan in June 2008. Responding to this, the Government of Japan consigned JICA to implement the first part of the

preparatory survey (hereafter referred to as the preliminary survey) in December 2009 with the aims of defining the road's significance, confirming the target components, implementing an initial environmental impact assessment, etc. based on the JICA environmental and social consideration guidelines, and so on. Through these efforts, the validity and urgency of the Project were confirmed.

Based on these findings, it was decided to implement this survey targeting Gerezani Road (a 1.3 km section of Gerezani Road and Bandari Road and reconstruction of Gerezani Bridge). In implementing the survey, the field survey was implemented over two phases: in the first field survey (OD-1, June 2010), the road widening plan based on preconditions in the outline design was identified, while the second field survey (OD-2, August 2010) was conducted on the selected widening plan.

As a result of these field surveys, upon checking congestion on the target section, usage of the existing road for commuting to work and school, etc. and progress in related plans, etc., the necessity and urgency of road improvement on the target section was confirmed and the basic specifications and plan for the Gerezani Road project were examined.

Table 1 Past Studies

Study	Year Implemented	Implementing Agency	Study Section	Outline of Study Results
Urban Transport Policy and System Development Master Plan for the City of Dar es Salaam	April 2007	JICA	Entire area of Dar es Salaam	Target year 2030, priority projects selection
Preparatory Survey of the Gerezani Road Widening Project in Tanzania	December 2009	JICA	Roads in Gerezani district	Target section approximately 1.7 km

3. Outline of Study Findings and Project Contents

JICA dispatched the Preparatory Survey Team to Tanzania to conduct the first field survey (OD-1) from June 5 to June 19, 2010, followed by the second field survey (OD-2) targeting the road widening plan identified in OD-1, from August 3 to September 3, 2010. The Team engaged in discussions with various government officials in Tanzania, conducted field surveys in the Project area, examined the present state of the target section, the state of development progress around the end point of the road and progress of the BRT and other related plans, and confirmed the level of necessity and urgency of upgrading on the requested section.

Based on the domestic work conducted after the return of the Team to Japan, it was decided to upgrade the road according to the contents shown Table 2, and the Team conducted local explanations and obtained basic agreement from the Government of Tanzania regarding the draft summary of the preparatory survey between January 31 and February 11, 2011.

Table 2 Outline of the Project

Planned item		Description/Specifications
Target Section		Approximately 1.3km (from Gerezani/Kamata Intersection to Bandari/Kilwa Intersection)
Width		Carriageways 7.5 m x 2; BRT central reservation 9.0 m; footpaths 2.0~3.0 m x 2
Road Paving Work	Wearing course	Asphalt concrete 5 cm
	Binder course	Asphalt concrete 5 cm
	Base course	Asphalt stabilized (DBM) 10 cm
	Sub-base course	Cement stabilized 20 cm
	Footpath	Asphalt concrete surface course 3 cm
	Bus bays, level crossing	Cement concrete paving 20 cm
Bridge	Gerezani Bridge	PC-T girders, 40 m long, pile foundations, existing railway overpass (bridge separated into width 11.0 m and 24.0 m)
Drainage work		Concrete U-shaped side drains : installed along the entire route Road crossing culvert : 5 locations (box culvert of 1.1 m x 1.1 m or other specifications) Slope drainage ditches : 37 locations
Auxiliary road structures		Curbstone work, Concrete retaining walls, Safety barriers, Traffic signals, Streetlights, Road signs, Road markings, Bus bays

4. Project Schedule and Estimated Project Cost

As a result of the above surveys, the length of time required to implement the Project is estimated to be five months for implementation design, six months for tender work and 23 months for the construction work, and the Tanzanian portion of the cost is estimated as approximately 245 million yen.

5. Project Assessment

(1) Relevance of the Project

Project implementation will contribute to improving convenience for impoverished inhabitants of the southern part of Dar es Salaam, as well as improving the trunk road network linking the south of Tanzania with the economic center. Accordingly, there is great significance in implementing the Project under the Government of Japan's Grant Aid scheme. Moreover, in order to ensure the long-term sustainability of such achievements, TANROADS is judged to have sufficient manpower and funding to conduct maintenance of the road after the implementation of the Project.

(2) Validity of project implementation

Implementation of the Project will improve the road conditions of the target section and also secure smooth and safe traffic flow, thereby benefiting the residents of Dar es Salaam and Southern Tanzania. The expected positive effects of the Project are briefly described next.

Quantitative effects

① Through widening the section between Kamata Intersection and Kilwa Intersection, average travel speed during the morning-noon and evening peaks (a total of nine hours: from 06:00 to 12:00 in the morning and from 18:00 to 19:00 in the evening) will be increased from 0.7 km/h (due to congestion) to around 40 km/h, thereby greatly shortening travel times.

② Traffic capacity will increase from the current some 825 vehicles/hr/lane to 1,740 vehicles/hr/lane.

Qualitative effects

① The shortening of travel times will reduce transportation costs.

② Increasing transport capacity on the road will improve the level of convenience of transport in Dar es Salaam.

③ Through securing regularity of passenger and goods distribution, access to the center of Dar es Salaam and port facilities will be improved, thereby contributing to the social and economic vitalization of Tanzania.

④ Construction of the Project road will make it possible to separate vehicles travelling at the standard speed from slower vehicles, thereby ensuring safe and smooth traffic flow.

⑤ Through stabilizing access from surrounding farm areas to markets, the stable transportation of goods will be secured, thereby leading to lower transportation costs and contributing to stable prices.

⑥ Through constructing a road linking Dar es Salaam to southern parts of Tanzania, the Project will contribute to economic development of the south and help rectify poverty differentials in that region.

Preparatory Survey Report on the Project for Improvement of Transport Capacity in Dar es Salaam in the United Republic of Tanzania

CONTENTS

Preface
Summary
Contents
Location Map
Map of the Target Road
Perspective
List of Figures & Tables
Abbreviations

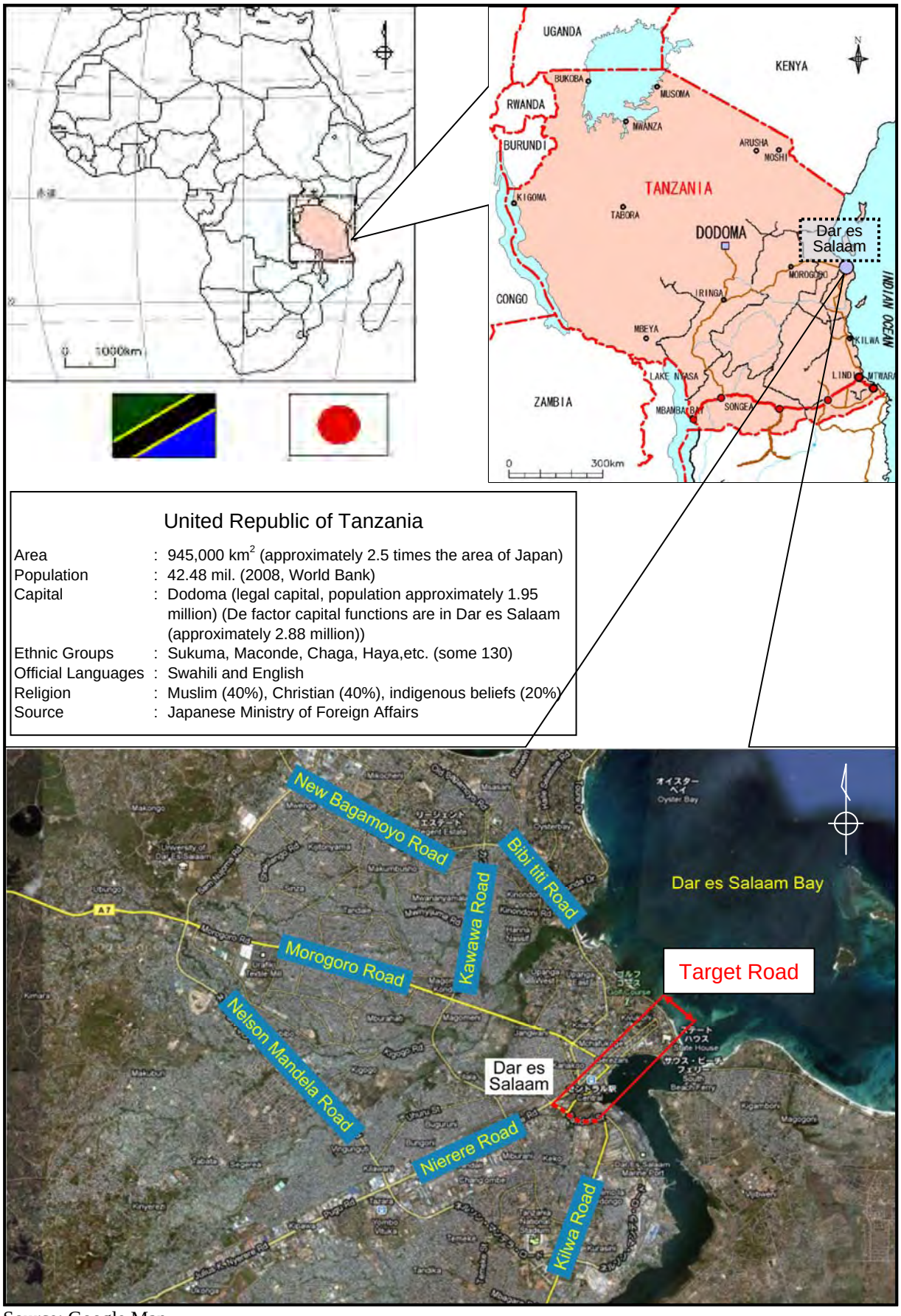
Chapter 1 Background of the Project 1-1
1-1 Background and Outline of the Request for Grant Aid 1-1
1-2 Natural Conditions 1-2
1-3 Social and Environmental Considerations 1-6

Chapter 2 Contents of the Project 2-1
2-1 Basic Concept of the Project 2-1
2-1-1 Superior Objectives and Project Targets 2-1
2-1-2 Outline of the Project 2-2
2-2 Outline Design of the Japanese Assistance 2-3
2-2-1 Design Policies 2-3
2-2-1-1 Basic Concept 2-3
2-2-1-2 Design Policies and Important Points 2-4
2-2-2 Basic Plan 2-21
2-2-2-1 Overall Plan 2-21
2-2-2-2 Facilities Plan 2-22
2-2-2-2-1 Road Plan 2-22
2-2-2-2-2 Bridge Plan (Gerezani Overpass) 2-28
2-2-2-2-3 Road Auxiliary Facilities Plan 2-31
2-2-3 Outline Design Drawings 2-33
2-2-4 Implementation Plan 2-34
2-2-4-1 Implementation Policy 2-34
2-2-4-2 Implementation Conditions 2-34
2-2-4-3 Scope of Works 2-35

2-2-4-4 Consultant Supervision 2-37
2-2-4-5 Quality Control Plan 2-38
2-2-4-6 Procurement Plan 2-40
2-2-4-7 Soft Component Plan 2-42
2-2-4-8 Implementation Schedule 2-42
2-3 Obligations of Recipient Country 2-43
2-3-1 General Items in the Government of Japan's Grant Aid Scheme 2-43
2-3-2 Specific Requirements for the Project 2-43
2-4 Project Operation and Maintenance Plan 2-45
2-5 Project Cost Estimation 2-46
2-5-1 Initial Cost Estimation 2-46
2-5-2 Operation and Maintenance Cost 2-47
2-6 Other Relevant Issues 2-47

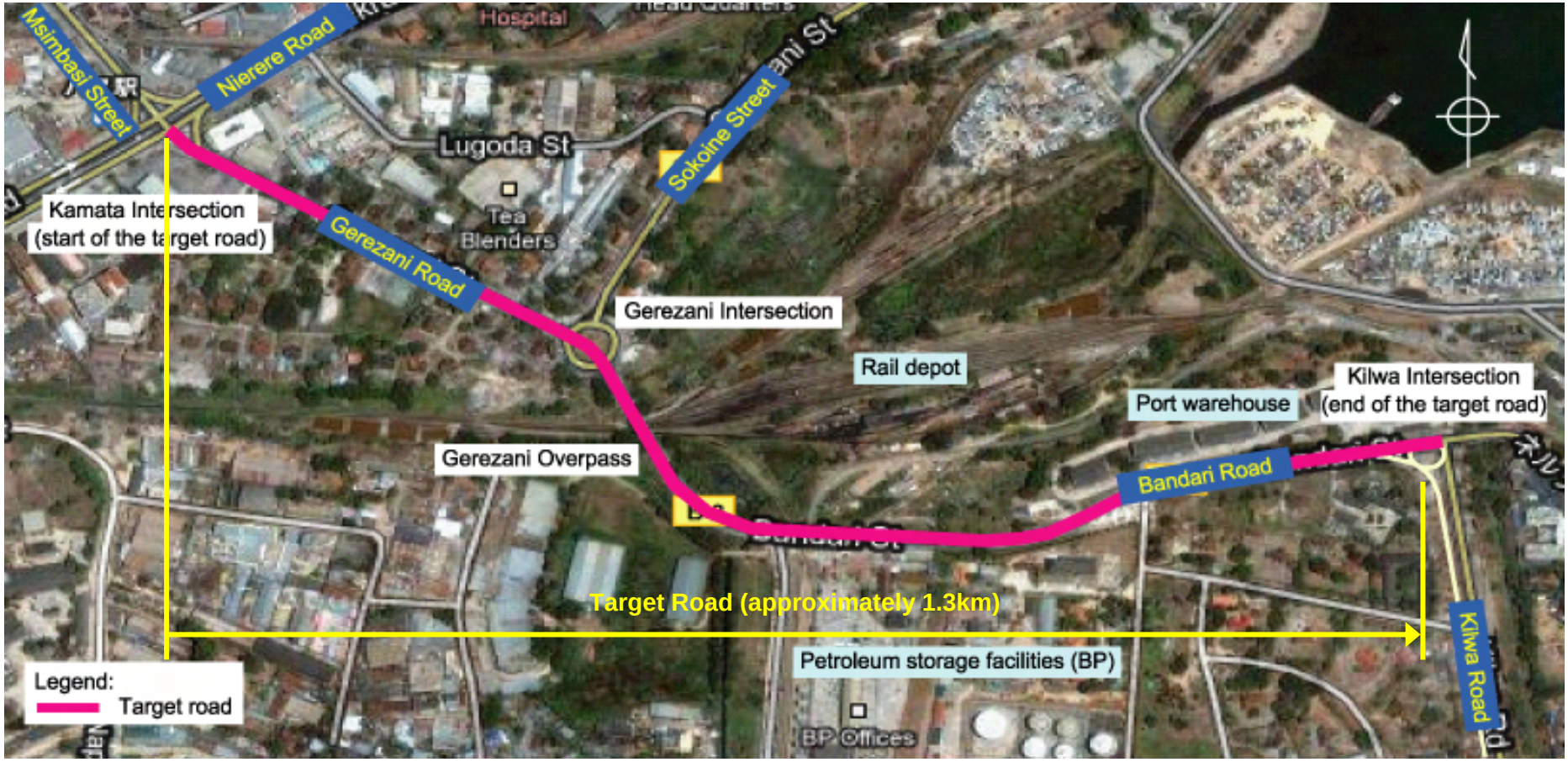
Chapter 3 Project Evaluation 3-1
3-1 Recommendations 3-1
3-1-1 Preconditions for Project Implementation 3-1
3-1-2 External Conditions for Attainment of the Overall Project Plan 3-2
3-2 Project Evaluation 3-3
3-2-1 Relevance 3-3
3-2-2 Effectiveness 3-3

Appendices
Appendix 1 Member List of the Study Team A-1
Appendix 2 Study Schedule A-2
Appendix 3 List of Parties Concerned in the Recipient Country A-5
Appendix 4 Minutes of Discussions (M/D) A-7
Appendix 5 Other Relevant Data
(Technical Note signed with the Government of Tanzania) A-31
Appendix 6 References (Outline Design Drawings) A-34



Source: Google Map

LOCATION MAP



Source: Google Map

MAP OF THE TARGET ROAD

PERSPECTIVE

LIST OF FIGURES & TABLES

(Figures)

Figure 1-1 Boring Position, Histogram 1-4

Figure 2-1 Important Points to Consider in Upgrading of the Target Section to a Four-Lane Road 2-5
Figure 2-2 Outline of Horizontal Alignment in the Optimum Route Plan 2-8
Figure 2-3 Plan for Transfer of Power Lines Presented by the Survey Team to the Tanzanian Side 2-11
Figure 2-4 Outline of Existing Drainage Facilities 2-13
Figure 2-5 Road Standard Cross-Sections 2-24
Figure 2-6 Project Paving Structure 2-26
Figure 2-7 Outline of Bridge Plan 2-29
Figure 2-8 General View of Bridge 2-30
Figure 2-9 Bridge Standard Cross-Section 2-30

(Tables)

Table 1-1 Past Studies 1-2
Table 1-2 Outline of Topographical Survey 1-3
Table 1-3 Reference Point Coordinates 1-3
Table 1-4 Outline of Boring Survey 1-4
Table 1-5 Outline of Soil and Materials Survey 1-5
Table 1-6 Outline of Traffic Volume Survey 1-5
Table 1-7 Outline of Existing Underground Objects 1-6
Table 1-8 Expected EIA Schedule 1-7
Table 1-9 Currently Envisaged Land Acquisition Schedule 1-8
Table 1-10 Scoping Results 1-9
Table 1-11 Facilities and Buildings inside the ROW 1-11
Table 1-12 Environmental Checklist 1-15
Table 1-13 Monitoring Form 1-19

Table 2-1 Decision of the Optimum Route Plan by the Tanzanian Side 2-6
Table 2-2 Outline of Vertical Alignment 2-9
Table 2-3 Existing Drainage Facilities 2-14
Table 2-4 TANROADS Budget and Actual Spending 2-18
Table 2-5 Outline of the Project 2-21
Table 2-6 Outline of the Road Plan 2-22

Table 2-7 Outline of the Bridge Plan 2-28
Table 2-8 Upgrading of Transversal Drainage Structures 2-31
Table 2-9 Outline of Side Ditches 2-32
Table 2-10 List of Outline Design Drawings 2-33
Table 2-11 List of Quality Control Items 2-39
Table 2-12 Procurement of Primary Materials 2-40
Table 2-13 Main Works Machinery Procurement Sources 2-41
Table 2-14 Work Implementation Schedule (Draft) 2-43
Table 2-15 Outline of the Scope of Works on the Tanzanian Side 2-44
Table 2-16 Registration Costs for Construction Operators 2-45
Table 2-17 Main Maintenance Items and Costs 2-47

Table 3-1 Quantitative Effects 3-3

ABBREVIATIONS

AASHTO	American Standard of State Highway and Transportation Officials
AfDB	African Development Bank
BS	British Standard
CBR	California Bearing Ration
CRB	Contractor Registration Board
DANIDA	Danish International Development Assistance
DBST	Double Bituminous Surface Treatment
DCP	Dynamic Cone Penetration
EIA	Environmental Impact Assessment
EU	European Union
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
MoID	Ministry of Infrastructure Development
MoW	Ministry of Works
NEMC	National Environmental Management Council
NSGRP	National Strategy for Growth and Reduction of Poverty
PC	Prestressed Concrete
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 OF THE PROJECT

CHAPTER 1
BACKGROUND OF THE PROJECT

1-1 Background and Outline of the Request for Grant Aid

Dar es Salaam is the largest city in Tanzania and plays a central role in the country's economy and physical distribution. As the city is the starting point for all transport systems, including the road, rail, air and maritime transport systems, it is truly the strategic point for transport in Tanzania.

Meanwhile, in the last 10 years, the number of registered vehicles in the city has grown at an annual rate of 7% which is higher than the population growth rate. As a result, the traffic congestion along trunk roads has been worsening every year, hampering economic activities in the city. In addition, since population growth in Dar es Salaam is advancing at a rapid rate, it is forecast that traffic congestion in the urban area will continue to deteriorate.

Against such a background, the Government of Tanzania issued a request to the Government of Japan for implementation of the Urban Transport Policy and System Development Master Plan Study for the City of Dar es Salaam aimed at improving the transport network in the city. In response, the Government of Japan consigned JICA to implement the study from April 2007 to June 2008, and it formulated the Transport Master Plan (M/P) having 2030 as the target year. In the M/P, among priority projects that have been selected for implementation between 2008 and 2015, the widening of Gerezani Road, targeted under the Project for Improvement of Transport capacity in Dar es Salaam, will connect to the end point of the Kilwa Road Widening Project, which aims to widen the said road to a four-lane highway under Japan's grant aid. Since the existing two-lane Gerezani Road is a major hindrance to smooth traffic between the city center and suburbs, it is regarded as a high priority project. This survey was requested by the Government of Tanzania to the Government of Japan in June 2008 based on the findings of the initial survey.

Responding to this, the Government of Japan consigned JICA to implement the first part of the preparatory survey (hereafter referred to as the preliminary survey) in December 2009 with the aims of defining the road's significance, confirming the target components, implementing an initial environmental impact assessment, etc. based on the JICA environmental and social consideration guidelines, and so on. Through these efforts, the validity and urgency of the Project were confirmed.

Based on these findings, it was decided to implement this survey targeting Gerezani Road (a section of 1.3 km on Gerezani Road and Bandari Road and reconstruction of Gerezani Bridge). In implementing the survey, the field survey was implemented over two phases: in the first field survey (OD-1, June

2010), the road widening plan based on preconditions in the outline design was identified, while the second field survey (OD-2, August 2010) was conducted on the selected widening plan.

As a result of these field surveys, upon checking congestion on the target section, usage of the existing road for commuting to work and school, etc. and progress in related plans such as the BRT Programme, etc., the necessity and urgency of road improvement on the target section was confirmed, and the basic specifications and project plan were examined.

Table 1-1 Past Studies

Study	Year Implemented	Implementing Agency	Study Section	Outline of Study Results
Urban Transport Policy and System Development Master Plan for the City of Dar es Salaam	April 2007	JICA	Entire area of Dar es Salaam	Target year 2030, priority projects selection
Preparatory Survey of the Gerezani Road Widening Project in Tanzania	December 2009	JICA	Roads in Gerezani district	Target section approximately 1.7 km

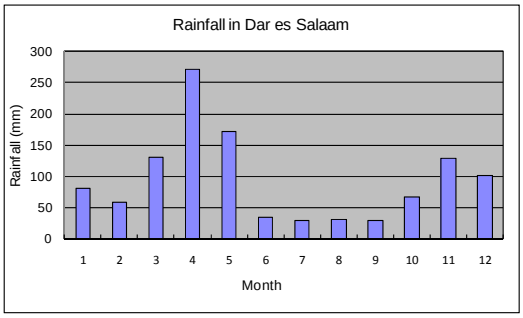
1-2 Natural Conditions

(1) Natural conditions around the target area

1) Terrain

The target road is situated on coastal hills at an altitude of around 10 m, and the section of 400 m to Gerezani Overpass adjoining Gerezani Intersection is located on a flat coastal terrace. The Kilwa Intersection side of Gerezani Overpass forms a bank of roughly 7 m in height on low-lying land. After crossing over Gerezani Overpass, the road descends at a gradient of approximately 5% and links to approximately 200 m of lowland. This lowland section includes a crossing over a rail bay-line leading to a petroleum storage facility (BP) and the BP offices. The land adjoining the rail bay-line is a valley bottom, where rainwater gathers from the surrounding high points, and this water is discharged via concrete drainage pipe that passes under the rail bay-line and drains into the sea via the downstream marsh area. The ground is soft in the marshy parts beside the road. The road moves uphill at a gradient of approximately 5% from the lowland to Kilwa Intersection, and the section from the 950 m point (in front of the port warehouses) to Kilwa Intersection at the 1.3 km point runs along the flat coastal terrace. Ground around the existing road comprises either sand or sandy soil. The banking of roughly 7 m before and after Gerezani Overpass has a slope gradient of 1:1.0~1:1.5, is covered with grass and trees and shows no signs of past collapse or repair. Similarly, the cutting beside the BP facility has a slope gradient of between 1:08~1:1.0 and is in a stable condition. Accordingly, when planning the target road, these characteristics in the local area shall be fully taken into consideration.

2) Meteorological conditions



The target area has only minor temperature fluctuations throughout the year. There are two rainy seasons: a major rainy season from March to May and a minor rainy season from November to December. The major rainy season witnesses a lot of rain squalls that are commonly seen in tropical countries. These conditions shall be fully reflected when formulating the drainage facilities plan and works implementation plan.

Concerning the low-lying marshy land over approximately 200 m of the target route after Gerezani Bridge, since rainwater tends to gather in this area, ample consideration shall be given to drainage facilities. In particular, since water has been known to accumulate to a depth of around 40 cm in front of BP and inundate the road to a depth of around 10 cm, examination was conducted with a view to improving this situation.

(2) Implementation of natural conditions survey

During the field survey period, a natural conditions survey was implemented on the terrain, geology, traffic volume and underground structures along the target route.

1) Topographical surveying

Topographical surveying was conducted along the target section (approximately 1.3 km), the intersections at Kamata, Gerezani and Kilwa and the area around the existing railway overpass.

Table 1-2 Outline of Topographical Survey

Work Item	Quantity	Remarks
(1) Reference point setting and surveying	6 points	Install at approximately every 0.5 km and at main intersections.
(2) Centre line surveying	2.5km	Target road section (1.3 km) and each intersection
(3) Road cross-sectional surveying	50 cross sections	50 m intervals
(4) Topographical surveying	11.3 ha	Section of 1.3 km and connecting roads, ROW 45 m

Table 1-3 Reference Point Coordinates

Reference point	X (m)	Y (m)	H (m)
JPN1	9245656.978	530493.130	13.036
JPN2	9245584.853	530386.881	13.607
JPN3	9245191.806	530953.141	3.681
JPN4	9245202.591	531059.474	6.540
JPN5	9245255.835	531534.818	13.616
JPN6	9245046.615	531571.632	14.977

2) Geological survey

a) Boring survey

At the expected bridge position on the optimum route, boring survey was implemented at two points in order to confirm the supporting layer around the abutment on the start point side and the abutment on the end point side.

Table 1-4 Outline of Boring Survey

Work Item	Quantity	Remarks
(1) Boring survey	2 locations	Area around existing railway overpass (1 location each in the start point and end point directions)
(2) Boring survey	2 locations	Standard penetration test (every 1 m), sampling (2 samples per bore hole), AASHTO standard, 19 m from the surface on the start point side, 18 m from the surface on the end point side, confirmation of a sand layer with N value of 30 or higher

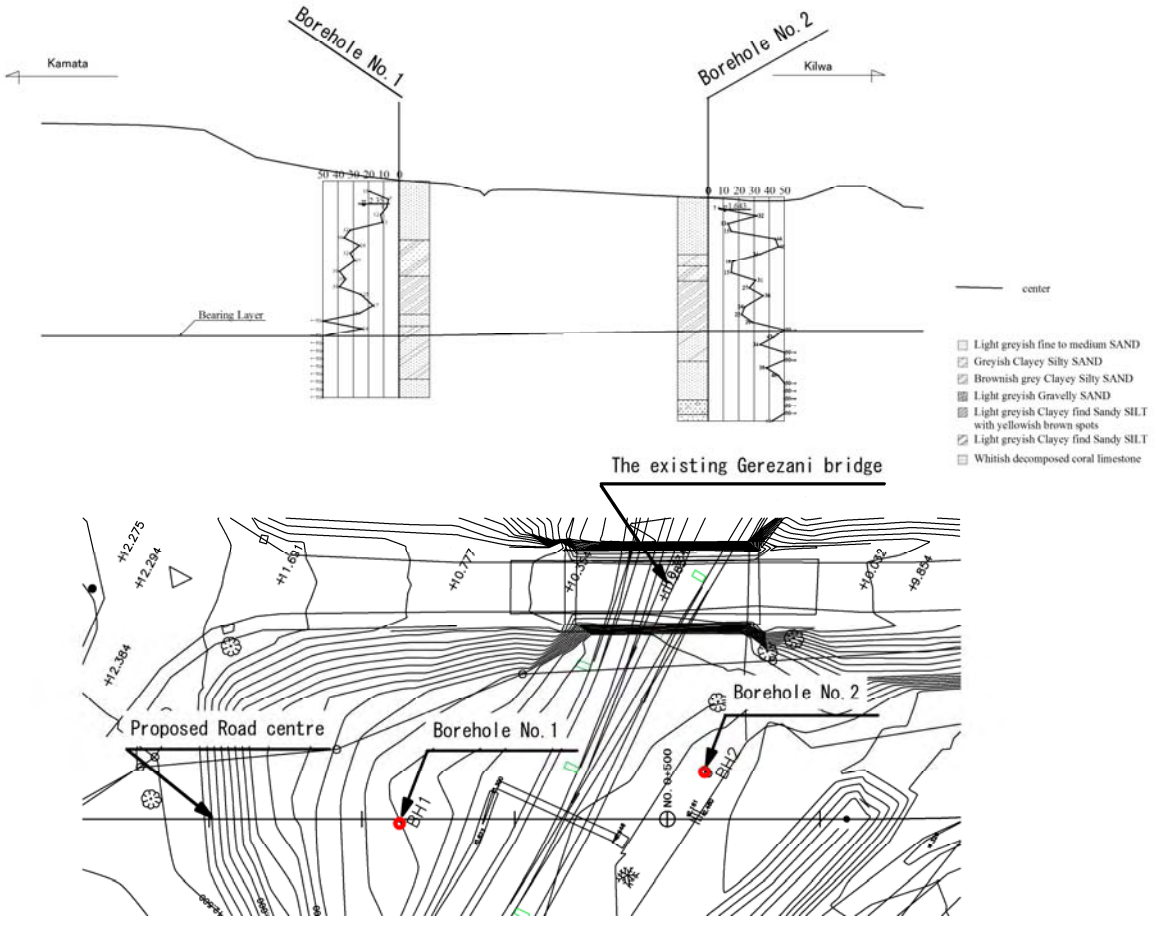


Figure 1-1 Boring Position, Histogram

b) Geological materials survey

The existing road shoulder was excavated in order to confirm the thickness and state of existing paving, and laboratory sampling and dynamic penetration test (DCP) were conducted. Moreover, in order to determine the procurable materials and confirm the transportation distance, materials tests were conducted on banking materials from the candidate quarry and rocks from the candidate rock quarry.

Table 1-5 Outline of Soil and Materials Survey

Work Item	Quantity	Remarks
(1) In-situ materials sampling	5 locations	2 rock locations, 1 sand location, 2 soil quarries
(2) Indoor test	2 ground rock samples	Rock samples: particle size, specific gravity, water absorption rate, abrasion, stability, flatness, alkali-silica reaction
	1 sand sample	Sand sample: particle size, specific gravity, water absorption rate, organic content, sand equivalence, stability, alkali-silica reaction
	2 soil quarry samples	Soil quarry samples: particle size, specific gravity, natural water content, Atterberg limit, compaction, CBR
(3) Current paving structure survey		
Trial pit survey:	4 locations	Every 400 m
Indoor tests:	6 samples	Atterberg test, particle size test, specific gravity and water absorption test, compaction test
DCP test:	12 locations	Every 100m

3) Traffic volume survey

Survey of traffic volume on the target road was implemented on August 18 (Wednesday) while paying attention to the following points. The survey date was set upon checking with the Tanzanian side in order to avoid dates of holidays or events that may impact traffic volume.

Table 1-6 Outline of Traffic Volume Survey

Survey Item	Survey Locations	Survey Contents
Traffic volume survey	3 main intersections	24 hours, each direction, by vehicle type (including pedestrians and carts, ① Kamata Intersection, ② Gerezani Intersection, ③ Kilwa Intersection)

4) Underground objects survey

Existing underground objects were first investigated in prior interviews with related agencies, and the actual confirmation was implemented on August 24 (Tuesday).

Table 1-7 Outline of Existing Underground Objects

Work Item	Quantity	Remarks
Survey of underground objects	5 locations	Hearings at related agencies, and confirmation by visual inspection, locater and trial excavation

1-3 Social and Environmental Considerations

Based on the findings of the field surveys, it was deemed that the road will need to be wide enough to contain commercial facilities, small shops and some houses, etc. Moreover, since all these facilities are inhabited by entitled residents, they will be eligible for compensation in the event of relocation. Concerning environmental and social consideration on the target section, Tanzanian law requires that EIA (environmental impact assessment) approval be obtained and that consent be secured from residents on assessment documents for resident relocation and land expropriation, etc. Since numerous grant aid projects have already been implemented in Tanzania, the Tanzanian side is well aware of the importance of EIA.

(1) Procedure for Environmental Impact Assessment (EIA)

When implementing road construction projects in Tanzania, it is necessary to implement EIA (Environmental Impact Assessment) according to the Environmental Management Act of 2004 and the Environmental Impact Assessment and Audit Regulations of 2005. It is necessary for TANROADS, the implementing body, to implement EIA and submit a report to the National Environment Management Council (NEMC) so that it can undergo review and receive a certificate.

EIA in Tanzania comprises project assessment conducted before project implementation, i.e. it is not assessment of plans conducted in the planning stage. Moreover, in cases where it is necessary to move residents and acquire land, negotiations are conducted with project affected persons (PAPs) in relation to land acquisition while assessment of land and property is carried out simultaneously with the EIA procedure. In the Project, the Japanese side presented the proposed road alignment to the Tanzanian side at the end of September 2010, and the EIA procedure was commenced after the TANROADS side gave its approval. Unless the NEMC instructs the EIA report to be submitted again, it is scheduled for the certificate to be issued around July 2011.

Table 1-8 Expected EIA Schedule

Year	2010							2011						
Month	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
JICA preparatory survey (2)	Field survey I ■		Field survey II ■	Decision of road alignment ▲					Outline explanation ■▲	Final report submission △				
EIA procedure														
Consultant selection /Project registration / Screening				■										
Scoping and preparation, submission and approval of the EIA instruction sheet					■									
EIA implementation, staging of public hearing										■▲	■▲			
Submission of EIA report, review of EIA report											Submission ▲	■	■	
Issue of environmental certificate														▲

(2) Procedures for Land Acquisition and Resident Relocation

The Land Act (2004) provides the legal basis for land acquisition and ensuing relocation of residents in Tanzania. All land in Tanzania is public property for which the president holds authority as the representative trustee of the people, and use rights are granted to ordinary citizens. In cases where land expropriation, resident relocation and relocation of buildings become necessary in line with the implementation of public projects, the legal landowners are entitled to appropriate compensation. Moreover, in the target area, surveying has been implemented and the holders of occupancy rights have been legally recognized, so the affected residents do not include any unlawful occupants. Compensation usually consists of monetary compensation based on a valuation report prepared by the valuer assigned to each municipality. The compensation includes the value of real estate as well as relocation expenses based on market prices as defined in the 'Replacement cost' indicated in the World Bank Operational Policies 4.12 and, as livelihood assistance, living expenses at the relocation destination for a set period or compensation for 36 months of revenue in the case of businesses. Moreover, an appeal procedure is guaranteed under the law if residents are unhappy with the compensation they receive. Illegal occupants are not eligible for compensation under Tanzanian law, however, donor policies are applied to compensation and support for involuntary relocations arising out of donor

assisted projects. For example, in the bus rapid transit project implemented by the World Bank, assistance for relocation expenses and maintenance of income is provided as supplementary compensation for illegal occupants. Also, the Ministry of Infrastructure Development compiled the Road Sector Compensation and Resettlement Guidelines within the World Bank's road construction project in 2009.

It takes roughly three months in order to prepare a land and property evaluation report. In the Project, after consent has been obtained from the PAPs, the implementing body TANROADS will be responsible for paying compensation. Concerning the demolition of old houses and other compensated properties, the compensated persons and municipal offices will take responsibility. In the case where negotiations and compensation procedures with the PAPs go smoothly, the compensation money is scheduled to be paid out from September 2011. The PAPs will themselves choose their resettlement destinations. Since the PAPs will be provided appropriate compensation and the housing and real estate market in the city is not pressing, it is unlikely to be a problem securing new destinations. There are no clear stipulations concerning the period from receipt of compensation to removal from premises, however, in past cases this has generally been between one and two months excluding Ramadan.

Table 1-9 Currently Envisaged Land Acquisition Schedule

Year	2010			2011									
Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct onwards
ROW surveying and confirmation of affected buildings	■	■											
Hearing survey of land users around the road		■											
Discussions with municipality representatives			▲ Cut-off date										
Field reconnaissance with land users targeted for acquisition			■										
Basic agreement with land users targeted for acquisition				▲									
Preparation of land and property assessment report					■	■	■						
Approval of the report by municipality government and representatives										■			
Discussion about the report with land users targeted for acquisition											■		
Preparation of payment schedule, payment of compensation and /or review of assessed amounts												■	■ →Ongoing

(3) Scoping Results and Categories

Based on the results of the environmental scoping conducted in the Preparatory Survey for the Gerezani Road Widening Project (1) that was implemented November ~ December 2009, reassessment of the environmental scoping and categorization was carried out when the road alignment and standard cross section were decided. The results of scoping are shown in Table 1-10. The ROW is widened from 36 m to 45 m, however, as a result of designing the road alignment so that the facilities and buildings affected by the land acquisition are basically on a single side of the road, the number of facilities and buildings affected (22) is the same as in the previous survey. Therefore, it is deemed that the actually occurring environmental impacts will be no larger than assessed in the previous survey, and the appropriate environmental category rating is deemed to be 'B,' which is also the same as in the previous survey.

Table 1-10 Scoping Results

Impact Item			Rating	Basis and Reasons for Impact
Social Environment	1	Involuntary relocation of inhabitants	B	Since the planned ROW is occupied by residences, shops and offices, etc. involuntary relocation of inhabitants and buildings will arise.
	2	Local economy: employment and means of livelihood, etc.	B	1) Since land will need to be acquired to secure the ROW, this will affect employment and means of livelihood. 2) Positive impacts such as temporary employment creation due to works and vitalization of the local economy due to reduced congestion will arise.
	3	Land use and local resources use	B	1) Since land will need to be acquired to secure the ROW, this will affect land use. 2) Movement of vehicles will speed up due to mitigation of local traffic congestion, and this will lead to changes in land use and use of local resources, thereby vitalizing the local economy.
	4	Social infrastructure and social organizations such as local decision making bodies, etc.	B	1) There is no major downsizing or division of communities. 2) Due to road widening and reduced congestion, it will be more difficult to cross the road. 3) Due to reduced congestion, transportation and other lifelines at times of emergency will be improved, thereby imparting a positive impact on social infrastructure.
	5	Existing social infrastructure and social services	B	1) Social infrastructure will be affected because it will be necessary to transfer water pipes, communication lines and distribution lines. 2) Impacts on sidewalks and roadside trees will arise. 3) Since manually powered traffic uses the motor road, there will be no impact. 4) At the time of works, it is possible that traffic on the current road as well as railway traffic will be affected. 5) Transport infrastructure will be improved due to road widening.
	6	People in poverty, indigenous population, minorities	C	There are no people in poverty, indigenous population or minorities around the Project road.
	7	Deviations in damage and convenience	B	Deviation will arise between impacts close to the road such as land appropriation and involuntary resettlement and the benefits for the whole city imparted by mitigation of congestion.
	8	Cultural assets	C	There are no cultural assets including mosques or churches near the Project road.
	9	Local conflicts of interest	C	There are no conflicts of interest around the Project road.
	10	Water usage, water use rights, rights of common	C	There are no water uses, water rights or rights of common around the Project road.

Impact Item			Rating	Basis and Reasons for Impact
	11	Public hygiene	B	It is possible impacts will arise due to the influx and activities of works personnel.
	12	Disasters and infections (HIV)	B	It is possible impacts will arise due to the influx and activities of works personnel.
Natural environment	13	Terrain and geology	C	There will be some earth banking, however, the impact will be minimal.
	14	Soil erosion	C	Water runoff will increase due to more extensive paved area, however, there is little possibility of serious soil erosion arising.
	15	Groundwater	C	Since the works will entail only a little excavation affecting the local topography, the impact on groundwater will be minimal.
	16	Lakes, marshes and rivers	C	The construction works will temporarily cause muddy water to arise, however, there will be no serious impacts on adjacent marshland and downstream lagoons.
	17	Coast and ocean	C	Since the works will take place near the coast and will not include any large-scale reclamation, there will be no impact.
	18	Flora and fauna and bio diversity	B	Impacts on the ecosystem will be minimal. There are no rare floras or fauna. However, trees will need to be cut in order to secure the ROW.
	19	Weather conditions	C	The impact will be minimal.
	20	Global warming	C	Although the overall volume of traffic in Dar es Salaam will remain the same, there will be less idling and less exhaust gas emissions caused by traffic congestion. Thus, there will be less generation of CO_2, which is a cause of global warming.
Pollution	21	Air pollution	B	1) For the same reasons as stated above, exhaust gases from vehicles will be reduced, thereby having a positive impact. 2) Generation of dust and congestion caused by traffic controls during works will have a temporary negative impact on air quality.
	22	Water pollution	B	Generation of muddy water during works will negatively impact water quality. However, there are no facilities that utilize surface water in the local area.
	23	Soil pollution	C	The local area is reported to have no soil pollution. If it does exist, its movement will have an impact. The works will cause hardly any pollution.
	24	Solid waste	B	1) Scrap will arise from the removal of existing structures. 2) Construction waste such as excess soil, etc. will arise in line with the works.
	25	Noise and vibration	B	1) It is forecast that traffic volume will increase around the Project road, and reduced congestion will lead to faster travel speeds. 2) Increased works traffic and construction machinery will generate noise and vibration.
	26	Ground subsidence	C	Banking works will arise in the road widening while foundation works will be needed for the bridge abutments, however, since the ground is firm, there will be no subsidence.
	27	Odor	C/B	The impact will be minimal. Odor may arise in 1) the asphalt plant and 2) when spreading emulsion on asphalt paving.
	28	Sediments	C	The impact will be minimal.
Other	29	Accidents	B	It is possible that accidents will increase due to the passage of works vehicles.
Overall evaluation			B	

Judgment classifications: A: Expected impact is grave; B: Some impact is expected but not as great as A; and C: Impact will be minimal.

(4) Major Environmental Impacts and Mitigation Measures

1) Land acquisition and relocation of residents

Roughly 24,000 m^2 of land will need to be acquired in order to widen the road. The target road is located in an urban area densely populated by commercial facilities, houses and government facilities, and it will be necessary to demolish existing facilities and buildings

and relocate residents in order to acquire the necessary land. When compiling the road widening plan, road alignment was selected in such a way to minimize the impacts of land acquisition upon discussing the matter with TANROADS. There are 22 facilities and buildings located inside the selected ROW and they are all owned by legal land users.

The standard ROW width is 45 m, which includes 1.5~2.0 m on both sides for transferring utilities. Ultimately, 21 facilities and buildings will be affected, while 15 will require total demolition. These 15 facilities and buildings consist of four privately owned houses, one office building, three company houses, two commercial tenants, two stores, one machine and used car dealer, one light meal restaurant, and one leased office. Non-voluntary relocation will target three households and 17 residents. However, since the owners of houses located inside the utilities area are owners of shops and restaurants that will require demolition, in the event where they seek relocation because they lose their means of livelihood, the non-voluntary relocation will target four households and 27 residents.

Table 1-11 Facilities and Buildings inside the ROW

Name of facility / building		Contents of facility / building	Number of residents	Expected degree of impacts
Gerezani Road				
1	Afri Scan Group Ltd. Building 1	Rental office building used by 17 companies	0	Partial acquisition of land (approximately 2,000 m^2) for the parking area is needed.
2	Afri Scan Group Ltd. Building 2	Rental office building used by 10 companies	0	Demolition of the entire building (steel frame, 3-story) is necessary.
3	Mama Mwinyi Takeaway (shop)	5 shops in terrace style, of which 4 are currently operating	0	Demolition of the entire building (brick, single story) is necessary.
4	Mama Mwinyi Takeaway (restaurant)	An open air takeaway restaurant	0	Partial acquisition of land (approximately 100 m^2) for the restaurant space is needed.
5	Mama Mwinyi Takeaway (housing block)	Privately owned house occupied since 1998	10	Since this is located in the utilities area, relocation can be avoided through adjusting the ROW.
6	Tanzania Farmers Service Centre Ltd. sale area	A simple building structure used for display and sale of farm machinery	0	Partial acquisition of land (approximately 20 m^2) for the sales area is needed.
7	Private home sold by the railway company (1)	Resided in by a family since 1999	5	In line with demolition of housing (wood structure, single story), relocation is necessary.
8	Private home sold by the railway company (2)	Resided in by a family since 2000	6	In line with demolition of housing (wood structure, single story), relocation is necessary.

Name of facility / building		Contents of facility / building	Number of residents	Expected degree of impacts
9	Private home sold by the railway company (3) (T RAMADA Trading Ltd.)	A farm and construction machinery sales office that is not currently occupied	0	Demolition of the entire building (wood structure, single story) is necessary.
10	Private home sold by the railway company (4)	Empty building	0	Demolition of the entire building (wood structure, single story) is necessary.
11	Private home sold by the railway company (5)	Empty building	0	Demolition of the entire building (wood structure, single story) is necessary.
12	KEBBY Fast Food	An open air restaurant, currently closed	0	Demolition of the entire building (wood structure, single story) is necessary.
13	Railway company housing (1)	Currently occupied by the family of a railway policeman	6	In line with demolition of housing (wood structure, single story), relocation is necessary.
14	Railway company housing (2)	A rest area used by employees on night shift, etc.	0	Demolition of the entire building (wood structure, single story) is necessary.
15	Railway company housing (3)	A rest area used by employees on night shift, etc.	0	Demolition of the entire building (wood structure, single story) is necessary.
Gerezani Roundabout				
16	Keep Left Bar & Restaurant	An open air takeaway restaurant	0	Partial acquisition of land (approximately 150 m^2) for the restaurant space is needed.
17	Karogho Business Centre	This rental building is owned by the same person who owns the adjacent Keep Left Bar & Restaurant, but it isn't currently occupied.	0	Demolition of the entire building (brick, single story) is necessary.
18	Shop	This small clothes shop next to the Karogho Business Centre is not currently occupied.	0	Demolition of the entire building (wood structure, single story) is necessary.
Bandari Road				
19	Vinyago Cultural Centre	This wood-carved handicraft shop is a simple building.	0	Demolition of the entire building (wood structure, single story) is necessary.
20	Rental offices owned by the Port Agency	This is currently used by a private corporation but has no occupants.	0	Demolition of the entire building (brick, single story) is necessary.
21	Port Agency warehouses	5 warehouses owned by the Port Agency, these are currently used by the railway company.	0	Removal of the fence (approximately 340 m) is necessary.
22	Display and parking area of a used car retail store	A display and parking area of a used car retail store, it is enclosed by a fence.	0	Partial acquisition of land (approximately 250 m^2) for the parking area is needed.

2) Impact on street vendors

During the day, street vendors utilize idle spaces alongside Gerezani Road and around Gerezani Roundabout in order to sell food and drinks, fruits and daily necessities and conduct repairs for punctured tires, etc. As a rule, it is illegal to conduct such commercial activities within the ROW, however, the authorities turn a blind eye because the vendors don't impede the flow of traffic. In order to secure the safety of street vendors during the construction period, it will be necessary to temporarily relocate them to other areas or suspend their activities. In previous road construction projects in Dar es Salaam, since data on sales prices, etc. to provide the basis for assessing the compensation amount was not recorded and stakeholders made no official requests, no compensation was provided for the business of street vendors. It will be necessary for the Project personnel to explain the works to the vendors in advance with a view to securing safety and minimizing the impact of the works.

3) Cutting of trees

In order to secure the ROW and enable construction works, it will be necessary to cut down trees alongside the road and within the premises of buildings and facilities that need to be demolished. There are 128 trees (with trunk diameter of at least 10 cm and height of at least 5 m) inside the ROW, and these are mostly roadside trees or horticultural species that have been artificially planted. Specifically, they consist of 65 Ashoka trees, 21 margosa trees, 17 coco trees, seven mango trees, seven Flacourtia indica trees, three papaya trees, three eucalyptus trees, one baobab (ordinary variety) and four others. There is no particular need to obtain permission from the forest department concerning the cutting of these trees including the naturally growing baobab. Concerning the trees located inside the utilities area, cutting can be averted by adjusting the ROW. In particular, since the large margosa (Neem: *Azadirachta indica*) trees along Gerezani Road and around Gerezani Roundabout enhance the landscape and provide shade for pedestrians, the utmost consideration should be taken to preserve them. Moreover, concerning the central reserve and utilities area that will be used for the bus lanes in future, it will be necessary to conduct greening with appropriate tree species upon consulting with TANROADS in order to improve landscape and prevent illegal passage.

4) Noise

As a result of conducting noise measurements along Gerezani Road (in front of City Garden Club), noise was found to be 71 dB during the daytime (maximum 74 dB between AM 6:00~7:00, and minimum 68 dB between AM11:00~12:00), which surpasses the prescribed noise standard (70 dB) in Tanzanian and Japan. Concerning the noise level following

completion of the road widening works, forecasting was carried out using the basic calculation method in the road traffic noise forecasting model of the Acoustical Society of Japan (AJS RTN Model 2003). Moreover, since the disparity between the forecast results using this model and the above measurements was +0.9 dB, it is judged that forecast based on this model is valid in the Project. Assuming that the future traffic volume will be 47,000 vehicles/day with a large-size vehicle ratio of 23%, the noise generated by the increased traffic volume will increase by approximately 3 dB; however, since the increased distance from the center of the road to the edges will cause the roadside noise level to fall by approximately 4 dB, it is forecast that the daytime noise level will be at the environmental control level of 70 dB.

5) Environmental checklist

Table 1-12 shows a checklist including environmental impacts other than those described above.

Table 1-12 Environmental Checklist

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations
1 Permits and Explanation	(1) EIA and Environmental Permits	① Have EIA reports been officially completed? ② Have EIA reports been approved by authorities of the host country's government? ③ Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? ④ In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	① The EIA report is preparing and will be submitted to National Environment Management Council (environmental management authority) by January, 2011. ②③ If the amendment of the EIA report is not required, the report will be approved by April, 2011. ④ The other permissions related to environmental management are not required. Existing borrow pit and quarry site will be used. Relocation of existing power line will be conducted by electric company directly.
	(2) Explanation to the Public	① Are contents of the project and the potential impacts adequately explained to the public based on appropriate procedures, including information disclosure? Is understanding obtained from the public? ② Are proper responses made to comments from the public and regulatory authorities?	① The public consultation was conducted at the preparatory study (I) in November 2009. The general agreement of the local people have been obtained at the consultation. Under the EIA report review, the report will be opened to the public in conformity to the regulation. ② The interview survey to the local people and stakeholder meeting with the other relevant organizations was conducted at the preparatory study (II) in June 2010. The results were reflected in the mitigation measures.
2 Mitigation Measures	(1) Air Quality	① Is there a possibility that air pollutants emitted from various sources, such as vehicle traffic will affect ambient air quality? Does ambient air quality comply with the country's ambient air quality standards? ② Where industrial areas already exist near the route, is there a possibility that the project will make air pollution worse?	① Because the Project site is located in urban area, there is a lot of traffic. However, as a result of Project implementation, congestion will be mitigated, meaning emission of less air pollutants compared to the case of no Project implementation. ② It is possible that a temporary air pollution impact will be caused due to occurrence of dust and particulate in the works and creation of congestion due to the traffic controls.
	(2) Water Quality	① Is there a possibility that soil runoff from the bare lands resulting from earthmoving activities, such as cutting and filling will cause water quality degradation in downstream water areas? ② Is there a possibility that surface runoff from roads will contaminate water sources, such as groundwater? ③ Do effluents from various facilities, such as stations and parking areas/service areas comply with the country's effluent standards and ambient water quality standards? Is there a possibility that the effluents will cause areas that do not comply with the country's ambient water quality standards?	① Turbid water will generate in the construction works. There are no intake facilities in and down the site. ② Impact on water resources of runoff from road surface will not occur. ③ Development of parking or service areas are not included in the project.
	(3) Noise and Vibration	① Do noise and vibrations from vehicle and train traffic comply with the country's standards?	① The noise and vibration levels will be improved because of the widening works of existing road.
3 Natural Environment	(1) Protected Areas	① Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	① There are no protected areas in and around the site.

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations
3 Natural Environment	(2) Ecosystem	① Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats) ? ② Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? ③ If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? ④ Are adequate protection measures taken to prevent impacts, such as disruption of migration routes, habitat fragmentation, and traffic accident of wildlife and livestock? ⑤ Is there a possibility that installation of roads will cause impacts, such as destruction of forest, poaching, desertification, reduction in wetland areas, and disturbance of ecosystems due to introduction of exotic (non-native invasive) species and pests? Are adequate measures for preventing such impacts considered? ⑥ In cases where the project site is located at undeveloped areas, is there a possibility that the new development will result in extensive loss of natural environments?	① There are no ecological valuable habitats in and around the site. ② The habitats of endangered species have not been identified in and down the site. ③ Significant ecological impact will not occur. ④ Wild animals migrating through the site have not been identified. ⑤⑥The project will not cause destruction of forest and poaching because of widening of existing road in urban area.
	(3) Hydrology	① Is there a possibility that alteration of topographic features and installation of structures, such as tunnels will adversely affect surface water and groundwater flows?	① Impact on surface and ground water will not occur.
	(4) Topography and Geology	① Is there a soft ground on the route that may cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides, where needed? ② Is there a possibility that civil works, such as cutting and filling will cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides? ③ Is there a possibility that soil runoff will result from cut and fill areas, waste soil disposal sites, and borrow sites? Are adequate measures taken to prevent soil runoff?	①②Filling works are included in the construction. However, there are no steep slope areas to occur slope failures or landslides in and around the site. ③ Adequate filling works prevent accidental and sufficient soil runoff.
4 Social Environment	(1) Resettlement	① Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? ② Is adequate explanation on relocation and compensation given to affected persons prior to resettlement? ③ Is the resettlement plan, including proper compensation, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement?	① To minimize the impacts on relocation, the most appropriate alignment has been selected. Consequently, removal of 15 structures and involuntary resettlement of 3 families or 17persons will be required. Additional land acquisition for relocation of existing power line will not required. ② The local government will conduct the explanation to the affected persons and estimation of the compensation in advance of the project implementation. ③ Adequate compensation will be provided to the Project affected persons in conformity with the Tanzanian regulations and World Bank's guidelines. Moreover, the Ministry of Infrastructure Development compiled the Road Sector Compensation and Resettlement Guidelines within the World Bank's road construction project in 2009.

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations
4 Social Environment	(1) Resettlement	④ Does the resettlement plan pay particular attention to vulnerable groups or persons, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? ⑤ Are agreements with the affected persons obtained prior to resettlement? ⑥ Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? ⑦ Is a plan developed to monitor the impacts of resettlement?	④ Vulnerable groups or persons are not included in the project affected persons. ⑤ Official agreement with the affected persons will be obtained in parallel with the EIA procedure in near future. ⑥ TANROAS, project implementing agency, has the sufficient experiences in similar road development projects including world bank projects. Ministry of Infrastructure Development will include the compensation cost in the 2011 fiscal budget. ⑦ The monitoring on resettlement will be conducted in the environmental management plan.
	(2) Living and Livelihood	① Where roads or railways are newly installed, is there a possibility that the project will affect the existing means of transportation and the associated workers? Is there a possibility that the project will cause significant impacts, such as extensive alteration of existing land uses, changes in sources of livelihood, or unemployment? Are adequate measures considered for preventing these impacts? ② Is there a possibility that the project will adversely affect the living conditions of inhabitants other than the affected inhabitants? Are adequate measures considered to reduce the impacts, if necessary? ③ Is there a possibility that diseases, including communicable diseases, such as HIV will be introduced due to immigration of workers associated with the project? Are adequate considerations given to public health, if necessary? ④ Is there a possibility that the project will adversely affect road traffic in the surrounding areas (e.g., by causing increases in traffic congestion and traffic accidents)? ⑤ Is there a possibility that roads and railways will cause impede the movement of inhabitants? ⑥ Is there a possibility that structures associated with roads (such as bridges) will cause a sun shading and radio interference?	①②③④⑤ The project will not cause significant changes and impacts on the livelihood of the local people and road traffic because of widening works of existing road in urban area. Street venders around existing road will be able to continue their business except for some period during the construction works. ⑥ Impact on sun shading and radio interference will not occur.
	(3) Heritage	① Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage sites? Are adequate measures considered to protect these sites in accordance with the country's laws?	① There are no cultural properties in and around the project sites.
	(4) Landscape	① Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	① There are no valuable landscape sites in and around the project sites.
	(5) Ethnic Minorities and Indigenous Peoples	① Where ethnic minorities and indigenous peoples are living in the rights-of-way, are considerations given to reduce the impacts on culture and lifestyle of ethnic minorities and indigenous peoples? ② Does the project comply with the country's laws for rights of ethnic minorities and indigenous peoples?	①②The project site is not area where ethnic minorities and indigenous people having unique culture and lifestyle are living.

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations
5 Others	(1) Impacts during Construction	① Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? ② If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? ③ If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts? ④ If necessary, is health and safety education (e.g., traffic safety, public health) provided for project personnel, including workers?	① The adequate mitigation measures and monitoring plans to reduce impacts of pollution during the construction will be prepared. ② The construction activities will not adversely affect the natural environment. ③ Because the construction works are conducted in urban area, countermeasures against traffic jam will be included in the execution scheme. ④ Because the construction works are conducted in urban area, safety education for the workers will be included in the environmental management plan.
	(2) Monitoring	① Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? ② Are the items, methods and frequencies included in the monitoring program judged to be appropriate? ③ Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? ④ Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	① The monitoring plans mentioned in the EIA report will be implemented during the construction and operation phase. ②③④Because the EIA report is in progress, the specific monitoring plans have not been prepared yet. JICA study team submitted the draft monitoring plan to TANROADS.
6 Note	Reference to Checklist of Other Sectors	① Where necessary, pertinent items described in the Forestry Projects checklist should also be checked (e.g., projects including large areas of deforestation). ② Where necessary, pertinent items described in the Power Transmission and Distribution Lines checklist should also be checked (e.g., projects including installation of power transmission lines and/or electric distribution facilities).	① Deforestation is not included in the project. ② Relocation of existing power transmission lines will be limited in the right of way and has no serious environmental impacts.
	Note on Using Environmental Checklist	① If necessary, the impacts to transboundary or global issues should be confirmed, if necessary (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	① Impacts to transboundary or global environmental issues will not occur.

1) Regarding the term “Country’s Standards” mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from the World Bank Safeguard Policy as a general rule, or the International Finance Corporation Performance Standards for private sector limited or non-recourse project finance cases, or other standards established by other international financial institutions, or other internationally recognized standards or good practices established by developed countries such as Japan regarding environmental and social considerations, the background and rationale for this deviation, and the measures to rectify it if necessary, are to be confirmed. In cases where local environmental regulations are yet to be established in some areas, considerations should be based on comparisons with international standards such as the World Bank Safeguard Policy, and appropriate standards of other countries (including Japan).
2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which it is located.

(5) Environmental Management and Monitoring Plan

The consultant and contractor are required to comply with the environmental management plan described in the EIA report that was approved by the Tanzanian side. Moreover, the consultant will be responsible for establishing a setup for the environmental monitoring items in the environmental management plan and implementing and supervising the monitoring during the construction period. Table 1-13 shows the environmental monitoring form. Concerning the monitoring items that are stated in the form, it is necessary to implement them even if they are not stated in the EIA report.

Table 1-13 Monitoring Form

1. Responses/Actions to Comments and Guidance from Government Authorities and the Public

Monitoring Item	Schedule	Responsible Person and Organization	Remarks (Location, Frequency, Method, etc.)	Monitoring Results
Status of implementation of the agreement on land acquisition	Detail design stage Construction phase	- TANROADS - Supervision consultant	Location : Area affected by land acquisition and/or on the ROW line on both sides Method : Visual observation, and interview and meeting with relevant agencies and project affected persons Frequency : Visual observation: Daily Interview and meeting: Monthly or as needed	

2. Environmental Pollution

- Air Quality (Dust)

Item	Standard	Schedule	Responsible Person and Organization	Remarks (Location, Frequency, Method, etc.)	Monitoring Results
Dust during construction phase	Serious impact of dust on local residents and pedestrians	Construction phase	- Supervision consultant - Construction contractor	Location : Construction site Method : Visual observation and interview to local residents and pedestrians Frequency : Visual observation: Daily Interview: Weekly or as needed	

- Waste

Monitoring Item	Schedule	Responsible Person and Organization	Remarks (Location, Frequency, Method, etc.)	Monitoring Results
Disposal methods of demolished buildings for land acquisition	Detail design stage Construction phase	- Municipality office - Supervision consultant	Location : Area affected by land acquisition and disposal site Method : Visual observation, and interview and meeting with waste disposer and project affected persons Frequency : Visual observation: Daily Interview and meeting: Monthly or as needed	
Disposal methods of construction waste	Construction phase	- Supervision consultant - Construction contractor	Location : Construction site and disposal site Method : Visual observation and meeting with contractor Frequency : Visual observation: Daily Meeting: Monthly or as needed	

- Noise

Item	Standard	Schedule	Responsible Person and Organization	Remarks (Location, Frequency, Method, etc.)	Monitoring Results
Noise during construction phase	Serious impact of noise on local people	Construction phase	- Supervision consultant - Construction contractor	Location : Construction site Method : Interview to local people Frequency : Weekly or as needed	
Noise by vehicular traffic during operation phase	Tanzanian environmental standards (Day 70dB, Night 60dB)	Operation phase	- TANROADS	Location : a point of the road side Method : Noise level meter Frequency : Yearly	

3. Natural Environment

- Needless felling of roadside trees

Monitoring Item	Schedule	Responsible Person and Organization	Remarks (Location, Method, Frequency, etc.)	Monitoring Results
Status of tree felling in the right of way	Construction phase	- Supervision consultant - Construction contractor	Location : Construction site Method : Visual observation and meeting with contractor Frequency : Visual observation: Daily Meeting: Monthly or as needed	

4. Social Environment

- Resettlement

Monitoring Item	Schedule	Responsible Person and Organization	Remarks (Location, Method, Frequency, etc.)	Monitoring Results
Status of compensation payment	Detail design stage Construction phase	- TANROADS - Supervision consultant	Location : Area affected by land acquisition Method : Interview and meeting with municipality office and project affected persons Frequency : Monthly or as needed	
Status of relocation or removal of buildings in the right of way	Detail design stage Construction phase	- Municipality office - TANROADS - Supervision consultant	Location : Area affected by land acquisition Method : Visual observation, and interview and meeting with relevant organizations and project affected persons Frequency : Visual observation: Daily Interview and meeting: Monthly or as needed	

- Accident and risk during construction phase

Monitoring Item	Schedule	Responsible Person and Organization	Remarks (Location, Frequency, Method, etc.)	Monitoring Results
Opinions from local residents and pedestrians	Construction phase	- Supervision consultant - Construction contractor	Location : Construction site Method : Interview and meeting with to local residents and pedestrians Frequency : Monthly or as needed	
Status of street vendors in and around construction site	Construction phase	- Supervision consultant - Construction contractor	Location : Construction site Method : Visual observation and interview to street venders Frequency : Visual observation: Daily Interview: Monthly or as needed	

(6) Relocation of obstacles

It will be necessary for the Tanzanian side to remove obstacles (water pipes, communication lines, power lines, steel towers, etc.) on the target section. On examining the existence of steel towers in the initial survey in the Project, since it was found that the current height of power lines between steel towers is not high enough to secure sufficient clearance with the bridge and its access sections following completion, it was confirmed that relocation is the only option. The

need for relocation by the Tanzanian side was explained and consent was obtained from the local counterparts. In particular, since special consideration in terms of budget and technology will be required concerning the removal of two steel towers for the 33 kV transmission line around Gerezani Overpass, the need for definite implementation by the Tanzanian side was explained. The public facilities that constitute obstacles are as indicated below. Moreover, because the relocation of these obstacles will take place inside the ROW, there will be no need to acquire new land for relocation.

① Electrical

An 11 kVA distribution line and a 33 kVA distribution line are installed along the east side of Gerezani Road and along Bandari Road respectively. The entire 11 kVA line along Gerezani Road as well as two steel towers and seven gantry utility poles along Bandari Road will be targeted for demolition or relocation. The responsible agencies will be the Ilala and Temeke branch offices of TANESCO.

② Water pipes

A 300 mm water pipe is buried at a depth of around 1.2 m at Kamata Intersection, and 150 mm water pipes are buried at depth ranging from 1.2 m to 2.5 m on both sides of Gerezani Road. The responsible agency will be the Dar es Salaam branch of Dar es Salaam Water & Sewerage Authority (DAWASA).

③ Communication cables

PVC pipe carrying cables is buried along the left side of the road at a depth of around 0.8 m. On Gerezani Bridge, cables are housed in pipe that is attached to the bridge. The responsible agency is the Tanzania Telecommunications Company (TTCL).

CHAPTER 2

CONTENTS OF THE PROJECT

CHAPTER 2
CONTENTS OF THE PROJECT

2-1 Basic Concept of the Project

2-1-1 Superior Objectives and Project Targets

In the National Strategic Poverty Reduction Plan (NSGRP), the Government of Tanzania is striving to promote economic growth and mitigate poverty under the banner of 'Growth and reduction of income poverty.' It has placed emphasis on infrastructure development, especially development of the road sector, which is indispensible for economic growth, and is striving to connect the country's major cities and improve access to markets under the National Transport Policy (NTC) that has been compiled as the policy for the road sector. In 2007, the Government of Tanzania formulated the Transport Sector Investment Program (TSIP Phase II: 2007~2016), and based on this is advancing comprehensive development plans covering trunk roads, local roads, airways and marine transport, etc.

Dar es Salaam plays a central role in the economy and physical distribution in Tanzania. As the city is the starting point for all transport systems, including the road, rail, air and maritime transport systems, it is truly the strategic point for transport in Tanzania.

Meanwhile, in the last 10 years, the number of registered vehicles in the city has grown at an annual rate of 7% which is higher than the population growth rate. As a result, the traffic congestion along trunk roads has been worsening every year, hampering economic activities in the city. In addition, since population growth in Dar es Salaam is advancing at a rapid rate, it is forecast that traffic congestion in the urban area will continue to deteriorate, making it desirable to conduct immediate improvements.

Under the TSIP, improvement of trunk roads through widening to four-lane roads is being advanced, while the Bus Rapid Transit (BRT) Program has been formulated with a view to encouraging people to use public transport rather than private vehicles. Based on this, works have been commenced on the Phase I sections with a view to relieving traffic congestion in the Dar es Salaam urban area. Within these activities, Gerezani Road is regarded as a priority section in the trunk road development program.

In Dar es Salaam, which is the economic center of Tanzania, JICA implemented a development survey, the Dar es Salaam General Urban Transport Network Survey (formulation of a transport master plan (M/P) with 2030 as the target year, and selection of priority projects from 2008~2015),

from 2007 to 2008. Within this, the widening of Gerezani Road, targeted under the Project for Improvement of Transport capacity in Dar es Salaam, was proposed as an extremely important undertaking within improvement of the overall road network in Dar es Salaam, and the Tanzanian side has issued a request based on this proposal.

Accordingly, the Project has the goal of implementing improvement on the target road section, thereby securing smooth and stable transport of people and goods. As a result, it aims to secure smooth traffic flow in Dar es Salaam, vitalize flows of people and goods in Tanzania as a whole, and promote vitalization of social and economic growth in the country.

2-1-2 Outline of the Project

In the Project, the following road widening work will be implemented in order to realize the above target.

- Target road section : Gerezani-Kamata Intersection to Bandari-Kilwa Intersection
- Length of target section : Approximately 1.3 km
- Road specifications : 4 carriageways, 3.5 m per lane
  Central reservation ＝9.0m
  Shoulder width = 0.5 m, both sides
  Footpath width = 3.0 m
- Paving specifications :
  Main road = Asphalt concrete wearing course 5cm, binder course 5 cm
  Base course = Base course 10 cm (asphalt stabilized: DBM), sub-base course 20 cm (cement stabilized)
  Footpath = Asphalt concrete surface course 3 cm
  Bus bays and railway crossing = Cement concrete paving 20 cm
- Bridge : PC-T girders, 40 m long, pile foundations, existing railway overpass (bridge separated into width 11.0 m and 24.0 m)
- Road drainage facilities : 3 box culverts, concrete U-shaped side ditches (roadsides, crests of retaining walls)
- Auxiliary road structures : Safety barriers, bus bays, kilometer posts, road markings, etc.

2-2 Outline Design of the Japanese Assistance

2-2-1 Design Policies

2-2-1-1 Basic Concept

The Project, which constitutes part of the program for widening of urban trunk roads in Dar es Salaam, aims to improve infrastructure that is incapable of supporting sustainable economic development, and to relieve traffic congestion arising in line with population growth and increased car ownership. The target section lies between Kilwa Road and Nierere Road, which are key trunk roads in Dar es Salaam, and at the central point it connects to Soikone Road leading to the city centre. This section is the source of chronic traffic congestion caused by a bottleneck as the road width from Kilwa Road, Nierere Road and Soikone Road decreases from four lanes to two. Accordingly, concerning the plan to upgrade this approximately 1.3 km section and Gerezani Overpass from a two-lane road to a four-lane road, based on the request from the Government of Tanzania, and taking the findings of the field survey and discussions into account, it has been decided to plan the road according to the following policies with a view to securing the smooth and safe flow of traffic.

(1) Basic policies of road design

① The road shall meet Tanzanian design criteria as a trunk road.

② The road shall be planned to fit within the overall trunk road network including other sections.

③ The plan shall be examined so that it fits inside the existing right of way (the existing route shall be traced, existing pavement and structures shall be utilized as far as possible, and negative impacts on the social environment shall be minimized).

④ The plan shall be examined with consideration given to cost cutting.

⑤ Traffic volume and characteristics (large vehicles, small vehicles, bus traffic, pedestrians, etc.) and related plans (BRT program) shall be examined and reflected in the plan.

⑥ Safety facilities shall be installed and consideration shall be given to traffic safety.

⑦ The road shall be planned so that it can be kept in good condition over the long term by conducting simple maintenance.

(2) Basic policies for bridge design

① Width and load bearing capacity in conformance with Tanzanian design standards shall be secured.

② Clearance that complies with the standard for the railway that passes underneath shall be secured.

③ Consideration shall be given to the safety and convenience of vehicles and pedestrians.

④ Consideration shall be given to cost cutting.

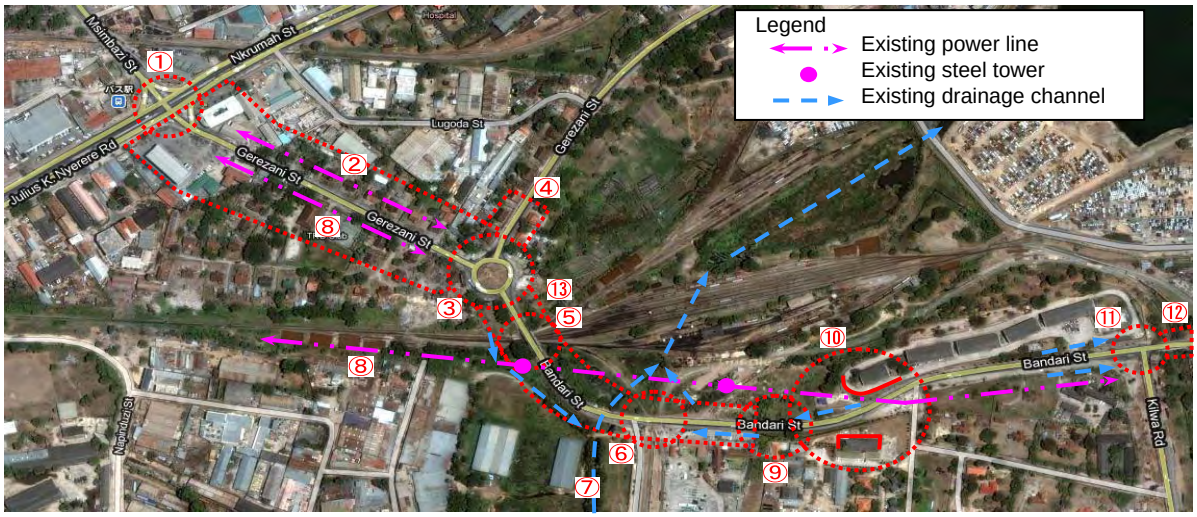
⑤ Bridge reconstruction shall be planned with a view to minimizing impacts on the social environment.

2-2-1-2 Design Policies and Important Points

The road design standards in the Project were examined upon applying the Tanzanian standard for trunk roads. Design speed has been set at 40 km/h upon considering conditions on the existing road. Moreover, since intersections are a major cause of the current congestion, it has been decided to add right-turn and left-turn lanes and traffic signals. Concerning the pavement design load, the optimum paving structure has been adopted upon considering Tanzanian pavement design standards and referring to American standards (AASHTO) for verification. Concerning the Project bridge, British Standards (BS), which are applied in Tanzania, have been adopted, while referring to Japanese design criteria when necessary. Moreover, bridge length has been kept as short as possible, while the optimum position and structure of the bridge have been decided upon generally considering a cost-efficient structure, geological and topographical conditions, ease of execution and the works schedule, etc. Based on the above thinking, the optimum scale of works for the Project has been planned.

(1) Important points in examination of the optimum road widening plan

In order to mitigate the chronic traffic congestion that is occurring on Gerezani Road, it will be necessary to widen the road from two lanes to four lanes in the Project, however, it will also be necessary to consider the acquisition of additional right of way, minimization of impacts on existing buildings and public facilities and relationship with other projects in line with the works. The following paragraphs describe the points that need to be considered when examining the optimum plan for widening of Gerezani Road, targeted under the Project for Improvement of Transport capacity in Dar es Salaam.



Source: Google Map

No.	Name	Consideration Points
①	Kamata Intersection	It is necessary to examine an intersection with right-turn and left-turn lanes. Newly install signals compatible with a four-lane road. Try to avoid the relocation of large existing buildings as much as possible.
②	Existing houses along Gerezani Road	Houses that are expected to be impacted.
③	Gerezani Intersection	Addition of right-turn and left-turn lanes, and examination of signals installation
④	Sokoine Street	Addition of right-turn and left-turn lanes within the existing 20 m ROW, and examination of signals installation
⑤	Railway overpass	Considering clearance in the vertical direction (5.8 m) and horizontal direction (5 m from the center of the outer rail), banking works of around 8~10 m will arise.
⑥	Rail crossings	Examination of a level intersection, and adjustment with the BP entrance
⑦	Drainage channels	Improvement of existing drainage channels, and measures to counter water buildup around the BP entrance
⑧	Supports	Relocation of existing power lines, utility poles, steel towers, water pipes, telecommunications lines and street lamps
⑨	Petroleum company (BP) entrance	Consideration for entry and exit by large-size vehicles
⑩	Port warehouses and BP buildings	Consideration for road cutting in line with revision to the ROW in front of the port warehouses. This will lead to around 8 m of banking and 2 m of cutting works.
⑪	Kilwa Intersection	Adjustment for connection with the already upgraded four-lane carriageway
⑫	Mandela Road	Consideration for passage by large-size vehicles
⑬	Existing water pipes and bridge line	Attachment of utility equipment to Gerezani Bridge

Figure 2-1 Important Points to Consider in Upgrading of the Target Section to a Four-Lane Road

(2) Setting of the Optimum Road Route and Road Width

1) Selection of six route options for comparison and the optimum route by the Tanzanian side

In examining the possible routes for the Project road, in addition to the above points, consideration was given to compatibility in terms of cost and technology, and minimization of social and environmental impacts in surrounding areas in line with road widening in the city. In the first field survey (June 2010), the Survey Team presented to TANROADS six alternative routes (for comparison) for a wider Gerezani Road (three routes each assuming a right of way (ROW) of 45 m or 35 m) and the most preferable route (Alt-1) within these. Following discussion with the related public authorities (Dar Es City, Ilala City, Temeke City), TANROADS selected Alt-1 as the optimum route option and notified Japan of the result.

Table 2-1 Decision of the Optimum Route Plan by the Tanzanian Side

Alternative	Road ROW	Road Section				Remarks (impacted houses)
		Kamata - Gerezani	Gerezani Bridge	Bridge - In front of BP	In front of BP - Kilwa	
ALT-1	45m	Inland shift (S-shaped alignment)	Inland shift	Alongside the BP facility	Alongside existing houses	3-story = 1 2-story = 0 1-story = 12
ALT-2	45m	Inland shift (Straight line)	Inland shift	Alongside the BP facility	Alongside existing houses	3-story = 1 2-story = 1 1-story = 5
ALT-3	45m	Centering on existing road	Centering on existing road (Little new land acquisition)	Alongside the BP facility	Alongside existing houses	3-story = 0 2-story = 2 1-story = 15
ALT-4	35m	Inland shift (S-shaped alignment)	Inland shift	Alongside the BP facility	Alongside existing houses (Small inroad to TPA)	3-story = 0 2-story = 0 1-story = 8
ALT-5	35m	Inland shift (Straight line)	Inland shift	Alongside the BP facility	Alongside existing houses (Small inroad to TPA)	3-story = 1 2-story = 1 1-story = 4
ALT-6	35m	Centering on existing road	Centering on existing road (Little new land acquisition)	Alongside the BP facility	Alongside existing houses (Small inroad to TPA)	3-story = 0 2-story = 1 1-story = 5

2) Examination of project contents in the optimum route plan (Alt-1)

On hearing the optimum route plan selected by the Tanzanian side, in the second field survey in August 2010, the Survey Team confirmed current conditions and conducted surveys (topographical surveying, boring survey, traffic volume survey, etc.) on the section

of 1.3 km between Kamata Intersection (the start point, where the Project road intersects with Nierere Road) and the Bandari-Kilwa Intersection (end point, where Bandai Road intersects with Kilwa Road). Moreover, the team conducted work on estimating the road alignment in the optimum route plan, investigating applicability of the estimated cross section (4 lanes in both directions + footpaths + BRT land), examining intersection plans, examining the execution plan in the case where the road is open to the existing traffic flow during the works, confirming obstructions and surveying the existing Gerezani Bridge, etc.

(3) Design policies

1) Project Start and End Points

1-1) Start point

The Project start point shall be the point of intersection between the Nierere Road ROW and the Project road at Kamata Intersection, and the road structure shall be designed upon taking the connection with Nierere Road into account. The Project scope shall be sufficient to enable smooth connection in term of horizontal plane and vertical profile and shall include installation of traffic signals compatible with a four-lane road.

1-2) End point

The Project end point shall be designed to enable smooth connection with the roundabout on the upgraded four-lane Kilwa Road.

2) Road geometric structure

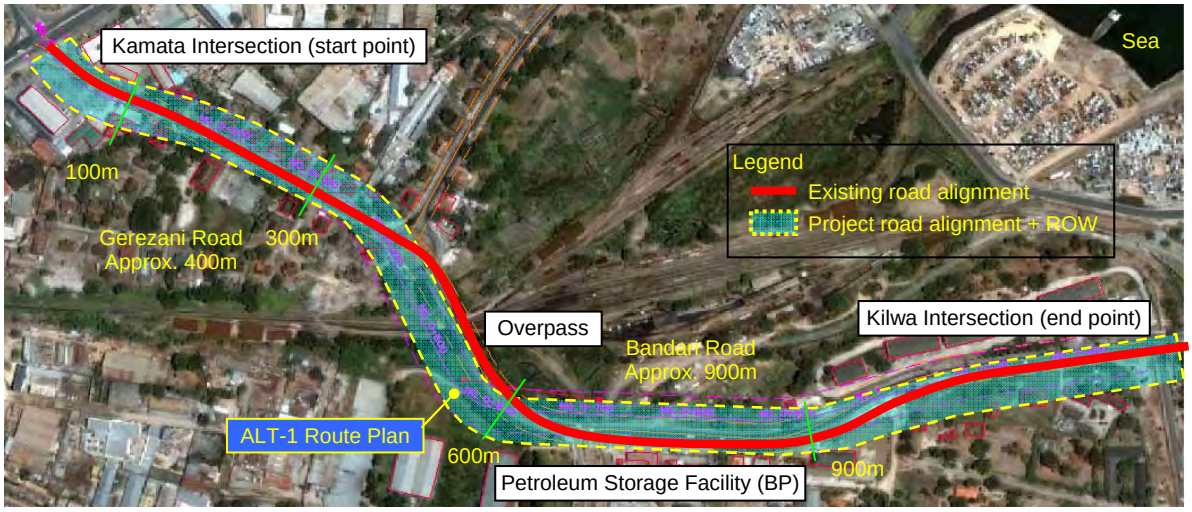
The current road alignment has been composed based on a design speed of 40 km/hr. In the Project, the basic policy has been to examine the road geometric structure that will enable social and environmental impacts to be minimized.

2-1) Alignment

In the Project, road alignment on the optimum route has been examined with a view to minimizing impacts in terms of land acquisition, resident relocation, building removal and public facilities transfer, etc. The following points describe the important consideration items and outline the road alignment.

- Horizontal alignment will be examined in detail for Alt-1, which was selected by the Tanzanian side as the optimum plan.
- Vertical alignment will be matched with the vertical alignment of the existing road, except for the part over the new overpass.

- Conformance with surrounding areas will be sought through widening from two lanes to four lanes.
- Height of the new overpass will be approximately 2.5 m higher than the existing bridge. In line with this, since it is predicted that the road before and after the overpass will be made higher, care will be taken to ensure that traffic safety is not hindered around Gerezani Intersection and the rail crossing in front of BP.
- The crossings over the TAZARA and RAHCO bay-lines in front of the BP offices will be examined as a level crossing.



Section	Alignment Features	Remarks
Start point-100m	Inland shift	As a result of adopting Project road alignment in consideration of the shape of connection with Nierere Road and Msimbasi Road and with a view to minimizing impacts on existing buildings on both sides, the intersection with Nierere Road is almost orthogonal and has shifted inland.
100-300m	Ocean side shift	The road avoids existing buildings as much as possible on the inland side and passes by railway company housing.
300-600m	Inland shift	A new bridge has been established on the inland side of the existing one.
600-900m	Ocean side shift	The road has been shifted towards the ocean side where there are fewer buildings and to avoid the petroleum storage facilities.
900m-End point	Existing road trace	Alignment has been set with a view to minimizing impact on the BP buildings and port authority buildings.

Figure 2-2 Outline of Horizontal Alignment in the Optimum Route Plan

2-2) Vertical alignment

The vertical alignment has basically been designed with a view to tracing the existing road alignment and topographical shape and minimizing impacts on the surrounding

area. However, concerning the upgraded Gerezani Bridge section, considering clearance with the railway and the raised height of the new bridge, it will be necessary to elevate the road approximately 2.5 m from the existing Gerezani Bridge, so only this section will have different vertical alignment from the present road. Accordingly, the road over Gerezani Intersection and Gerezani Bridge will be almost flat, while the gradient from Gerezani Bridge to BP will be approximately 6%, which will be steeper than the present 5%. Concerning the section from the BP rail crossing to the end point, vertical alignment traces the existing road. The following table indicates the points where the vertical alignment will be altered.

Table 2-2 Outline of Vertical Alignment

Position	Application	Remarks
Start point-300m	Follow the existing road	Give consideration to the connection with the existing road.
300-600m	Raising by approximately 2.5 m	Pay attention to gradient before and after the bridge.
600m-End point	Follow the existing road	Give consideration to the connection with the existing road.

3) Intersection plan

In order to select structures that will maximize traffic capacity at the three intersections on the Project road, the intersections will be planned based on results of traffic volume survey and upon considering the local conditions, etc.

① Kamata Intersection

- Construction of right-turn and left-turn lanes (mitigation of congestion caused by confusion of right-turning and left-turning vehicles)
- Installation of traffic signals for use on a four-lane road (improvement of visibility)
- Examination based on information found in hearings about BRT plans for the opposite facing Msimbasi Road (central BRT, one lane on each side)

② Gerezani Intersection

- Examine whether or not to change the existing roundabout with diameter of approximately 35 m (no signals) to a T-shaped three-forked road.
- Installation of traffic signals
- Construction of right-turn and left-turn lanes

- Consideration of change in traffic flow arising from the BRT plan (central BRT, single side going into the city (or single lane on both sides))

③ Bandari /Kilwa Intersection

- Currently, most traffic moves between Kilwa Road ⇔ Bandari Road while there is less traffic in the direction of Nelson Mandela. Accordingly, the current shape is deemed to be appropriate.
- In future, it will be desirable to examine a T-shaped intersection with traffic signals when the BRT program is implemented.

④ Area around the petroleum storage facilities

- Conduct examination with a view to mitigating the impact of large-size vehicles entering and leaving the facilities.
- Examine adopting a level crossing for the railway bay-line (owned by RAHCO and TAZARA) into the storage facilities.

4) Paving plan

In examining the paving structure in the Project, based on the assessment of the condition of the existing paving and ground conducted in the field surveys, consideration has been given to the quality and quantity of the projected traffic, utilization of existing paving, reduction of cost and social and environmental impacts, etc. with a view to obtaining the maximum effect for the minimum cost.

- Consider a design life of 15 years (the same as for existing roads)
- The permissible traffic load shall take the results of traffic volume survey into account.
- Over the low-lying marshy land in front of BP, examine paving structure with consideration given to the confirmed conditions of high groundwater level and accumulation of rainwater.
- Examine the application of concrete paving before and after level crossings and bus bays, etc.

In the Project, it will be necessary to conduct examination based on judgment of ground conditions, survey of traffic volume and forecast of future traffic volume over the optimum route, and examination giving consideration to compatibility with the existing axle load of 13 t. Also, the design life of paving will be examined as 15 years (2013-2027) as is the case in other road projects in Tanzania. Moreover, among the large-size vehicles that use the

road, since some trailers with multiple axles raise some of their axles so they don't touch the road surface (in order to mitigate wear of tires), the impact of this on pavements should also be taken into account.

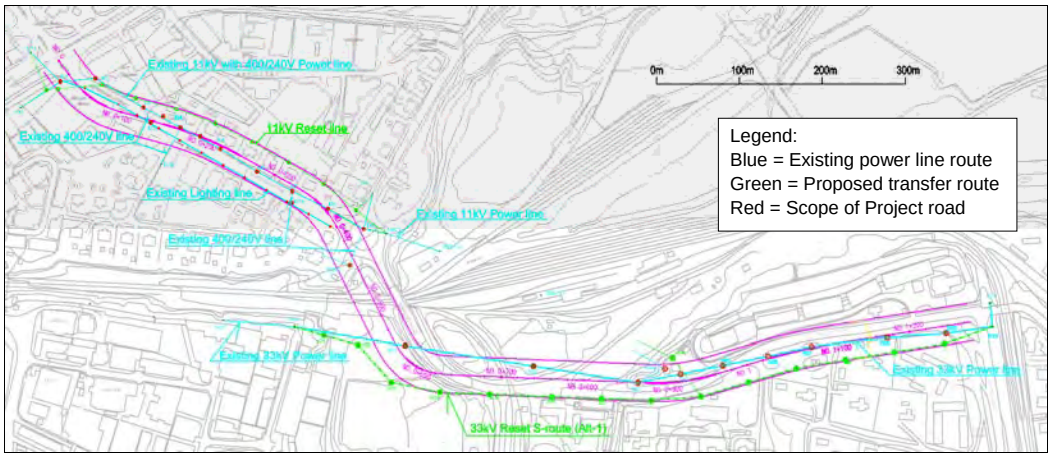
5) Addition of ROW and setting of transfer areas

5-1) Addition of ROW

The ROW of the target road has basically been set as 45 m based on the request from the Tanzanian side. Concerning Gerezani Intersection and banked land around the bridge, it will be necessary to additionally acquire 100 m^2 and 300 m^2 respectively (400 m^2 in total) for the ROW.

5-2) Setting of area for transferring obstructions

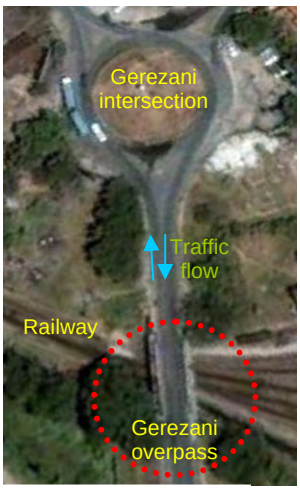
Out of the 45 m ROW that will be secured for the target road, around 2 m on both sides will be considered as a transfer zone for existing public utilities (electricity, water supply, telecommunications, etc.). Through securing this area, the indiscriminate scattering of utilities will be prevented and adverse impacts caused by water leaks and refilling, etc. after the Project can be prevented.



Source: JICA Study Team

Figure 2-3 Plan for Transfer of Power Lines Presented by the Survey Team to the Tanzanian Side

6) Upgrading of the existing Gerezani Bridge



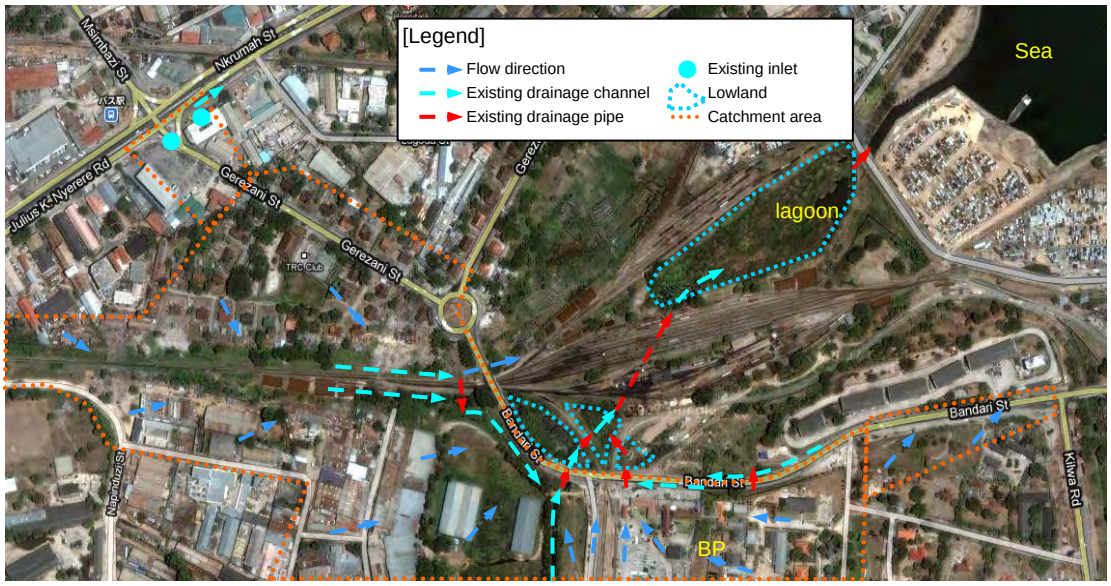
Source: Google Map

The existing bridge dates back to before 1960. It combines rivets that were used for linking the original members and bolts that have been used with subsequent repairs, however, records of these repairs no longer exist in TANROADS. Considering the current state of the bridge, since there is need for reconstruction in view of deterioration and non-conformance with current standards, it has been decided to build a new bridge in the Project. The existing bridge is described below.

- The bridge is a steel structure of 40 m in length, comprising 25 m across the overpass and 7.5 m at each end.
- Height from the railway line to the bottom of the bridge is 4.2 m.
- The bridge carriageway consists of two lanes having width of no more than 7 m (7.5 m including the wheel guard).
- The carriageway is flanked by footpaths each with a width of 1.5 m.
- There is relatively frequent passage of freight trains on the railway line under the bridge.
- The existing bridge was constructed 50 years ago and does not possess enough strength to withstand current live loads; moreover, width is not sufficient in relation to current standards.
- The existing bridge suffers from extreme deterioration such as cracking of floor plates and corrosion of steel members (missing sections), etc.
- Footpath foundations have been corroded by rain from the surface and about one-third are hanging in the air in a dangerous state.
- According to current building standards, it is necessary to secure clearance of 5.8 m from the top of track to the bottom of the bridge and at least 3.0 m from the center of track closest to the edge to structures.
- The load withstand capacity at the time of original design is far below the current standard.

7) Upgrading of road drainage facilities

Drainage facilities on the target road comprise concrete box culverts, concrete pipe culverts, roadside ditches, and side ditches without support, etc. Drainage conditions around the road are described below.



Source: Google Map

Figure 2-4 Outline of Existing Drainage Facilities

In terms of terrain, the start and end points of the target road are situated on coastal terrace, while the central part runs through a valley when rain falls, water flows from both sides into the valley and into the existing earth ditch alongside the BP facilities. From the earth ditch, rainwater runs through a box culvert under the existing road and enters the marshland and creeks on the opposite side; from there is passes through the box culvert under the railway shunting yard and flows into the sea through the lagoon on the downstream side. Judging from the past flood history in the local area, the existing drainage facilities under the railway line and shunting yard do not need to be replaced, so it is only necessary to upgrade the drainage facilities traversing the road and the side ditches in line with the road widening works. Concerning the area in front of the BP facilities, where buildup of water during rainfall is a problem, since the problem is caused by the state of the traversal drainage facilities, it will be necessary to examine facilities that will definitely drain the water.

Table 2-3 Existing Drainage Facilities

Item	Location		Remarks
Box culvert 	Kamata area	-	
	Gerezani Road	-	
	Bandari Road	0+650	1.1x1.1x2@, RC
		0+700	1.1x1.1, RC
Pipe culvert 	Kamata area	-	
	Gerezani Road	-	
	Bandari Road	0+480	φ1.0, RC
		0+500	φ0.4x4@, RC
		0+820	φ0.2, RC
		1+250	φ0.9, RC
Drainage inlet 	Kamata area	0-10	0.5x0.5x8Nos
		0+00	0.5x0.5x1Nos
	Gerezani Road	-	
	Bandari Road	-	
Concrete side ditch 	Kamata area	-	
	Gerezani Road	-	
	Bandari Road	0+710~0+770	U-shaped side ditches 0.3 x 0.3
Lining side ditch 	Kamata area	-	
	Gerezani Road	-	
	Bandari Road	0+770~0+810	
		0+830~0+920	
Side ditch without support 	Kamata area	-	
	Gerezani Road	-	
	Bandari Road	0+470, 0+500	
		0+500~0+640, 0+640	
		0+820~0+830	
		1+20~1+90	

8) Upgrading of road auxiliary facilities

The target road section is lined with shops, businesses, warehouses, petroleum storage facilities and ordinary houses. In the plan, consideration has been given to the safety and convenience of local residents by providing bus bays (for people commuting to the said facilities or travelling into the city center on business), lay-byes and deceleration zones. Accordingly, examination has been conducted on installing signal facilities compatible with four-lane traffic and for the benefit of pedestrians, constructing traversal multipurpose underground conduits for public utilities (as requested by the Tanzanian side), and installing street lights at intersections, curves and bus bays, etc. Moreover, since the road connecting to Gerezani Bridge will need to be raised to a maximum height of around 10 m but this cannot be done by simple banking, examination has been given to the construction of concrete retaining walls. Furthermore, examination has been given to installation of protection facilities for preventing falling and so on by pedestrians on such sections, etc.

(4) Works to be borne by the Tanzanian side

1) Transfer of obstructions

In order to conduct road widening over the target section, it will be necessary for the Tanzanian side to relocate obstructions (water pipes, telecommunications lines, power lines, steel towers, etc.). Upon investigating the location of steel towers in the first survey conducted in the Project, it was confirmed that the current height of power lines between steel towers will not provide sufficient clearance after the work is finished on Gerezani Bridge and that there is no other choice but to move the towers and lines. The need for relocation of these obstructions was conveyed to the Tanzanian side and consent was obtained. In particular, concerning removal of the two steel towers used for the 33 kV distribution line around Gerezani Overpass, since this will require special handling in terms of cost and technology, the Tanzanian side will need to conduct sure and reliable work. The existing public facilities that constitute obstructions are as indicated below.

① Power lines and steel towers

Power lines currently consist of 11 kV lines along Gerezani Road and 33 kV lines along Bandari Road. All the 11 kV lines along Gerezani Road and two steel towers and all eight gantry utility poles along Bandari Road will be targeted for removal and transfer. The responsible agencies will be the Ilala district and Temeke district offices of Tanzania Power Corporation (TANESCO). The most potentially troublesome steel towers are the ones situated in Temeke district.

		
11 kV line	33 kV line	Steel tower (33 kV)

② Water pipes

At Kamata Intersection, a water pipe with diameter of 300 mm is buried alongside Nierere Road at a depth of around 1.2 m. Along Gerezani Road, a 150 mm water pipe is installed on the right-hand side of the road at a depth ranging from 1.2 to 2.5 m; this crosses the road at approximately 300 m and is installed on the left-hand side of the road at a similar depth. The responsible agency is the Dar Es branch of the Tanzania waterworks and sewerage authority (DAWASA).

③ Telecommunication cables

PVC pipe for housing telecommunications cables is installed at a depth of around 0.8 m on the left-hand side of the road. The pipe is attached to the side of the bridge at Gerezani Bridge. The responsible agency is the Dar Es branch of the Tanzania telecommunications company (TTCL).

2) Securing of land for camp yard

TANROADS explained that the sites that were provided during construction of Kilwa Road (30 x 200 m on the left side of Kilwa Road approximately 2.3 km from the end point, and 80 x 150 m on the left side of Kilwa Road at approximately 8.3 km) can be used as space for the camp yards required during the Project works.

3) Customs and tariff exemptions

In past grant aid projects in Tanzania, the following problems have been confirmed regarding tariffs and customs clearance for works equipment and materials.

3-1) Tariff exemptions

When works equipment and materials are procured for grant aid projects in Tanzania, the construction contractor pays for the initial procurement including tax, and this is refunded by the authorities at a later date. The refund procedure is implemented based on notification of Government Notice (GN), however, it takes a lot of time from application to refund and this is a major drawback in project implementation. Moreover, although the major targets of refund in line with works implementation are fuel tax and value added tax (VAT), it is necessary to conduct separate GN procedure for these. Based on the experience of past projects, it can take between three and six months from procurement to refund at the

soonest, and in reality it takes longer than this, and the burden of interest payments placed on contractors as a result of such delays is a major problem. Moreover, in addition to delays, tax refunds are sometimes refused on fuel purchased before the GN notification, while the amount of refund is sometimes reduced for no clear reason and so on.

In view of these conditions, it will be necessary to limit procurement of equipment and materials before notification of GN, and this may adversely impact the progress of works.

3-2) 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 maneuver.

(5) Operation and Maintenance Capacity of the Implementing Agency

The responsible government agency for the Project is the MoW, and the implementing agency is TANROADS. The maintenance capacity of TANROADS is being strengthened via works under financial assistance from the World Bank and the EU, and JICA is also supporting improvement in project management capacity via bilateral cooperation. Furthermore, progress is being made on improving efficiency of contracts for maintenance by the private sector, while execution management capacity in directly managed works is also being enhanced. Regarding the organizational performance of TANROADS, the following table shows recent trends in budget and actual revenue and expenditure in recent years. Revenue is derived from the Road Fund, contributions from the MoW and contributions from donors and the basket system. In particular, a uniform amount of money is provided to TANROADS from the Road Fund and this constitutes an important source of funding for road maintenance. The main revenue sources of the Road Fund are petrol tax and fees for roadside advertisement boards and the Fund allocates 70% of its revenue to the MoID and the TANROADS and 30% to local public bodies. The Development Fund that is used for road rehabilitation and improvement is dependent on assistance from donors. Moreover, since expenditure is held to around 90% compared to the budget amount, there is need to improve the efficiency of budget implementation.

Table 2-4 TANROADS Budget and Actual Spending

(1,000 Tshs)

Item		2005/2006	2006/2007	2007/2008	2008/2009
Revenue	Road Fund subsidies (development, maintenance)	46,738,000	53,322,000	139,201,000	147,210,000
	Ministry of Works Public Bond Fund contribution (development)	73,671,000	97,191,000	151,580,000	15,160,000
	Ministry of Works contribution (salaries)	4,409,000	5,782,000	5,595,000	471,130,000
	Assistance from donors	3,890,000	14,605,000	25,839,000	113,850,000
	Basket method funding	-	-	350,000	-
	Other	6,144,000	3,464,000	4,091,000	1,500,000
	Total	134,852,000	174,364,000	326,656,000	748,850,000
Expenditure	Employee salaries	4,553,000	6,617,000	6,746,000	24,760,000
	General administration expenses / execution management expenses	7,750,000	7,375,000	10,201,000	32,840,000
	Maintenance works costs	58,093,000	53,960,000	125,358,000	403,910,000
	Development works costs	57,135,000	103,682,000	156,896,000	505,520,000
	Organizational strengthening costs	1,184,000	1,385,000	1,991,000	6,420,000
	Capital investment	2,026,000	734,000	2,512,000	8,090,000
	Total	130,741,000	173,753,000	303,704,000	981,570,000

Remarks: The budget year is from July to the following June. The currency is Tanzanian shilling (Tshs).
Source: TANROADS

TANROADS currently has 21 regional offices which are controlled by four zonal offices. The Dar es Salaam Regional Office has jurisdiction over the project road.

Judging from past numerous road construction projects and maintenance work, the Proect implementing agency (TANROADS) and its superior agency (MoW) are deemed to possess satisfactory organizational setups and capacity. Regarding the Project, TANROADS and the MoW are deemed to possess adequate organization, domestic budget in Tanzania, technical capability and capacity for conducting maintenance following completion.

(6) Issues in project cost estimation

The biggest issue in terms of project cost is that it is necessary to procure and transport numerous materials such as paving aggregate over long distances. Moreover, costs will be inflated even more because conditions on some transport routes are so poor. In particular, aggregate needs to be procured and transported over 130 km, while additional soil needs to be transported roughly 20~40 km to the target section (urban area). These conditions were given ample consideration when calculating the project cost.

(7) Construction situation

1) Policies regarding general works conditions

Legislation concerning the employment of local workers in the Project is the Tanzanian Labour Law, and works in the Project will be employed according to this law's stipulations concerning occupation-separate minimum wages, working hours and so on. Donors such as Japan, the World Bank and the EU have assisted in the implementation of road and bridge construction works in Tanzania, and overseas contractors set up local offices in Tanzania on such occasions. In line with this, local construction firms are sometimes employed as sub-contractors. Accordingly, it should be possible for the Japanese contractor in the Project to procure local labour.

2) Construction materials procurement policy

In the coastal region of Tanzania, the locations where basic road construction materials such as banking earth, roadbed materials, asphalt crushed stone can be procured are extremely limited, making it necessary to transport over long distances. Cement is produced by a number of companies in Tanzania, and suppliers will be determined upon fully confirming supply quality and quantity. Bridge construction materials (PC steel, expansion joints, supports, liner plates, etc.) cannot be easily procured in Tanzania and will need to be procured from Japan or third countries in order to secure quality, quantity and economy. As for fuel, imported products can be procured locally.

3) Policy regarding utilization of local construction companies

All private construction companies that are capable of receiving orders for public sector construction work are registered with the Contractors Registration Board (CRB) and are classified into seven classes (Class 1 through Class 7) using the annual turnover and asset value of the construction machinery in possession as indices. For road construction work, 42 Class 1 companies and 12 Class 2 companies are registered and each company has a range of its own construction machinery.

Because of the absence of leasing companies or leasing system for construction machinery in Tanzania, local construction companies mutually lease their machinery, making it possible to lease construction machinery in Tanzania except for special kinds of equipment. However, due to the poor capacity and state of maintenance of such machinery, leasing is not a viable option in the Project. Accordingly, suppliers will be determined upon taking such conditions into account.

4) Policy regarding construction method and period

The following policies are adopted in connection with the construction work under the Project.

① The planned work to expand the Project road must be conducted despite the difficulty of diverting the entire daily traffic volume of more than 20,000 vehicles to nearby roads. An appropriate and economical construction schedule will, therefore, be prepared by arranging a suitable detour using existing roads and the newly expanded section so that the work can be conducted without a severe detrimental effect on the existing traffic flow.

② To prevent the occurrence of traffic standstill during the construction period, work will first be advanced on the central reservation of 9 m that will eventually be used for the BRT, and it will be used by ordinary vehicles to ensure the traffic flows.

③ Through close consultation and coordination with the project implementing agency, a project implementation schedule which allows the smooth commencement of each work will be prepared so that the work by the Tanzanian side to relocate obstacles can be completed prior to the work by the Japanese side.

④ Construction methods will be examined upon considering ground conditions, procurable materials and ease of maintenance, etc. on the target road.

⑤ The type of bridge will be determined upon considering cost, works period and future maintenance costs, etc. Moreover, since the locally available construction materials are limited, materials will be determined upon taking economy and quality into account.

⑥ Since the bridge works are a critical element in the overall plan, the possibility of shortening the works period according to the bridge type will be considered.

⑦ In consideration of the maintenance capability of the Tanzanian side, the structures of the planned road facilities will not require special construction machinery or skills.

⑧ The social environment and traffic safety will be taken into full consideration for the formulation of the implementation plan.

⑨ A close communication network involving the Government of Tanzania, the JICA Office in Tanzania, the Consultant and the Contractor will be established for the smooth implementation of the Project.

2-2-2 Basic Plan

2-2-2-1 Overall Plan

(1) Scope and scale of the Project facilities

The Project scope covers the upgrading of a 1.3 km section of the target road starting from Kamata Intersection, where the target road intersects with Nierere Road, and ending at the Bandari /Kilwa Intersection, where Bandari Road intersects with Kilwa Road, to four lanes (with consideration of the BRT Program) together with the replacement of a bridge and the construction of drainage facilities and other auxiliary road structures.

(2) Outline of the basic plan

The following table shows an outline of the Project configured according to design based on the basic concept.

Table 2-5 Outline of the Project

Planned item		Description/Specifications
Target Section		Approximately 1.3km (from Kamata Intersection to Bandari/Kilwa Intersection)
Width		Carriageways 7.5 m x 2; central median 9.0 m (BRT consider); footpaths 2.0~3.0 m x 2
Road Paving Work	Wearing course	Asphalt concrete 5 cm
	Binder course	Asphalt concrete 5 cm
	Base course	Asphalt stabilized (DBM) 10 cm
	Sub-base course	Cement stabilized 20 cm
	Footpath	Asphalt concrete surface course 3 cm
	Bus bays, level crossing	Cement concrete paving 20 cm
Bridge	Gerezani Bridge	PC-T girders, 40 m long, pile foundations, existing railway overpass (bridge separated into width 11.0 m and 24.0 m)
Drainage work		Concrete U-shaped side drains : installed along the entire route Road crossing culvert : 5 locations (box culvert of 1.1 m x 1.1 m or other specifications) Slope drainage ditches : 37 locations
Auxiliary road structures		Curbstone work, Concrete retaining walls, Safety barriers, Traffic signals, Streetlights, Road signs, Road markings, Bus bays

2-2-2-2 Facilities Plan

2-2-2-2-1 Road Plan

(1) Design conditions

1) Design criteria

The Standard Specifications for Road Works 2000, which were published by the former Ministry of Infrastructure Development and which are commonly used for road projects in Tanzania, are considered to be the basic design standards for the Project. However, international standards such as the Explanations and Applications of the Road Construction Ordinance in Japan and the British Standards (BS) are referred to as the need arises.

2) Geometric structure of road

The road standard in the Project was examined upon applying the standards for trunk roads in Tanzania. Design speed has been set at 40 km/h in consideration of conditions on the existing road. Also, since intersections are a major cause of the currently occurring congestion, it has been decided to add right-turn and left-turn lanes in order to maximize traffic throughput at these points. The following table shows the basic outline of the Project road.

Table 2-6 Outline of the Road Plan

Item		Unit	Value/Remarks
Target section		km	Approximately 1.3km (from Kamata Intersection to Bandari/Kilwa Intersection)
Road specifications			
Design speed		Km/hr	40
Number of lanes		No.	4
Width of right of way		m	45.0
Lane width		m	7.0 / direction
Shoulder width		m	0.5
Width of central reservation		m	9.0
Width of footpath		m	2.0~3.0 (depending on the installed location)
Drainage slope for road surface		%	2.5
Minimum curve radius		m	50
Maximum vertical gradient		%	7 (maximum = 10)
One-way grade		%	6
Banked Slope	Ordinary soil	Ratio	1:1.5~4.0 (depending on the soil quality)
Cut slope	Hard rock	Ratio	1:0.5
	Soft rock	Ratio	1:0.75
	Other than Rock	Ratio	1:1.0~1.5 (depending on the soil quality)
Design paving life		-	15 years (according to the Tanzanian Road Manual)
Paving type (carriageway)		-	Asphalt concrete surface course

3) Vertical alignment

The 400 m section from Gerezani Overpass adjoining Gerezani Intersection is flat with some gentle undulations; after the Gerezani Overpass it descends at a gradient of around 5% and connects with a low-lying section that continues for around 200 m. The road rises at a gradient of around 5% at the end of the low-lying section, and is then flat with gentle undulations for 300 m until the end point. The road vertical alignment plan in the Project basically traces the current alignment, however, in the parts before and after Gerezani Bridge, since the road will be around 2.5 m higher than present in order to secure clearance with the railway line and because of the increased height of the new bridge girders, the road from Gerezani Intersection to the new bridge will be almost flat, while it will slope downward at a gradient of around 6% from the bridge to the low-lying land. Accordingly, the vertical alignment will be changed over these sections only.

4) Cross-Section

The road cross-section was examined for a ROW of 45 m taking into account the required functions of a four-lane road, maximization of traffic capacity at intersections, consideration of BRT land, minimization of impacts on roadside obstructions, traffic safety and so on. Since the target section is a key trunk road that is expected to serve as part of the basic road framework in the Dar es Salaam network, the following cross-section has been planned in order to secure these functions: four-lanes in two directions + 9 m central reserve (considering BRT land) + 3 m footpaths on both sides. As for the gradient of cutting and banking slopes, 1:1.0~1.5 on cuttings and 1:1.5~4.0 on banking is planned in consideration of local conditions and soil quality, etc. The width of carriageways, shoulders and footpaths will be decided upon considering road cross-sections in similar projects and taking cost reduction into account. The following standard cross-section is envisaged.

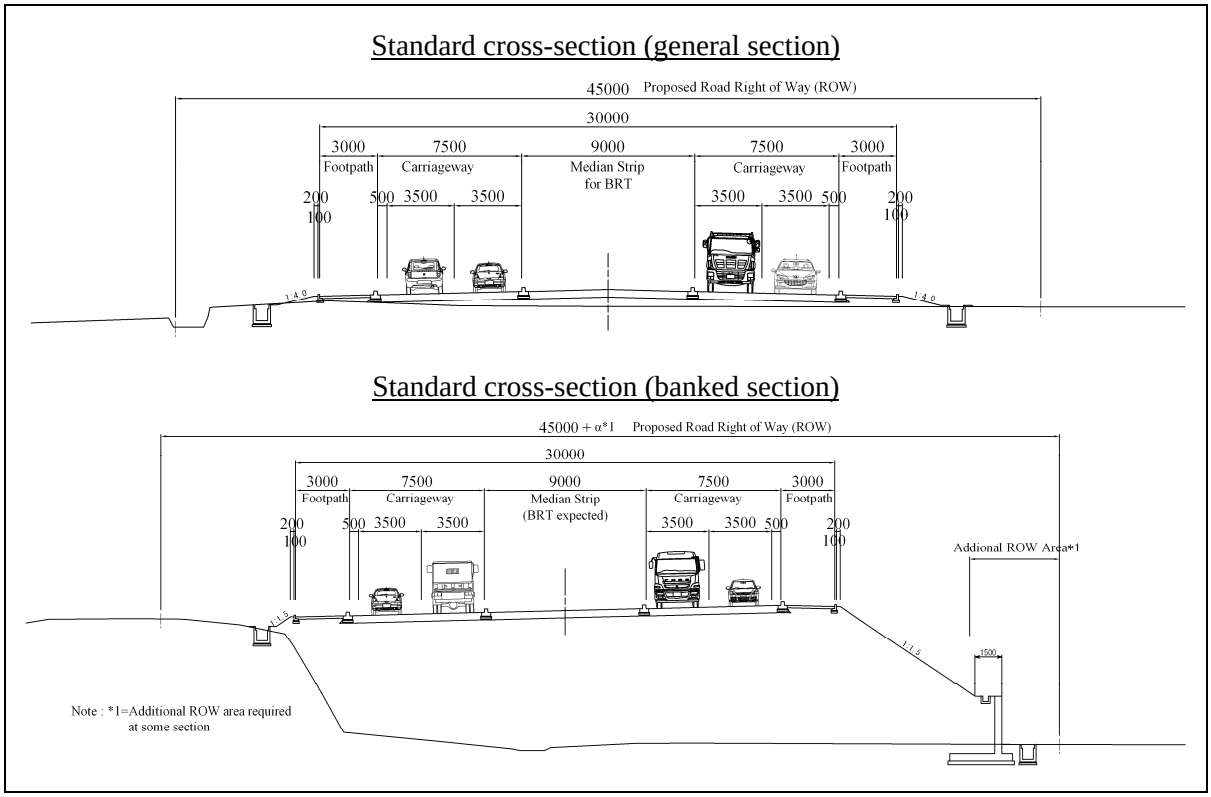


Figure 2-5 Road Standard Cross-Sections

5) Paving plan

The Pavement and Materials Design Manual 1999, which is published by the former Ministry of Infrastructure Development and is commonly used for road projects in Tanzania, is considered to be the basic design standard for paving work in the Project. The AASHTO paving design is also referred to for verification of the configuration of the planned paving work in the Project.

Concerning the design load necessary for paving planning, examination was conducted assuming a design axle load of 13 tons, which is the currently applied standard in Tanzania, and a design service life of 15 years. Based on the traffic volume over the target section that was obtained in the field survey, the cumulative traffic load during the design period is calculated in terms of the standard axle load (converted to 8.2 ton axle load). Based on these load conditions, paving will be designed upon considering the state of existing ground and impact of nearby water accumulation and groundwater, examining material procurement conditions and considering cost cutting, etc.

① Traffic volume and traffic load

The annual average daily traffic (AADT), which is used in paving design, was found to be 25,169 vehicles/day as a result of conducting analysis on the traffic volume survey conducted in the field survey. The growth rate in traffic volume has been set at 4.0% upon considering the past measured rate of growth over the target section and the future running of GDP and BRT, etc., and examination has been conducted based on vehicle categories. Concerning axle load according to each vehicle type, based on AASHTO criteria, assuming the load exerted on the road by passing vehicles during the design period is calculated as the standard equivalent single axle load (18 kip (8.2 t), ESAL), the design traffic load during the design period is computed as approximately 32 million-axles.

② Paving Design

The paving design was verified according to the AASHTO Guide for Design of Pavement Structures 1993.

The following conditions were used when preparing the paving design.

- Design period : 15 years, 2013~2027
- Design vehicle load : 13 tons
- Traffic load (W18) : Number of passing equivalent single axle loads (ESAL) converted to 18 kip during the service life
- Reliability (R) : Probability that traffic load and paving strength are within the assumed scope is assumed to be 95% judging from the target road rating (Standard deviation ZR = -1.645, standard deviation of load and paving strength S0 = 0.40)
- Serviceability index : Initial serviceability index P0 = 4.2 (AASHTO road test results)
  Ultimate serviceability index Pt = 2.5 (AASHTO standard value for trunk road)
- Subgrade resilient modulus (MR) : 9,000
- Paving course coefficient : Asphalt-concrete surface course a = 0.44
  Asphalt stabilized course a = 0.34
  Granular subgrade (CBR = 30) a = 0.13

- Drainage coefficient : Base course m = 1.0
  Sub-base course m = 1.0

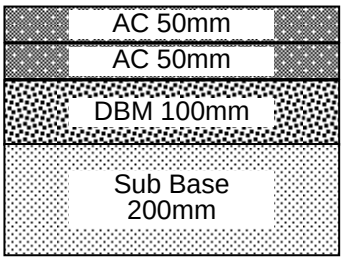


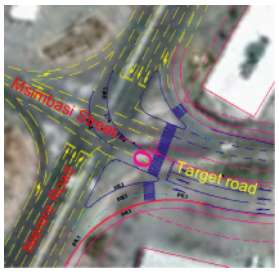
Figure 2-6 Project Paving Structure

The paving structure was examined upon taking into general account the ground bearing force of the target road, local characteristics (water accumulation during rainfall), traffic volume over the target section, the ratio of large-size vehicles, the rate of growth in traffic, and the results of hearing surveys on the Tanzanian side concerning implementation conditions in similar projects. Also, the traffic load classes stipulated in the Tanzania Pavement and Materials Design Manual were taken into consideration. Based on consideration of the existing traffic conditions, paving structure comprising a two-layer asphalt-concrete surface course and asphalt-stabilized (DBM) base course is deemed to be appropriate (see the figure).

6) Intersection plan

The three main intersections on the target road were examined with a view to maximizing traffic volume through the intersections and securing safe and smooth traffic flow.

① Kamata Intersection



- Mitigation of congestion caused by confusion of right-turning and left-turning vehicles has been sought through installing a right-turn lane of approximately 100 m into Nierere Road, a left-turn lane of approximately 100 m, and a left-turn lane of approximately 40 m out of Nierere Road.
- Traffic signals for use on a four-lane road have been installed in visible positions.
- Consideration has been given to inflowing traffic (including the BRT plan) from the opposite facing Msimbasi Road.

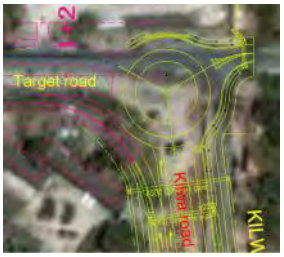
② Gerezani Intersection

- The existing roundabout with diameter of approximately 35 m (no signals) has been changed to a T-shaped three-forked road.
- Mitigation of congestion caused by confusion of right-turning and left-turning vehicles has been sought through installing a right-turn lane of approximately 80 m

into Sokoine Road and a right-turn lane of approximately 30 m out of Sokoine Road.

- Traffic signals for use on a four-lane road have been installed in visible positions.
- Consideration has been given to changes in traffic flow caused by the BRT Program.

③ Bandari / Kilwa Intersection



- The curve radius going into the current roundabout has been enlarged in order to enable smoother connection to the intersection.
- The shape has been designed with a view to enabling application of a T-shaped intersection with traffic signals when the BRT program is implemented in future.

④ Area around the petroleum storage facilities

- Since the large-size vehicles going into the petroleum storage facilities are divided into those entering the BP storage facility for refueling and those driving along the road adjacent to BP and entering the GAPCO facility for refueling, a central reserve has been established between these two entrances, making it possible to turn left and right out of both entrances.
- It is planned to adopt a level crossing for the railway bay-line (owned by RAHCO and TAZARA) into the storage facilities and to pave the crossing part with concrete.

7) Access roads, etc.

① General access sections

Concerning access drives for houses confirmed along the target road, it is planned to give footpaths the same paving as the main road and adopt asphalt concrete paving (5 cm thick) for connecting parts (as in other road projects in Tanzania).

② Branch roads

Concerning branch roads that connect to the Project road, it is planned to adopt the same paving structure as in the general access sections.

③ Drainage pipes on access roads

Concerning transversal sewers at points where access roads connect with the Project road, it is planned to adopt the U-shaped concrete drains applied in the Project but with covers attached.

2-2-2-2-2 Bridge Plan (Gerezani Overpass)

(1) Bridge Position

Among other problems, the existing Gerezani Bridge is badly deteriorated, its width of 7.0 m is less than the 8.0 m required of trunk road bridges in the Tanzanian standards, and its design live load that was adopted 50 years ago is insufficient to withstand modern live loads. Accordingly, it is urgently necessary to reconstruct the bridge. In the Project, it has been decided to build the new bridge on the inland side of the existing structure following examination of the local natural conditions and overall works costs, etc. including the cost of temporary structures. It will be necessary to remove the existing bridge at some point in the future, however, since this can be done by the Tanzanian side, bridge demolition has been omitted from the Project components and the Tanzanian side has consented to this.

(2) Design Criteria

Table 2-7 Outline of the Bridge Plan

Bridge-related specifications		
Position	-	Close to the existing Gerezani Bridge
Live load	-	BS5400, live load = HA and HB (37.5 units)
Horizontal seismic coefficient	kH	0.05
Width of carriageway	m	8.0
Width of footpath	m	2.0
Clearance with existing railway line	m	5.8m in the vertical direction, from the top of existing rails 3.0m in the horizontal direction, from the center of existing outer rails
Structure	-	Concrete bridge
Others	-	Demolition of the existing Gerezani Bridge is omitted. 0.200t/m on both sides, in consideration of the attached load of public utilities.

(3) Planning Policies

1) Bridge planning policy

The need to reconstruct the existing Gerezani Bridge was confirmed from the viewpoints of ① deterioration, ② width, ③ live load strength, and ④ building clearance. As for the new Gerezani Overpass, the position, size and specifications will be examined based on the

optimum route plan. Moreover, since the new bridge is adjacent to Gerezani Intersection, it is planned to simultaneously construct sufficient width to carry the BRT in future and to incorporate right-turn lane capability, and it is assumed that this work will be implemented by the Japanese side. The main items for consideration in bridge construction are as follows.

- The abutment position and structure will be examined with a view to ensuring the most economical bridge length and specifications.
- Considering the above point, a bridge structure of two lane carriageways + footpath in the Kilwa direction (to suburbs) and two lane carriageways + footpath + BRT area in the Kamata direction (to city) is deemed to be appropriate.
- Concerning the bridge type, in view of proximity to the sea, rather than a steel bridge, a concrete bridge as requested by the Tanzanian side shall be adopted.
- Building clearance with the railway line shall be 5.8 m in the vertical direction (currently 4.2 m) and 3.0 m in the horizontal direction from the center of the outside rail, as was requested by the Tanzanian side.
- Structural thickness (distance from the road surface to the bottom edge of the bridge) is approximately 1.4 m, however, this will become roughly 2.5 m in the case where PC-T girders are adopted for the deck.
- Regarding vertical alignment of the bridge access roads, it is necessary to consider the bridge position and construction height.
- Since the bridge will be no longer than 40 m, the applicable bridge structure will be the ordinary superstructure type (concrete PC-T girders, etc.) that is commonly used in Japan.
- Demolition of the existing bridge has been omitted from the Project.
- Since water pipes and telecommunications lines are attached to the existing bridge, it will be necessary to attach the same utilities to the new bridge.

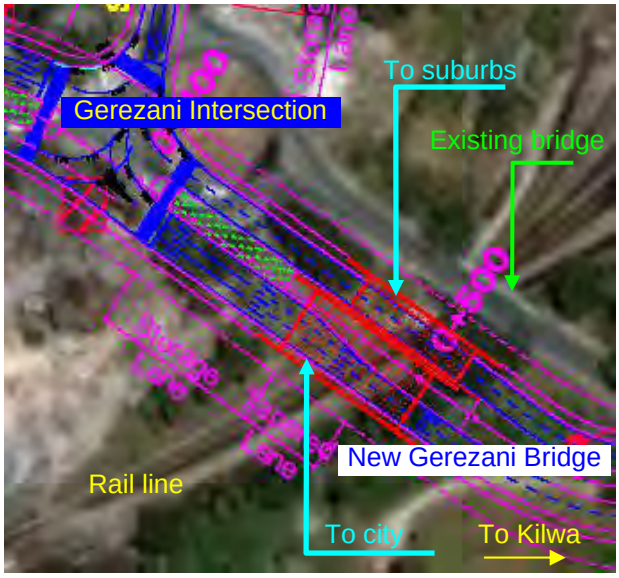


Figure 2-7 Outline of Bridge Plan

2) Examination of the optimum bridge plan

In the Project, the optimum upgrading plan has been examined while giving primary consideration to location close to the ocean, fit with the existing railway, ground conditions and bearing layer, overall construction costs including temporary structures and impact on existing houses, etc. Upon taking these items into account, it is recommended that the new bridge be located adjoining the existing bridge on the optimum route. Concerning the distance from the existing bridge, upon considering the road alignment, surrounding conditions and ease of execution, etc., it is deemed appropriate to locate the center of the new bridge 30 m inland from the center of the existing bridge. Moreover, the new bridge will be 2.5 m higher than the existing bridge with a view to securing clearance (5.8 m) with the railway line passing underneath and because of the increased height of the new girders. Accordingly, the height of banking leading up the bridge will increase from the present 8 m to 10 m. The following figures indicate the general view and standard cross-section of the new bridge.

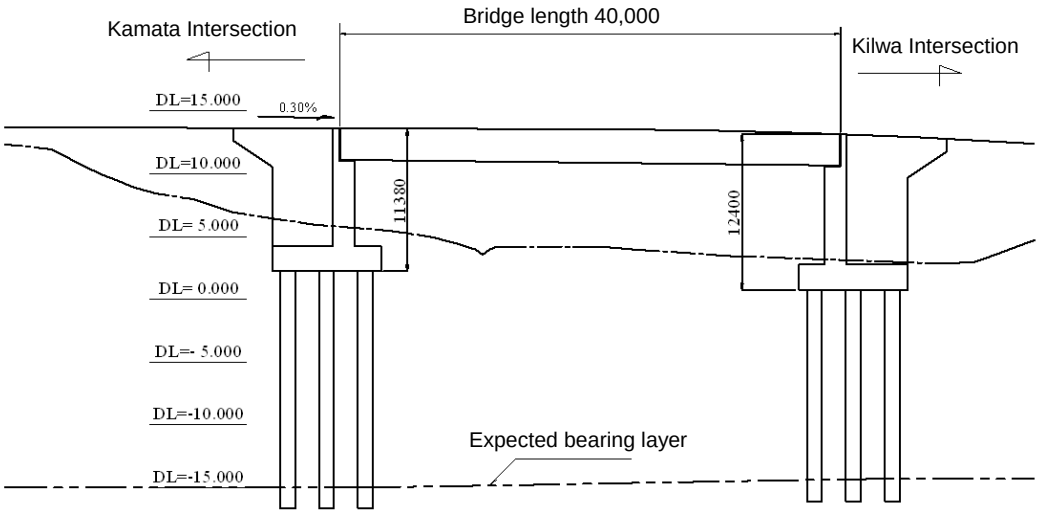


Figure 2-8 General View of Bridge

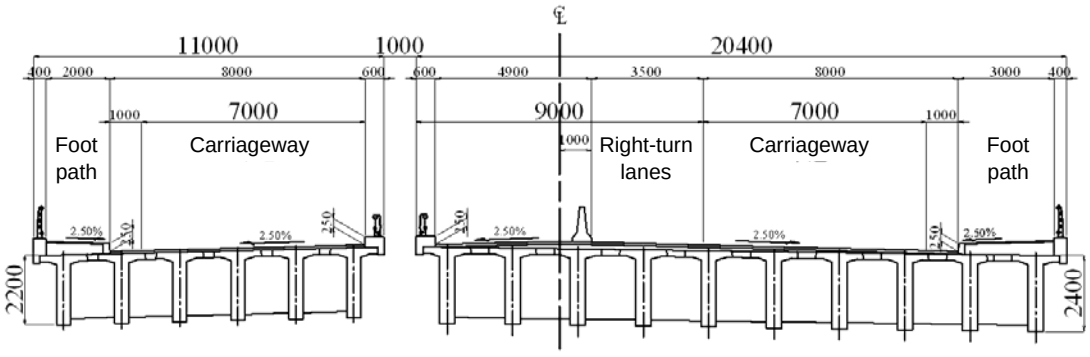


Figure 2-9 Bridge Standard Cross-Section

2-2-2-2-3 Road Auxiliary Facilities Plan

(1) Road transversal drainage facilities and side ditches

The existing transversal covered conduits comprise box culverts and concrete pipes. Upgrading of these transversal conduits has been planned upon considering compatibility with the local natural conditions and ease of maintenance.

1) Culverts

Since the area between the existing Gerezani Bridge and the BP offices forms a valley bottom, water from the surrounding area flows through the existing earth ditch (4 m wide x 1 m deep) within the premises of the concrete products plant next to BP, and from there it flows through the box culverts (2 lines, 1.1 x 1.1 m) under the existing road, then via the box culvert (2.5 m x 2.5 m) under the railway shunting yard, and from there into the sea. Also, a small box culvert goes under the road in front of the BP offices. There are another two culverts in front of the BP office, however, because these are not functioning sufficiently due to accumulated sand, etc., water accumulates to a depth of around 40 cm in the depression in front of BP and inundates the road to a depth of around 10 cm around once per year. While paying particular attention to these areas it has been decided to replace existing structures in line with the widening work based on confirmation of the local drainage system.

Table 2-8 Upgrading of Transversal Drainage Structures

Transversal structure	Issues	Upgrading method	Existing	Upgraded
Box culverts	Although box culverts over the target section do not have any structural problems, it will be necessary to replace them in line with road widening to four lanes.	Replace with box culvert structures suited to four-lane road, while also considering discharge volume and maintenance, etc.	2	2
Pipe culverts	Pipe culverts on the target section have almost been rendered useless due to sedimentation blockage.	It is necessary to unblock the culverts. Also, replace culverts with open channels by altering the drainage system.	4	1
Total			6	3

2) Roadside ditches

The existing roadside ditches consist of earth ditches (4.0 m wide, 1.0 m deep) installed at right angles to the existing road on the low-lying land and concrete-lined drains (2.0 m wide, 0.8 m deep) alongside the existing road in parts. Also, a U-shaped side ditch (40 cm x

50 cm) is installed beside the road in front of BP. In the Project, the following facilities are planned in line with widening of the road to four lanes.

Table 2-9 Outline of Side Ditches

Type	Size	Locations	Remarks
Concrete drain	600 x 600	2,760m	Both sides of the road
Longitudinal drainage channel	600 x 300	37	Slope sections
Collection drain	1000 x 1500	9	

(2) Retaining walls

The road sections before and after Gerezani Overpass will be banked to a height of up to 10 m. In the case where general banking structure is adopted next to a bridge, since the width of banking greatly exceeds the road ROW, it has been decided to construct concrete retaining walls. Also, installation of safety barriers is planned in order to prevent falling by pedestrians and other accidents.

① Reverse-T retaining wall of height 6~3m, 120m on the right side of the approach to Gerezani Overpass

② Gravity retaining wall of height 3~1.5m, 14m beside the above reverse-T retaining wall

(3) Road auxiliary facilities

Since the target road is located in a city area, the following auxiliary facilities have been included in the plan in consideration of convenience and safety, etc. for road users commuting to work and school and on business, etc.

1) Deceleration facilities

Deceleration facilities (humps) shall be installed on the downhill sections from Gerezani Bridge in the direction of Kilwa and from Kilwa Intersection to Gerezani Bridge.

2) Bus bays

Bus bays can be found on roadsides all over Dar es Salaam. In the Project too, examination has been conducted on the location and size (6m wide x 52m long) of four bus bays while considering current conditions of use and expected positions of stations in the BRT Program.

3) Street lights

Being situated in the city, the target road is used by numerous drivers and pedestrians every day. Street lights are installed along the existing road, albeit in poor condition, however,

they will need to be relocated or removed in line with widening to a four-lane road. Accordingly, in consideration of current conditions, it has been decided to install street lights at 40 points such as intersections, curves, bus bays and sections before and after the level crossing, etc.

4) Multipurpose underground conduits

Since the target road is situated in the city, it is likely that new public facilities will be installed in the future. Accordingly, in order to avoid stopping traffic and partially removing and replacing paving every time new facilities are added in future, the Tanzanian side requested multipurpose underground conduits be installed in order to carry public utilities across the road. Accordingly, three such conduits, that is one at each main intersection, shall be installed.

5) Central reserve

It is planned to install a central reserve 9 m wide that will also serve as the BRT zone in the future. Incorporation of the BRT program into the target road section is being examined as the next section after Morogoro Road where work has already been started. Accordingly, since BRT construction on the target section is not likely to be implemented for a few years, it has been decided to pave the central reserve with a single layer of asphalt in order to prevent erosion by rain.

2-2-3 Outline Design Drawings

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

Table 2-10 List of Outline Design Drawings

No.	Drawing Contents	Number of Drawings
1	Standard cross-section, road top view and profile	5
2	General bridge drawings	1
3	Drainage facilities structural drawings	2
4	Auxiliary facilities structural drawings	6

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

(1) Basic policy in implementation

Since the Project will be implemented under the grant aid scheme of the Government of Japan, the following points have to be taken into consideration as a guideline for execution.

① Formulate the implementation method and construction schedule in 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 side, adopt common execution methods that do not require special construction machinery or technology following construction.

③ In compiling the execution 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 vitalization of the local economy.

2-2-4-2 Implementation Conditions

(1) Adherence to labor standards

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

(2) Social and environmental consideration during the works period

① Select construction methods with a view to minimizing dust and particulate, etc.

② Establish plants, etc. that generate noise and particulate away from inhabited areas, etc.

③ Transport waste materials that arise as a result of the works to an appropriate site for landfill disposal, etc.

④ Appropriately treat wastewater discharged from plants according to Tanzanian standards.

(3) Securing of safety during works

① Since lane control will be required during the works, establish safety facilities (barricades, colour cones, revolving lights) and assign traffic controllers.

② Warn local residents about the increased works traffic through staging public hearings (chaired by TANROADS) and installing information/notice boards.

(4) Need for means of communication on site

Since mobile phones can be used on the Project section, it has been decided to let works personnel carry mobile phones. Moreover, traffic controllers shall carry portable transceivers and a traffic safety control setup geared to ensuring the safety of general traffic and local residents shall be established.

(5) Observance of local customs

A construction time schedule in accordance with the local religious customs and daily habits shall be considered when formulating the execution scheme.

(6) Securing of traffic safety

A plan shall be formulated for ensuring the efficient and rational diversion of traffic within the ROW while paying attention to safety.

(7) HIV countermeasures

It will be necessary to consider measures for countering HIV among Project personnel when compiling the execution plan.

(8) Customs clearance

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

(9) Land acquisition

Confirm that pre-agreement for land use and payment of guarantee money, etc. will properly be undertaken by the Tanzanian government.

(10) Coordination of construction time schedule with others

Progress of works on the Tanzanian side shall sufficiently be verified for coordination.

2-2-4-3 Scope of Works

The works to be undertaken by the Japanese and Tanzanian sides during the Project are outlined below.

(1) Scope of work by Japan

1) Construction work

Upgrading of existing road over the target section of approximately 1.3 km:

- Road upgrading works (earth works, roadbed works, binder course and surface course works, drainage structures, road auxiliary facilities, etc.), temporary installations and main structural works required for bridge construction

- Temporary installations (base camp (including plant yard), office, warehouse, etc.)

2) Procurement of labor, equipment and materials

Procurement of the labor, construction materials and equipment for construction of the road and bridge

3) Safety measures

Safety management and measures concerning execution of the construction works

4) Consulting service

Detailed design, drawing up of tender and contract documents, assistance for bidding, and works supervision

(2) Scope of work by Tanzania

1) Securing of land

Securing of the road right of way (ROW), land necessary for facilities such as base camp, etc. given in the “Work execution plan,” and site for disposal of construction waste materials and surplus soil

2) Customs clearance and procedure for tax exemptions

Provision of conveniences and prompt implementation to facilitate customs clearance and tax exemption based on the list of imported equipment and materials prior to commencement of the construction works

3) Relocation of public facilities

- Relocation of obstructing facilities (water pipes, telephone cables, power line) (see 2-3-2 ‘Items Unique to the project’)

- Assignment of supervisory staff to the Tanzanian side and securing of expenses for them

4) Others

- Support to facilitate immigration and stay, etc. of Japanese engaged in implementation of the Project
- Appointment of counterpart and securing of personnel and expenses

2-2-4-4 Consultant Supervision

(1) Procedure for implementation of consulting service

Conclusion of the exchange of notes (E/N) for the Project between the governments of Japan and Tanzania and, following that, of the Grant Agreement (G/A) between JICA and the Government of Tanzania, forms the precondition for implementation of the Project. After conclusion of the E/N and G/A, the consultant shall conclude a consultancy agreement with TANROADS as the implementation agency on the Tanzanian side according to the scope and procedure of the grant aid by Japan on the basis of the letter of recommendation by JICA to proceed with implementation design, assistance for bidding and execution control. The principal contents of service to be contained in the consultancy agreement are described below.

1) Stage of drawing up tender documents

According to the results of the basic design study report, the implementation design for each facility shall be conducted, tender drawings and documents shall be prepared, and approval for them obtained from the Tanzanian side.

2) Tender stage

TANROADS will select a contractor of Japanese nationality by open bidding with assistance by the consultant. The representatives of the Tanzanian government participating in the bidding and signing of construction contract will need to have the authority to approve the contract and be capable of making judgment on technological matters. The assisted services by the consultant in the tender stage will be as follows:

①Pre-qualification, ②Announcement of tender, ③ Bidding and evaluation of tenders, ④ Contract conclusion.

3) Organization for execution supervision (organization for site supervision by the consultant)

After contract conclusion with the contractor, the consultant shall issue the notice to commence and proceed with execution supervision. Within the framework of execution control, the consultant shall directly report to the Tanzanian side about the progress of construction, and propose improvements to the contractor regarding work progress control, quality, safety and payments, etc. Furthermore, the consultant shall make regular reports to the Japanese Embassy in Tanzania and the Tanzanian office of JICA. Moreover, one year after completion of execution supervision, the consultant shall perform inspection of the completed construction works.

2-2-4-5 Quality Control Plan

The contractor shall establish a quality control laboratory in the camp yard. For this, the minimum necessary equipment for implementing quality tests on road soil, asphalt paving and concrete, etc. shall be procured. As for the staffing plan, one locally recruited laboratory technician shall supervise all testing. The following table shows the main quality control plan for the Project construction works.

Table 2-11 List of Quality Control Items

Description			Test method	Test frequency
Base / Sub-base	Combination (mixed) materials		Liquid limit / Plasticity limit	For each mix
			Grain size distribution	
			Strength test for aggregates	
			Density test for aggregates	
			Maximum drying density (compaction test)	
	Laying		Density test (compaction rate)	Once / day
Prime coat Asphalt emulsion	Materials	Bitumen materials	Certificate of quality	For each material
			Temperature and quantity at the time of keeping / spreading	For each delivery
Asphalt	Materials	Bitumen materials	Certificate of quality, Ingredient analysis list	For each material
		Aggregate	Grain size distribution	For each mix, once / month
			Water absorption rate	For each material
			Strength test for aggregate	
	Mixing test		Stability	For each mix
			Flow value	
			Porosity	
			Design asphalt value	
	Laying		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	
		Course aggregate	Absolutely dry specific gravity	For each material
			Grain size distribution	
	Cement mix		Compressive strength test	For each mix
	When placing		Slump (concrete)	For each material
			Air contents	For each material
			Temperature	For each material
	Strength		Compressive strength test (7th day, 28th day)	For each material
Reinforcement bar	Materials		Certificate of quality, Tension strength test result	Each lot unit

2-2-4-6 Procurement Plan

(1) Policies regarding Procurement

1) Labor

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

2) Construction materials

In the coastal areas of Tanzania, basic road construction materials such as banking materials, roadbed materials and crushed stone for asphalt paving can only be procured in extremely limited locations, and such materials need to be transported over long distances. In view of these conditions, the following policies have been adopted regarding procurement of construction materials:

① In view of economy and ease of procurement, 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 obtained locally, procure from Japan or third countries upon considering ease of procurement, price, quality and delivery time, etc.

④ Concerning crushed stone for road construction, excavating rights are required in order to directly extract stone from a quarry and produce aggregate, however, since the procedure for this usually takes a few months, it is more realistic to utilize a local stone merchant or builder. Similarly, concerning the blasting work necessary to conduct excavation, it has been decided to utilize local operators in order to secure permission.

Table 2-12 Procurement of Primary Materials

Material	Procurement Situation
Banking material	Laterite transported from a quarry some 25 km from Gerezani Road
Roadbed material	Coral stone or laterite transported from the same quarry as above
Crushed stone for paving	Granite transported from Lugoba Quarry some 120 km from Gerezani Road
Asphalt	Imported
Cement	Cement is domestically produced, however, capacity is limited and it can also be procured from third countries.
Reinforcing bars	Imported
Fuel	Imported
Guard rails	Imported
Road surface paint	Imported

3) Construction machinery

Road construction machines not including special machinery can be rented from local construction companies in Tanzania, however, some of these machines do not possess the necessary capacity and are not maintained in suitable condition for use in the Project. The procurement sources of main works equipment have been planned as shown in the following table.

Table 2-13 Main Works Machinery Procurement Sources

Equipment	Specifications	Source			Reason
		Tanzania	Japan	Third Country	
Bulldozer	Normal 3t type	●			Lease from local contractors is possible.
Bulldozer	Normal 21t type		●		Locally available equipment is badly deteriorated.
Back hoe	Crawler type, 0.28m^3 piling	●			Lease from local contractors is possible.
Back hoe	Crawler type, 0.45m^3 piling		●		Locally available equipment is badly deteriorated.
Back hoe	Crawler type, 0.8m^3 piling		●		Ditto
Wheel loader	Normal type, 2.1m^3 piling		●		Ditto
Dump truck	Normal type, diesel, 4t & 10t loading	●			Lease from local contractors is possible.
Truck crane	6t loading, 2.9t suspension	●			Ditto
Semi-trailer	25t, 32t loading	●			Ditto
Crawler crane	Hydraulic expansion jib, 50~55t suspension		●		Procure from Japan, because local procurement is impossible
Truck crane	Hydraulic telescopic jib 16t		●		Ditto
Rough terrain crane	Hydraulic telescopic jib 25t		●		Ditto
Forklift	Engine drive, maximum load 1.5t	●			Local leasing is possible
Hydraulic pile press-in and removal machine	Engine, pressure input 980.7~1,471.0kN		●		Procure from Japan, because local procurement is impossible
Oscillating all-casing excavator	Crawler type, maximum excavation diameter 1,500 mm		●		Ditto
Large breaker	Hydraulic type, 600~800kg		●		Ditto
Large breaker	Hydraulic type, 1,300kg		●		Ditto
Motor grader	Blade width 3.1m		●		Ditto
Road roller	Macadam 10~12t		●		Locally available equipment is badly deteriorated.
Tire roller	8~20t		●		Ditto
Vibrating roller	Hand guide type 0.8~1.1t	●			Local leasing is possible
Vibrating roller	Mounted combined type 3~4t	●			Ditto
Concrete plant	Forced mixing type, capacity 30m^3/hr		●		Procure from Japan, because local procurement is impossible
Truck mixer	Mixing capacity 3.0~3.2m^3		●		Ditto
Asphalt plant	Batch type 30t/h		●		Ditto
Asphalt kettle	Stationary type, tank capacity 6,000ℓ		●		Locally available equipment is badly deteriorated.
Asphalt distributor	Self-running type, tank capacity 6,000ℓ		●		Ditto
Water sprinkler (water supply) truck	Tank capacity 5,500~6,500ℓ		●		Locally available equipment is badly deteriorated.
Tamper, vibrating compactor	60~80kg, 40~60kg	●			Local leasing is possible
Motor generator	Rated capacity 20KvA-300KvA	●			Ditto

(2) Important Points to consider in Procurement

The important points to consider in procurement are as follows.

① Compile a procurement schedule that doesn't 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, land at Dar es Salaam Port (the main port of Tanzania). For inland transportation, use trailer trucks for construction machinery and trucks for general goods (materials).

2-2-4-7 Soft Component Plan

This is not applicable in the Project.

2-2-4-8 Implementation Schedule

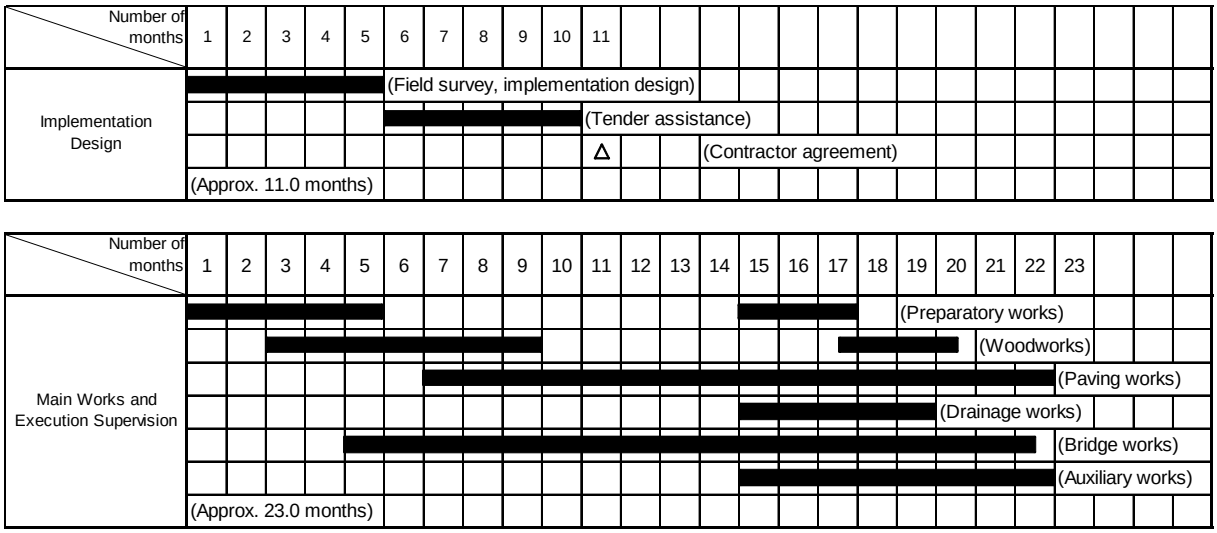
(1) Setting of the Works Period

In the event where the Project is implemented under the grant aid scheme of the Government of Japan, the following table shows the draft schedule for implementation design and construction supervision. The estimated entire schedule is approximately 34 months, comprising approximately 11 months for the implementation design and tender activities and 23 months for the construction works.

(2) Implementation Schedule

The following table shows the draft implementation schedule.

Table 2-14 Work Implementation Schedule (Draft)



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 supply of service and materials under approved contracts.
- Complete the environmental and social consideration procedures and necessary surveys required under Tanzanian law.

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

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 for the Project is 3,764 million Tshs, and since this is equivalent to roughly 0.7% of the total development works budget in 2008/9 of approximately 505,520 million Tshs, it is comfortably affordable for the Tanzanian side. Moreover, it has been confirmed with TANROADS that these budgets will be secured in fiscal 2011.

Table 2-15 Outline of the Scope of Works on the Tanzanian Side

(Unit: million Tshs)

Item		Contents	Cost burden
1	Environmental and social consideration items	Relocation and compensation of houses in the ROW	3,000
2	Relocation of existing public service structures	Relocation of water pipes, telecommunications lines, power lines and steel towers	634
3	Registration of construction operators	Costs of registration of construction operator (CRB) and consultant (ERB)	112
4	A/P costs	Authorization for payment (A/P) expenses	18
Total			3,764

Note: 1Tshs = 0.065 yen

(2) Securing of a temporary yard

It will be necessary to secure a temporary yard for the construction contractor.

- Assumed location s and scale of temporary yards

  Base camp : 80 m x 150 m, on the left side of the road 8.3 km from the end point

  Asphalt and concrete plant : 30 m x 200 m, on the left side of the road 2.3 km from the end point

- Required period: 3 years

(3) Implementation of a project explanation meeting for roadside residents

Immediately following signing of the official exchanged notes (E/N), the implementing agency is requested to stage an explanation meeting geared to thoroughly conveying safety measures, noise countermeasures and work methods, etc. to the roadside residents or their representatives.

(4) Traffic safety measures

It is requested that pedestrians and drivers will be thoroughly informed about temporary traffic arrangements so that they comply with instructions given by traffic controllers during the construction period.

(5) Thorough notification to road users

Since the construction work is expected to cause inconvenience to the passing traffic, it is requested that such inconveniences be thoroughly informed to road users via TV, radio, newspapers and other public media.

(6) Registration costs for construction operators (CRB, ERB)

In recent years, it is necessary to bear the following registration costs when construction firms and consultants in Tanzania register with the associated organizations in that country.

Table 2-16 Registration Costs for Construction Operators

Item	Cost	Remarks
Registration fee	$20,000	Assuming $10,000 each for CRB and ERB
Annual membership fee	$60,000	Assuming $10,000 per year each for CRB and ERB, 3 years
Total	$80,000	

2-4 Project Operation and Maintenance Plan

The following maintenance work will be required in order to keep the Project facilities in good condition following construction.

(1) Routine maintenance

Maintenance work, particularly the repair work required after the rainy season, is listed below.

- Patching up the damaged road surface (filling potholes)
- Repairing the sub-base as required
- Reshaping the road surface

Also, it is necessary to repair and clean side ditches, slopes and traversal drainage structures constantly.

(2) Periodic maintenance work

- Road surface repairs
- Sub-base repairs

- Repairs of structures

Currently, the TANROADS Dar es Salaam regional office conducts the above maintenance work by subcontracting to local construction companies (works contracts include direct works costs, personnel expenses and overheads), and there are no operational problems. Since it will be especially important to repair damaged parts immediately, the local side will be expected to conduct regular rounds of inspection at sufficient intervals for early detection.

2-5 Project Cost Estimation

2-5-1 Initial Cost Estimation

(1) Cost Burden on the Tanzanian side : 3,764 million Tshs
(approximately 245 million yen)

① Cost of relocating and demolishing buildings : 3,000,000,000 Tshs
(approximately 195.0 million yen)

② Cost of relocating public utility structures : 634,000,000 Tshs
(approximately 41.2 million yen)

③ Cost of registering construction company : 112,000,000 Tshs
(approximately 7.3 million yen)

④ Cost for issuing AP : 18,000,000 Tshs
(approximately 1.2 million yen)

(2) Estimation Conditions

The conditions at the point of estimation in September 2010 were as follows.

1) Exchange rate

US$1 = ¥90.90

2) Implementation period

The Project intends to use the government bond (A) scheme for funding with approximately 34 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 the 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 is estimated to be approximately 20 million Tshs (equivalent 1.3 million yen) during the Project life. Since this is equivalent to 0.001% of the annual maintenance budget (2.64 billion yen) of TANROADS in fiscal 2008, this cost is considered to be easily affordable for the Tanzanian side.

Table 2-17 Main Maintenance Items and Costs

(1Tshs = 0.065 yen)

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	195	12	81,900,000
		Roadbed repair	1% of road area	m^2	26,400	195	12	61,776,000
		Shoulder repair	1% of footpath area	m^2	26,000	78	12	24,336,000
		Cleaning of structures	5% of the length of side ditches	m	2,860	130	12	4,461,600
		Subtotal-I				15-year aggregate=		172,473,600
Periodic	Every 5 years	Roadbed repair	2% of total paved area	m^2	26,400	390	3	30,888,000
		Overlay	2% of total paved area	m^2	35,000	390	3	40,950,000
		Shoulder repair	2% of footpath area	m^2	26,000	156	3	12,168,000
		Repair of structures	1% of the length of side ditches	m	230,230	26	3	17,957,940
		Subtotal-II						101,963,940
			Total routine and periodic maintenance III (=I + II)					274,437,540
Operation and maintenance cost			10% of III	Set	-	-		27,443,754
Total								301,881,294
Cost per year								20,125,420

2-6 Other Relevant Issues

In order to smoothly implement the Project works and realize and sustain an adequate Project effect, the Tanzanian side will need to pay particular attention to the following points.

(1) Speeding-up of tariff exemption and customs clearance procedures

After the Exchange of Notes (E/N) marking the official decision of Project implementation, TANROADS will need to appeal to the necessary organizations and agencies to ensure speedy and sure exemption from tariffs and customs clearance.

(2) Implementation of Project explanation meetings for roadside residents

After the Exchange of Notes (E/N) marking the official decision of Project implementation, TANROADS will promptly need to stage meetings to explain the Project to roadside residents or their representatives.

(3) Traffic safety

It will be necessary to appeal to drivers to follow the guidance of traffic controllers during the works.

(4) Notification of inconvenience during the works

Since the works are expected to cause inconvenience to passing traffic, it will be necessary to thoroughly inform road users via radio and other public media.

CHAPTER 3

PROJECT EVALUATION

CHAPTER 3
PROJECT EVALUATION

3-1 Recommendations

3-1-1 Preconditions for Project Implementation

The preconditions necessary for Project implementation will be as follows.

- In the road upgrading to be conducted in the Project, it will be necessary for TANROADS to secure the necessary right of way (ROW, 45 m in width) and to relocate houses, offices and shops, etc. that are currently inside the ROW. It will be necessary to finish this relocation work by the start of the Project tender.
- Concerning the banked sections at Gerezani Intersection and around the bridge, it will be necessary to secure additional land next to the ROW (45 m) of 100 m^2 and 300 m^2 respectively (400 m^2 in total). This land will need to be secured at the same time as the above ROW.
- In the road upgrading to be conducted in the Project, it will be necessary to relocate public facilities such as power lines, steel towers, telephone lines and water pipes, etc. inside the ROW. Moreover, it will be necessary to complete relocation of these obstacles by the start of the Project tender.
- It will be necessary for Tanzanian side to secure the necessary budget for the said relocation work (budget request to be made by March 2011) and to promptly implement the relocation after the budget is granted in July. It will be necessary for the Tanzanian side and Japanese side to share information regarding the schedule and procedures and for the Tanzanian side to aim for definite implementation to ensure that Project implementation is not hindered.
- In order to conduct widening of Gerezani Road, it will be necessary for TANROADS (the implementing agency) to implement an EIA and obtain a certificate from the National Environmental Management Conference (NEMC) (this is currently anticipated around April 2011).
- It will be necessary to secure camp sites, plant sites and earth quarries for the Project and to obtain authorization for digging.
- It will be necessary to support customs clearance procedures and facilitate the prompt and definite implementation of tariff exemption measures regarding the equipment and materials procured for the Project. Failing to do so could lead to works delays.
- The existing Gerezani Overpass will be retained, however, the Tanzanian side will need to conduct maintenance and remove it in future when it becomes necessary.

- It is expected that the road upgrading works will be conducted while securing daily traffic volume of at least 20,000 vehicles. Moreover, following completion, vehicles will travel faster than at present due to the improved road conditions. Accordingly, in order to prevent serious accidents during and after the works, it is desirable to implement public education on road safety for road users and local residents.
- In order to secure smooth traffic and extend the service life of the road and structures following completion of the works, it will be necessary for the Tanzanian side to immediately start maintenance work after issuing the works completion certificate. In addition to implementing everyday maintenance, removing obstacles and conducting cleaning work, etc., it will be important to definitely implement periodic inspections and conduct prompt repairs when damage is found on the road and structures. Accordingly, it will be necessary to secure the necessary budget and personnel so that maintenance can be implemented on an ongoing basis. Moreover, as was mentioned in the previous section on operation and maintenance, the Tanzanian side is amply capable of implementing the necessary work.

3-1-2 External Conditions for Attainment of the Overall Project Plan

The following external conditions will be needed in order to realize and sustain the Project effects.

① The Project proposes to retain the existing Gerezani Overpass and construct a new bridge on the inland side of this. Even if the existing bridge is continued to be used for pedestrian use, it will be necessary to conduct periodic maintenance in order to secure structural safety.

② The first phase works of the Bus Rapid Transit (BRT) Programme have been commenced with a view to improving road traffic conditions in Dar es Salaam. Since the Project road section corresponds to the second phase of the BRT programme, it is intended to secure a 9 m wide space in the centre of the Project road. Accordingly, when it comes to implementing the BRT programme over the Project section, it may become necessary to make fine adjustments for BRT stations and intersection structures, etc.

③ In order to improve the road traffic situation in Dar es Salaam, in addition to the said BRT programme, widening works and so on are being conducted on successive sections of trunk roads. Moreover, the Project road section is the final section on the trunk road that will be the sole link between the capital Dar es Salaam and the south of the country. Accordingly, not only is the Project road an important route in the metropolitan region, it will also play an important role in the arterial road network of Tanzania, and Project implementation is indispensible for promoting development in the south of the country.

3-2 Project Evaluation

3-2-1 Relevance

① The Project beneficiaries will be large numbers of residents living in impoverished areas in the southern part of Tanzania, the south of Dar es Salaam and the entire city area.

② The Project is urgently required in order to rectify income differentials, strengthen the trunk road transportation network, improve the living environment of residents and remove impediments to economic activity caused by the serious congestion occurring on the target road section.

③ The Project road can be operated and maintained utilizing the independent funds, human resources and technology of the Tanzanian side, and it will not require excessively sophisticated technology.

④ The Project will contribute to rectifying poverty differentials, which is a common goal in national development plans in Tanzania, and it will help improve and strengthen the trunk road network.

⑤ The Project entails hardly any negative environmental and social impacts.

⑥ As well as having necessity and superiority in using Japanese construction technology, the Project can be implemented without any great difficulty under Japan's Grant Aid scheme.

3-2-2 Effectiveness

(1) Quantitative effects

Project implementation will impart direct effects in that the serious congestion currently arising on Gerezani Road will be mitigated, safety on the bridge section will be enhanced through raising load resistance and width, safety of pedestrians will be improved through installing footpaths and auxiliary facilities, and safe and smooth traffic flow will be secured.

Table 3-1 shows the quantitative effects that can be anticipated from Project implementation. This shows reference values from the reference year before Project implementation and target values for the intended Project completion year.

Table 3-1 Quantitative Effects

Indicator	Current Value (2010)	Design Value (2014)
Peak (*) average speed	0.7km/h	40km/h
Traffic volume	825 vehicles/hour/lane	1,740 vehicles/hour/lane

(*)Peak times (morning 06:00~12:00, evening 18:00~19:00, total 9 hours)

(2) Qualitative effects

The Project will bring about the following qualitative effects.

① The shortening of the travelling time will reduce transportation costs.

② Increasing transport capacity on the road will improve the level of convenience of transport in Dar es Salaam.

③ Through securing regularity of passenger and goods distribution, access to the centre of Dar es Salaam and port facilities will be improved, thereby contributing to the social and economic vitalization of Tanzania.

④ Construction of the Project road will make it possible to separate vehicles travelling at the standard speed from slower vehicles, thereby ensuring safe and smooth traffic flow.

⑤ Through stabilizing access from surrounding farm areas to markets, the stable transportation of goods will be secured, thereby leading to lower transportation costs and contributing to stable prices.

⑥ Through constructing a road linking Dar es Salaam to southern parts of Tanzania, the Project will contribute to economic development of the south and help rectify poverty differentials in that region.

APPENDICES

Appendix 1 Member List of the Study Team
Appendix 2 Study Schedule
Appendix 3 List of Parties Concerned in the Recipient Country
Appendix 4 Minutes of Discussions (M/D)
Appendix 5 Other Relevant Data (Technical Note signed with the Government of Tanzania)
Appendix 6 References (Outline Design Drawings)

Appendix 1 Member List of the Study Team

(1) First Field Survey

Position	Name	Affiliation
Chief / Traffic Planning	Hideaki MORITA	Ingérosec Corporation
Road Design	Shin HISADA	Toho Consultants Co., Ltd.
Bridge Planning / Integrity Survey	Jiro KOYAMA	Ingérosec Corporation
Transmission Line Relocation Planning	Yasutaka HINATA	EX'S, Inc.
Natural Conditions Survey	Atsuyuki ISHIKAWA	Ingérosec Corporation
Environmental and Social Consideration	Kanji WATANABE	Sowa Consultants Inc.

(2) Second Field Survey

Position	Name	Affiliation
Team Leader	Shuntaro KAWAHARA	Counsellor, JICA, Economic Infrastructure Department
Project Management	Yoshitomo KUBO	JICA, Economic Infrastructure Department, Transport and Information Communications Group, Transport and Information Communications Section 2
Chief / Traffic Planning	Hideaki MORITA	Ingérosec Corporation
Road Design	Shin HISADA	Toho Consultants Co., Ltd.
Bridge Planning / Integrity Survey	Jiro KOYAMA	Ingérosec Corporation
Transmission Line Relocation Planning	Yasutaka HINATA	EX'S, Inc.
Natural Conditions Survey	Atsuyuki ISHIKAWA	Ingérosec Corporation
Environmental and Social Consideration	Kanji WATANABE	Sowa Consultants Inc.
Execution Planning / Estimation	Fujio OGAWA	Ingérosec Corporation

(3) Outline Explanation of the Preparatory Survey

Position	Name	Affiliation
Team Leader	Hiroshi KIMURA	JICA, Economic Infrastructure Department, Transport and Information Communications Group, Transport and Information Communications Section 2, Manager
Project Management	Yoshitomo KUBO	JICA, Economic Infrastructure Department, Transport and Information Communications Group, Transport and Information Communications Section 2
Chief / Traffic Planning	Hideaki MORITA	Ingérosec Corporation
Road Design	Shin HISADA	Toho Consultants Co., Ltd.
Bridge Planning / Integrity Survey	Jiro KOYAMA	Ingérosec Corporation
Transmission Line Relocation Planning	Yasutaka HINATA	EX'S, Inc.

Appendix 2 Study Schedule

(1) First Field Survey

Month	Date	Day	Team Leader	Project Management	Chief / Traffic Planning	Road Design	Bridge Planning /Integrity Survey	Transmission Line Relocation Planning	Natural Conditions Survey	Environmental and Social Consideration	Execution and Procurement Plan/Estimation
			JICA	JICA	Hideaki MORITA	Shin HISADA	Jiro KOYAMA	Yasutaka HINATA	Atsuyuki ISHIKAWA	Kanji WATANABE	Fujio OGAWA
6	5	Sat			Japan ~						
	6	Sun			~ Dar es Salaam						
	7	Mon			Courtesy calls to Embassy, MoID, TANROADS and JICA Office						
	8	Tue			Explanation and discussion of Inception Report (TANROADS)						
	9	Wed			Field surveys (confirmation of current conditions in the Study Team-TANROADS joint project, confirmation of road boundary and obstructions, etc.)						
	10	Thu			Field survey (discussions with BRT-related agencies, Railway Authority, RAHCO, Port, BP, etc.)				Field survey (collection of information on buried objects)	Field survey (discussions with TANROADS, NEMEC, etc.)	
	11	Fri			Field survey	Field survey	Field survey	Field survey (discussions with power company)			
	12	Sat						Field survey (confirmation of similar projects)			
	13	Sun			Team internal discussions, materials collection and arrangement						
	14	Mon			Examination of Project alternative plans				Local subcontracting negotiations	Confirmation of procedures for acquiring environmental authorization	
	15	Tue			Presentation, explanation and discussion of Project alternative plans						
	16	Wed			Field survey (preparation of discussion materials)				Local subcontracting negotiations	Confirmation of procedures for acquiring environmental authorization	
	17	Thu			Discussions with TANROADS (contents of technical notes, etc.), Embassy, MoID, and report at JICA office						
	18	Fri			~ Dar es Salaam						
	19	Sat			~ Japan						

(2) Second Field Survey

Month	Date	Day	Team Leader	Project Management	Chief / Traffic Planning	Road Design	Bridge Planning /Integrity Survey	Transmission Line Relocation Planning	Natural Conditions Survey	Environmental and Social Consideration	Execution and Procurement Plan/Estimation
			JICA	JICA	Hideaki MORITA	Shin HISADA	Jiro KOYAMA	Yasutaka HINATA	Atsuyuki ISHIKAWA	Kanji WATANABE	Fujio OGAWA
7	3	Tue			Japan ~						Japan ~
	4	Wed			~ Dar es Salaam						~ Dar es Salaam
	5	Thu			Discussions with TANROADS						Discussions with TANROADS
	6	Fri			Field surveys	Field surveys	Field surveys	Field surveys			Field surveys
	7	Sat									
	8	Sun			Team internal discussions				Japan~		Team internal discussions
	9	Mon	Courtesy call and discussions (TANROADS)		Field surveys	Field surveys	Field surveys	~ Dar es Salaam			Field surveys
	10	Tue	Courtesy call and discussions (MoID)					Field surveys			
	11	Wed	Discussions (TANROADS)								
	12	Thu	Signing of MD (TANROADS)								
	13	Fri	Report (Japanese Embassy, JICA)								
	14	Sat	~Japan		Field surveys						
	15	Sun			Team internal discussions						Team internal discussions
	16	Mon			Field surveys	Field surveys	Field surveys	Field surveys	Field surveys		Field surveys
	17	Tue						Dar es Salaam~			
	18	Wed						~Japan			
	19	Thu								Japan~	
	20	Fri								~ Dar es Salaam	
	21	Sat								Field surveys	
	22	Sun			Team internal discussions				Team internal discussions		
	23	Mon			Field surveys	Field surveys	Field surveys		Field surveys	Field surveys	Field surveys
	24	Tue									
	25	Wed									
	26	Thu									
	27	Fri			Report (Japanese Embassy, JICA)				Report (Japanese Embassy, JICA)		
	28	Sat			Dar es Salaam~				Field surveys	Field surveys	Field surveys
	29	Sun			~Japan				Team internal discussions		
	30	Mon							Field surveys	Field surveys	Field surveys
	31	Tue									
8	1	Wed							Dar es Salaam~		
	2	Thu							~Japan		

(3) Outline Explanation of the Preparatory Survey

Day No.	Month	Date	Day	Team Leader JICA	Project Management JICA	Chief / Traffic Planning Hideaki MORITA	Road Design Shin HISADA	Bridge Planning / Integrity Survey Jiro KOYAMA	Transmission Line Relocation Planning Yasutaka HINATA
1	1	31	Mon			Move			
2		1	Tue			Move			
3		2	Wed			Field investigations, Courtesy calls to TANROADS			
4		3	Thu			Field investigations			
5		4	Fri			Courtesy call to and discussions at TANROADS (explanation of draft report), presentation of draft M/D, three-party talks with public utilities agencies (electricity, communications, water supply)			
6		5	Sat			Arrangement of materials			
7	2	6	Sun	Move		Arrangement of materials			
8		7	Mon	Courtesy calls to the JICA Tanzania Office					
9		8	Tue	Field investigations, Courtesy calls to, MoW, Japanese Embassy					
10		9	Wed	Courtesy call to TANROADS and discussion of draft M/D					
11		10	Thu	Discussion of minutes (TANROADS, MoW, MoFEA, Study Team) JICA Tanzania Office report Move					
12		11	Fri	Move					

Appendix 3 List of Parties Concerned in the Recipient Country

Ministry of Works, MoW	
Musa I Iyombe	Director of Transport Infrastructure
Alex Mollel	Road Engineer
Ministry of Finance and Economic Affairs, MoFEA	
Mameltha K. Mutagwaba	Ag. Assistant Commissioner, External Finance
Samuel N. Marh	Ag. Assistant Commissioner, Bilateral Aid
James Msma	Finance Management officer
Yosephe Tamamy	Senior Economist
Tanzania National Roads Agency, TANROADS	
Patrick A.L. Mfugale	Ag. Chief Executive
Ephraem C. M. Murema	Chief Executive
Jason Rwiza	Director of Planning
Chrispianus AKO	Ag. Director of Projects
Ebenezer R Mollel	Head of Design and Standards
Bencolias Tinkaligaile	Head of Planning
Noel K Ngowi	Head of Material
Lutengano E. Mwandambo	Project Engineer
Julius Ngusa	Project Engineer
Mohamed Issa	Project Engineer
Browo Kisawo	Surveyor
Martin Anthony	Engineer
Ambari S. Idabaga	Material Engineer
Emanuel Msumba	Structural Engineer
Sanjo M. Mgeta	Senior Environmentalist
Dar es Salaam Rapid Transit, DART	
Cosmas P. M. Takule	Chief Executive
Enoch J. Kitandu	System and operation Director
Dar es Salaam City Council, DCC	
Bakari R. Kingobi	City Director
Mwakyusa P. H.	City Planner
Nyenye S. M.	Project Engineer
Irala Municipality	
Justine Mayoda	Civil Technician
Tanzania Electoric Supply Company Ltd., TANESCO	
Rukia A. S. Mpako	Principal Engineer, Temeke
Nathaniel Mbogela	Planning Engineer, Temeke
George Mtunda	Planning Engineer, Temeke
Mary Kabakuzi	Planning Engineer, Ilala
Dar es Salaam Water & Sewage Authority, DAWASA	
Isimael Kakwezi	Programme Engineer
Dar es Salaam Water & Sewage Company, DAWASCO	
Rwgphenem Ngosssa	Engineer
Tanzania Telecommunications. Corporation, TTCL	
Johon Hoseph Muwmun	Network Manager
Dominick Ngawnama	Engineer, DSM Central

J. Chilumba	Planning Engineer
Tanzania Railway, TRL	
A. H. Hawai	Planning Engineer
Tanzania Port Authority, TPA	
J. S. Natianota	Engineering Manager
Thed S. Bilegeya	Ag. Principal Engineer
G. Mugewi	Engineer, DSM HQ
Reli Assets Holding Company, RAHCO	
Aminiel H. Omari	Senior Engineer
BP Tanzania	
Engelhardt Kongoro	Managing Director
Embassy of Japan	
Hiroshi Nakagawa	Ambassador extraordinary and plenipotentiary
Yukinori Seki	Second Secretary
JICA Tanzania Office	
Yukihide Katsuta	Chief Representative
Toshihisa Hasegawa	Senior Representative
Shin Maruo	Representative

Appendix 4 Minutes of Discussions (M/D)

(1) Second Field Survey

Minutes of Discussions
on the Preparatory Survey
on the Project for Widening Gerezani Area Road
in the United Republic of Tanzania

In response to a request from the Government of the United Republic of Tanzania (hereinafter referred to as "Tanzania"), the Government of Japan decided to conduct a Preparatory Survey for Outline Design (hereinafter referred to as "the Survey") on the Project for Widening Gerezani Area Road (hereinafter referred to as "the Project"), and entrusted the study to Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent the Preparatory Survey Team for Outline Design (hereinafter referred to as "the Team") to Tanzania, headed by Mr. Shuntaro KAWAHARA, and is scheduled to stay in the country from August 9th to August 13th, 2010.

The Team held discussions with the officials of the Government of Tanzania and conducted a field survey. In the course of the discussions, both sides have confirmed the main items described in the Attachment. The Team will proceed to further works and prepare the Preparatory Survey Report.

Dar es Salaam, August 12th, 2010

Shuntaro KAWAHARA
Leader
Preparatory Survey Team
Japan International Cooperation Agency

Ephraem C M Mrema
Chief Executive
Tanzania National Roads Agency
The United Republic of Tanzania

Witness

Musa I Iyombe
Director of Transport Infrastructure
Ministry of Infrastructure Development
The United Republic of Tanzania

Jerome Buretta
Ag.Commissioner for External Finance
Ministry of Finance and Economic Affairs
TheUnited Republic of Tanzania

ATTACHMENT

1. Objective of the Project

The objective of the Project is to meet increasing transportation demand and contribute to mitigate traffic congestion, especially in the periphery of the Center of Dar es Salaam City, through the expansion of Gerezani Area Road in Dar es Salaam City in the United Republic of Tanzania.

2. Project Site

The Project site is located in Dar es Salaam City, as shown in Annex-1.

3. Responsible and Implementing Organizations

3-1.The responsible organization is the Ministry of Infrastructure Development (MoID).

3-2.The implementing organization is Tanzania National Roads Agency (TANROADS).

3-3.The organization chart of MoID is as shown in Annex-2.

3-4.The organization chart of TANROADS is as shown in Annex-3.

4. Items Requested by the Government of Tanzania

After discussions with the Team, the items described below were requested by the Tanzanian side.

Widening of Gerezani Area Road (approximately 1.3km, composed of Bandari Road and Gerezani Street)

- Construction of Gerezani Bridge (adequate length over existing railway, including allowable width for the Bus Rapid Transit-Lane)
- Installation of traffic signals at the existing Gerezani roundabout area.
- Installation of level crossing road at RAHCO and TAZARA rail line near BP depot.

JICA will assess the appropriateness of the above-mentioned component through the Preparatory Survey and will report the findings to the Government of Japan. Implementation of the Project will be decided by the Government of Japan.

5. Japan's Grant Aid Scheme

5-1. The Tanzanian side understands the Japan's Grant Aid scheme explained by the Team, as described in Annex-4 and 5.

5-2 The Tanzanian side will take the necessary actions to facilitate the smooth implementation of the Project, if the Japan's Grant Aid is implemented, according to existing agreement between the Government of Japan and the Government of Tanzania.

6. Schedule of the Survey

6-1.The Team will proceed to further study in Tanzania until September 1st, 2010.

6-2.JICA will prepare the draft report in English and dispatch a mission to Tanzania in order to explain its contents around January, 2011.

6-3.In case that the contents of the report is accepted in principle by the Government of Tanzania, JICA will complete the final report in English and send it to the Tanzanian side by the end of February,2011.

7. Environmental and Social Considerations

7-1.Both sides confirmed that the Tanzanian side conduct the necessary procedure concerning the environmental assessment (including stakeholder meetings for effective public participation about the outline of the Project, the EIA survey etc.) based on the laws and regulations of Tanzania by the commencement of the construction. The expected EIA schedule is as follows

(1) Preparation for the EIA consultant by the end of August, 2010.
(2) Contract with the EIA consultant by the end of September, 2010.
(3) Submission of Draft EIA Report by the end of December, 2010.
(4) Site Visit and Review of EIA report by National Environmental Management Council (NEMC)
(5) Revising and submission of EIA final report to NEMC and the Approval by the end of June, 2011.

7-2.Regarding the Project Affected Persons (PAPs) alongside the Project sites, the Tanzanian side agreed to secure and allocate the appropriate budget for the resettlement and the compensation for the PAPs before implementation of the Project. In this regard, the Resettlement Action Plan (RAP) will be prepared as necessary.

8. Other Relevant Issues

8-1. The Tanzanian side confirmed that the following undertakings should be taken by the Tanzanian side at the Tanzanian expenses under the Project

(1) Acquisition of the land for the Project.
(2) Relocation and/or removal of existing utilities (power cables, water lines, etc.) including the underground facilities from the Project site.
(3) Necessary arrangement for traffic control at necessary sections.
(4) Necessary arrangement for tax exemption of equipment and materials for the Project.
(5) Securing temporary yard for the Project.
(6) Securing site for borrow pit and disposal area.

8-2. Both sides confirmed that the Tanzanian side should secure enough budget and personnel necessary for smooth implementation of relocation and/or removal of existing utilities at its own expenses, conduct the necessary arrangement for relocation and/or removal before commencement of tender for the Project, and manage the progress for relocation and/or removal. The expected schedule for the relocation and/or removal (subject to change based on the agreement of both sides) is as follows.

(1) Budget estimation and registration by the end of March, 2011.
(2) Preparation of tender document by the end of April, 2011.
(3) Commencement of tender by the end of June, 2011.
(4) Contract with the company for relocation and/or removal by the end of August, 2011.
(5) Completion of relocation and/or removal by the end of December, 2011.

8-3. The Tanzanian side shall secure enough budget and personnel necessary for the operation and maintenance of the road and bridge constructed by the Project, including the periodical maintenance work after the completion of the Project.

8-4.The Team confirmed the Tanzanian side understood that the space for Bus Rapid Transit system will be included in the Project Design but any works for the Bus Rapid Transit system will not be covered by Japanese grant (except for the Gerezani bridge and roundabout) .

8-5. The Team explained that the refund of Value Added Tax (VAT) and Fuel levy imposed on Japanese nationals with respect to purchase of the products and services has been delayed and reduced in some previous Japan's Grant Aid Projects. The Team expressed great concern of JICA on the above mentioned problem to the Tanzanian side. Further, the Team requested the Tanzanian side to propose feasible measures in writing to prevent recurrence of such problem in this Project. The Tanzanian side understood the above mentioned concern expressed by the Team and promised to request the Ministry of Finance and Economic Affairs to comply with the agreement between the two Governments with respect to tax exemption.

8-6. The Tanzanian side understood that the Team is not in the position to guarantee implementation of the Project.

End

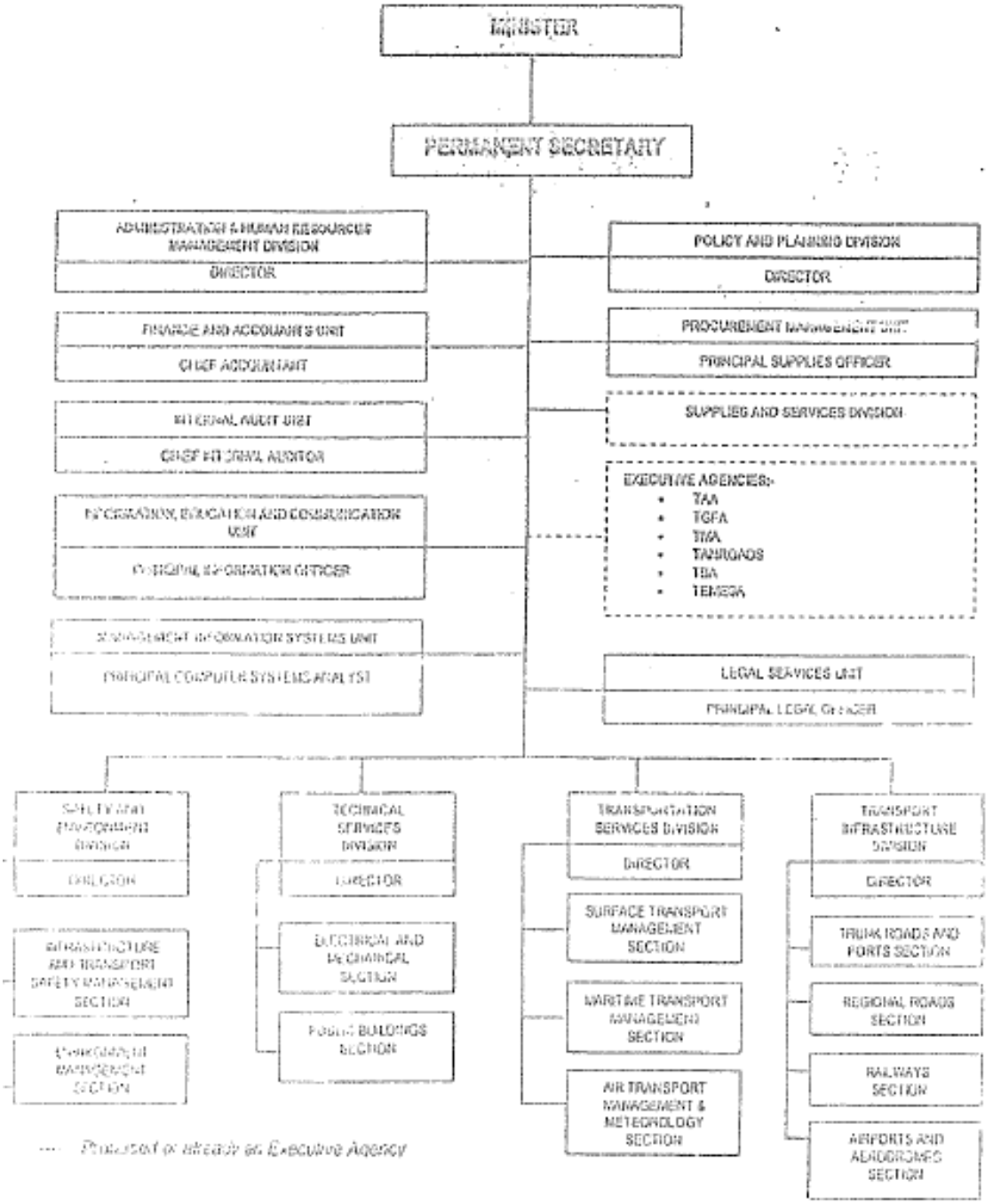
ANNEX-1: Project site
ANNEX-2: Organization chart of TANROADS
ANNEX-3: Organization chart of MoID
ANNEX-4: Japan's Grant Aid Scheme
ANNEX-5: Necessary measures taken by Each Government
ANNEX-6: Flow Chart of Japan's Grant Aid Procedures

ANNEX-1
Gerezani Street
Bandari Road
Google

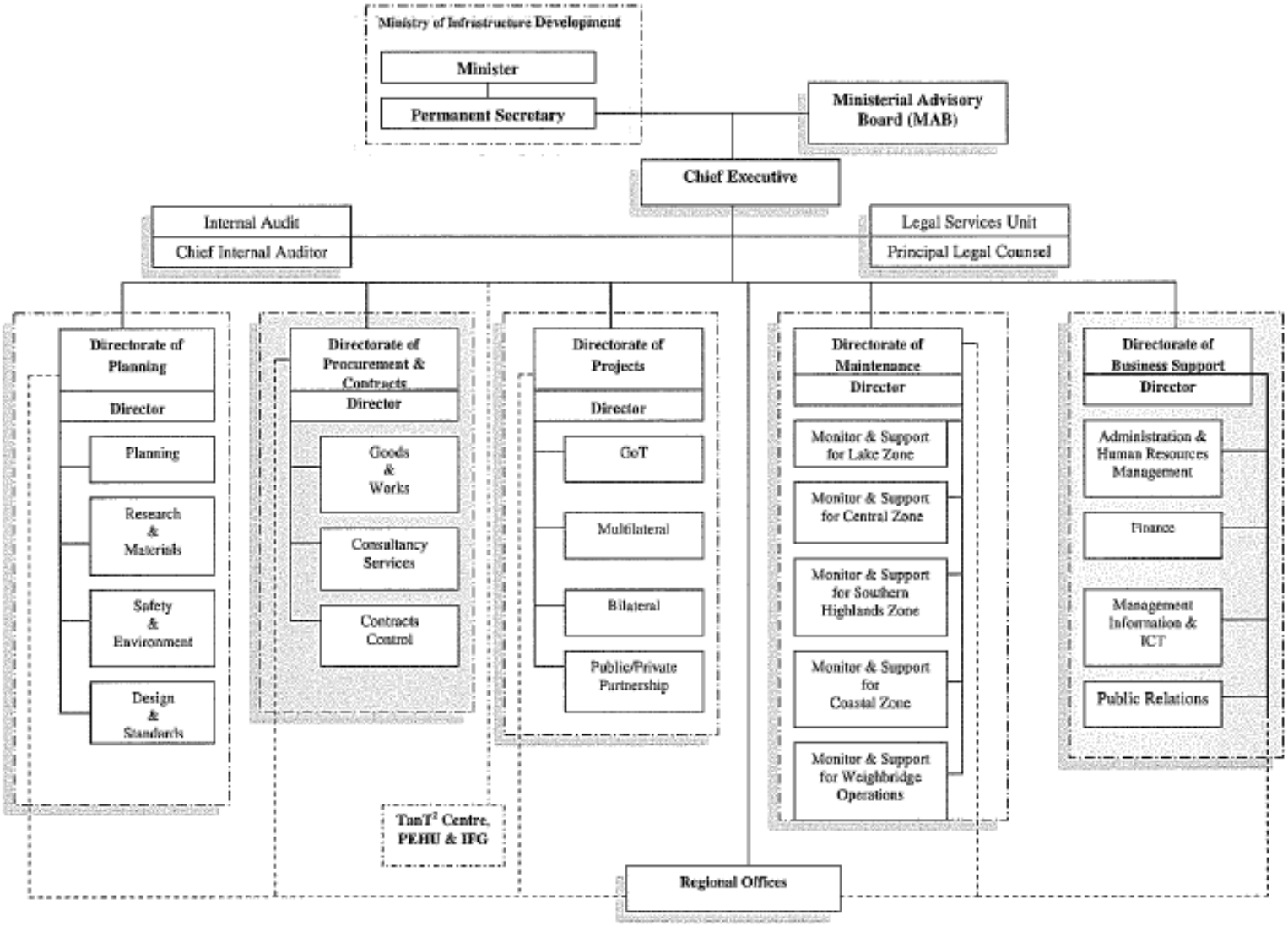
ANNEX 2

THE ORGANISATION STRUCTURE OF THE MINISTRY OF INFRASTRUCTURE DEVELOPMENT

(Approved by the President on 04th July, 2008)



Organization Structure for TANROADS (Headquarters) **Chart 11**



JAPAN'S GRANT AID

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as a part of this realignment, a new JICA law was entered into effect on October 1, 2008. Based on this law and the decision of the GOJ, JICA has become the executing agency of the Grant Aid for General Projects, for Fisheries and for Cultural Cooperation, etc.

The Grant Aid is non-reimbursable fund provided to a recipient country to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures

The Japanese Grant Aid is supplied through following procedures :

・Preparatory Survey
- The Survey conducted by JICA

・Appraisal &Approval
-Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet

・Authority for Determining Implementation
-The Notes exchanged between the GOJ and a recipient country

・Grant Agreement (hereinafter referred to as "the G/A")
-Agreement concluded between JICA and a recipient country

・Implementation
-Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

The aim of the preparatory Survey is to provide a basic document necessary for the appraisal of the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.

- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of a outline design of the Project.
- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Outline Design of the Project is confirmed based on the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization of the recipient country which actually implements the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA employs (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the Report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the appropriateness of the Project.

3. Japan's Grant Aid Scheme

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes(hereinafter referred to as "the E/N") will be singed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the recipient country to continue to work on the Project's implementation after the E/N and G/A.

(3) Eligible source country

Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals".

(4) Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by JICA. This "Verification" is deemed necessary to fulfill accountability to Japanese taxpayers.

(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Annex.

(6) "Proper Use"

The Government of the recipient country is required to maintain and use properly and effectively the facilities constructed and the equipment purchased under the Grant Aid, to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Grant Aid.

(7) "Export and Re-export"

The products purchased under the Grant Aid should not be exported or re-exported from the recipient country.

(8) Banking Arrangements (B/A)

a) The Government of the recipient country or its designated authority should open an account under the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). JICA will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

b) The payments will be made when payment requests are presented by the Bank to JICA under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment

commissions paid to the Bank.

(10) Social and Environmental Considerations

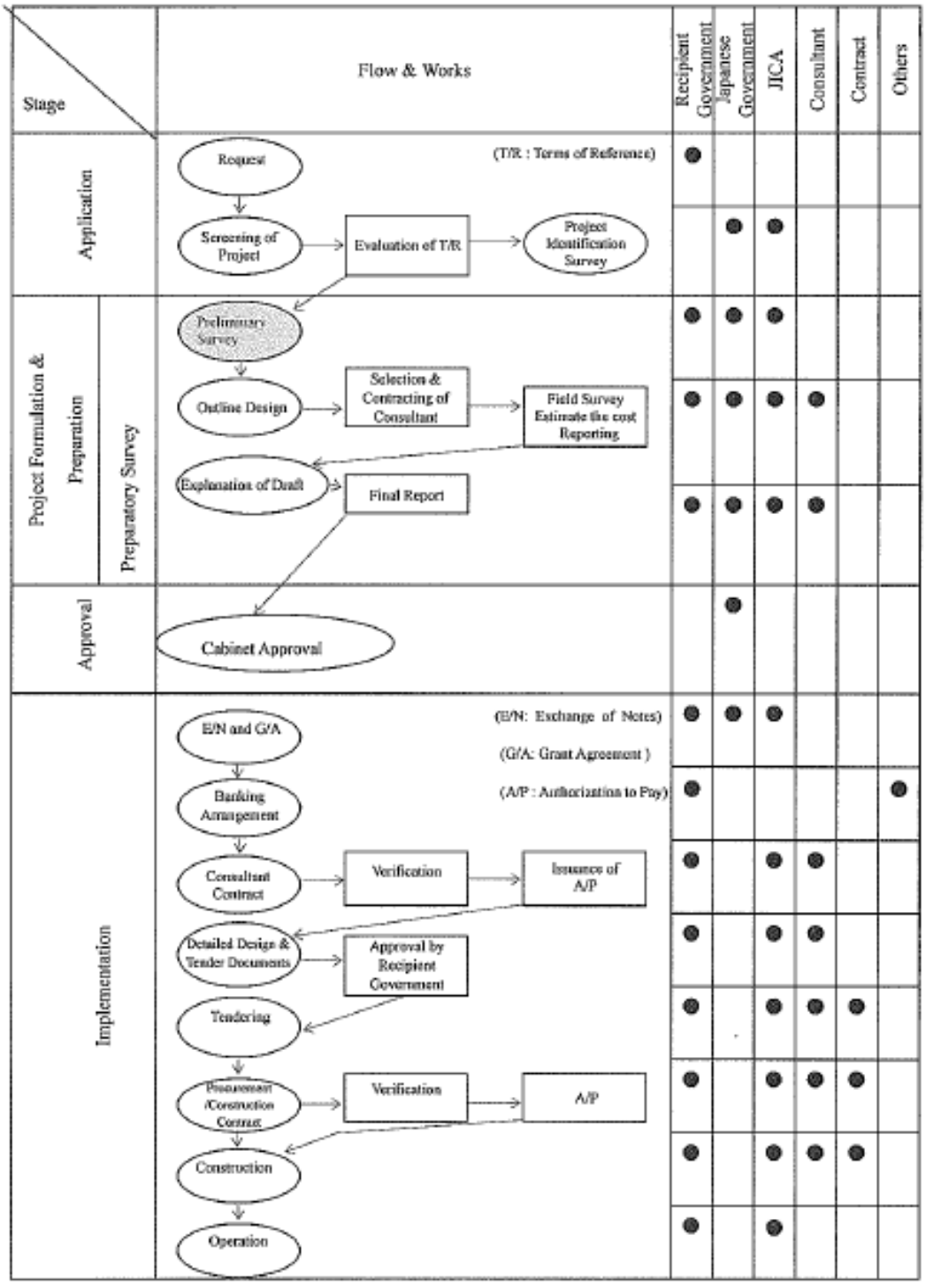
A recipient country must carefully consider social and environmental impacts by the Project and must comply with the environmental regulations of the recipient country and JICA socio-environmental guidelines.

Major Undertakings to be taken by Each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side
1	to secure [a lot] /[lots] of land necessary for the implementation of the Project and to clear the [site]/[sites];		●
2	To ensure prompt unloading and customs clearance of the products at ports of disembarkation in the recipient country and to assist internal transportation of the products		
	1) Marine (Air) transportation of the Products from Japan to the recipient country	●	
	2) Tax exemption and custom clearance of the Products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site	●	
3	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the products and the services be exempted		●
4	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
5	To ensure that the Facilities are maintained and used properly and effectively for the implementation of the Project		●
6	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project		●
7	To bear the following commissions paid to the Japanese bank for banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
8	To give due environmental and social consideration in the implementation of the Project.		●

(B/A : Banking Arrangement, A/P : Authorization to pay)

FLOW CHART OF JAPAN's GRANT AID PROCEDURES



(2) Outline explanation of the Preparatory Survey

Minutes of Discussions
on the Preparatory Survey
on the Project for Widening Gerezani Area Road
in the United Republic of Tanzania
(Explanation on Draft Final Report)

In June 2010 and August 2010, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Preparatory Survey Teams on the Project for Widening Gerezani Area Road to the United Republic of Tanzania (hereinafter referred to as "Tanzania"), and through discussions, field surveys and technical examination of the results in Japan, JICA prepared a Draft Final Report of the study.

In order to explain and to consult with the concerned officials of the Government of Tanzania on the contents of the Draft Final Report, JICA sent to Tanzania the Preparatory Survey Team (hereinafter referred to as "the Team"), for explaining the Draft Final Report. The team is headed by Mr. Hiromi Motomura, Director, Transportation and ICT Division 2, Economic Infrastructure Department, JICA and is scheduled to stay from February 1 to February 10, 2011.

As a result of the discussions, both sides confirmed the main items described in the attached sheets.

Dar es Salaam, February 10, 2011

Mr. Hiromi Motomura
Leader
Preparatory Survey Team
Japan International Cooperation Agency

Eng. Patrick A.L. Mfugale
Ag. Chief Executive
Tanzania National Roads Agency

Witnessed by

Ambassador Herbert Mrango
Ag. Permanent Secretary
Ministry of Works

Ms. Mameltha K. Mutagwaba
Ag. Commissioner for External Finance
Ministry of Finance and Economic Affairs

ATTACHMENT

1. Title of the project
The change of the project title from "The Project for Widening Gerezani Area Road" to "The Project for Improvement of Transport Capacity in Dar es Salaam" was agreed.

2. Project Component
After the explanation of the contents of the Draft Final Report by the Team, the Tanzanian side agreed in principle to the project contents.

3. Responsible Organizations
Because of the reorganization of government ministries, the responsible organization has become Ministry of Works (MoW) instead of Ministry of Infrastructure Development (MoID).

4. Cost Estimation
Both sides agreed that the Project Cost Estimation as attached in Annex-1 should never be duplicated or disclosed to any third parties before the signing of all the contract(s) with contractor(s) for the Project.

5. Japan's Grant Aid Scheme
The Tanzanian side understood the Japan's Grant Aid scheme and the necessary measures to be taken by the recipient country as explained by the Team and described in Annex-4, Annex-5 and Annex-6 of the Minutes of Discussions signed on August 12, 2010.

6. Schedule of the Study
JICA will complete the final report in accordance with the confirmed items and send it to the Tanzanian side around May, 2011.

7. Environmental and Social Considerations

7-1 The Tanzanian side agreed to complete the EIA certification process and inform the result to JICA Tanzania office by the end of July, 2011.

7-2. Both sides agreed the contents of the Environmental Checklist as shown in Annex-2.

7-3. The Tanzanian side agreed that monitoring for Environmental and Social considerations should be conducted by Tanzania National Roads Agency (TANROADS) in accordance with the Monitoring Plan for the Project described in the Preparatory Study Report and EIA report.
The results of monitoring will be provided to JICA by filling in the Monitoring Form attached as Annex-3, as part of progress reports during the pre- construction phase, construction phase, and after completion of the Project.

7-4. The Tanzanian side agreed that JICA will disclose the results of monitoring conducted by TANROADS on JICA's website to the extent that those are made public in their country and report the results of monitoring to the Advisory Committee for Environmental and Social Considerations established by JICA on a periodic basis.

8. Other Relevant Issues

8-1. Both sides confirmed that the following undertakings should be taken by the Tanzanian side at the Tanzanian expenses under the Project.

(1) To acquire the land and establish boundary pegs along the Project site and inform the result to JICA Tanzania office by the end of March, 2012
(2) Removal of existing buildings, trees and other obstacles within the Project site in accordance with the following schedule and to inform the result to JICA Tanzania office.
  i) Budget estimation for building demolition by the end of March, 2011.
  ii) To start payment of compensation by the end of October, 2011.
  iii) Completion of building demolition by the end of February, 2012.
(3) Relocation of existing utilities (power lines and poles/towers, waterpipes, telecom lines, etc.) including the underground facilities within the Project site to designated area or out of the Project site in accordance with the following schedule and inform the result to JICA Tanzania office.
  i) Budget estimation for relocation by the end of March, 2011.
  ii) To start utility relocation activity in October, 2011.
  iii) Completion of relocation by the end of March, 2012.
(4) Necessary arrangement for traffic control at necessary sections.
(5) Necessary arrangement for detours for public traffic at necessary sections.
(6) Securing and clearance of the temporary yard for the Project.
(7) Securing site for borrowing pit, quarry and disposal area.
(8) Necessary arrangements for issuance of license, permission and other necessary procedures from the Project commencement.
(9) Necessary arrangement for tax exemption and custom clearance for project related equipments, materials and facilities.
(10) Necessary coordination with concerned officials and stakeholders.

8-2. The Tanzanian side promised to ensure necessary budget for land acquisition, compensation and facility relocation and necessary procedures for the Project execution. The expected schedule to ensure the budget is as follows.
(1) Budget estimation by the end of March, 2011.
(2) To start the budget releasing by October, 2011.

8-3. The Tanzanian side agreed that the completion of relocation work for all utilities from the Project site is a condition of the commencement of pre-qualification under the contractor bidding procedure.

8-4. The Tanzanian side shall bear the banking commissions as a condition for the Japan's Grant Aid to be implemented, and secure the sufficient budget to cover the following cost.
(1) The commissions for the banking services based upon Banking Arrangement (B/A)
(2) The advising commission of the Authorization to Pay (A/P)

8-5. The Tanzanian side shall ensure issuance of Government Notice (GN) timely to avoid any unwarranted delays of the project.

8-6. The Tanzanian side shall secure enough budget and personnel necessary for the operation and maintenance of the facilities constructed by the Project and conduct the periodical maintenance work after the completion of the Project.

8-7. The demolition of the existing bridge and utilities relocation from the existing bridge to the new one are not included in the Project and therefore shall be done by the Tanzanian side at the Tanzanian expenses if they are needed.

Annex-1 Project Cost Estimation
Annex-2 Environmental Checklist
Annex-3 Monitoring Form

<Confidential>

This Page is closed
due to the confidentiality.

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations
1 Permits and Explanation	(1) EIA and Environmental Permits	① Have EIA reports been officially completed? ② Have EIA reports been approved by authorities of the host country's government? ③ Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? ④ In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	① The EIA report is being prepared and will be submitted to National Environment Management Council (environmental management authority) by April 2011. ②③ If the amendment of the EIA report is not required, the report will be approved by June 2011. ④ The other permissions related to environmental management are not required. Existing borrow pit and quarry site will be used. Relocation of existing power line will be conducted by electric company directly.
	(2) Explanation to the Public	① Are contents of the project and the potential impacts adequately explained to the public based on appropriate procedures, including information disclosure? Is understanding obtained from the public? ② Are proper responses made to comments from the public and regulatory authorities?	① The public consultation was conducted at the preparatory study (I) in November 2009. The general agreement of the local people has been obtained at the consultation. Under the EIA report review, the report will be opened to the public in conformity to the regulation. ② The interview survey to the local people and stakeholder meeting with the other relevant organizations were conducted at the preparatory study (II) in June 2010. The results were reflected in the mitigation measures.
2 Mitigation Measures	(1) Air Quality	① Is there a possibility that air pollutants emitted from various sources, such as vehicle traffic will affect ambient air quality? Does ambient air quality comply with the country's ambient air quality standards? ② Where industrial areas already exist near the route, is there a possibility that the project will make air pollution worse?	①② Because the project site is located in urban area near sea, the traffic volume is much. However, serious air pollution will not occur because of the spreading effect by sea wind.
	(2) Water Quality	① Is there a possibility that soil runoff from the bare lands resulting from earthmoving activities, such as cutting and filling will cause water quality degradation in downstream water areas? ② Is there a possibility that surface runoff from roads will contaminate water sources, such as groundwater? ③ Do effluents from various facilities, such as stations and parking areas/service areas comply with the country's effluent standards and ambient water quality standards? Is there a possibility that the effluents will cause areas that do not comply with the country's ambient water quality standards?	① Turbid water will be generated in the construction works. There are no intake facilities in and down the site. ② Impacts on water resources of runoff from road surface are none. ③ Development of parking or service areas are not included in the project.
	(3) Noise and Vibration	① Do noise and vibrations from vehicle and train traffic comply with the country's standards?	① The noise and vibration levels will be improved because of the widening works of existing road.
3 Natural Environment	(1) Protected Areas	① Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	① There are no protected areas in and around the site.

3 Natural Environment	(2) Ecosystem	① Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? ② Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? ③ If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? ④ Are adequate protection measures taken to prevent impacts, such as disruption of migration routes, habitat fragmentation, and traffic accident of wildlife and livestock? ⑤ Is there a possibility that installation of roads will cause impacts, such as destruction of forest, poaching, desertification, reduction in wetland areas, and disturbance of ecosystems due to introduction of exotic (non-native invasive) species and pests? Are adequate measures for preventing such impacts considered? ⑥ In cases where the project site is located at undeveloped areas, is there a possibility that the new development will result in extensive loss of natural environments?	① There are no ecological valuable habitats in and around the site. ② The habitats of endangered species have not been identified in and down the site. ③ Significant ecological impacts are not anticipated. ④ Wild animals migrating through the site have not been identified. ⑤⑥ The project will not cause destruction of forest and poaching because the project is widening of existing road in urban area.
	(3) Hydrology	① Is there a possibility that alteration of topographic features and installation of structures, such as tunnels will adversely affect surface water and groundwater flows?	① Impacts on surface and ground water are none.
	(4) Topography and Geology	① Is there a soft ground on the route that may cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides, where needed? ② Is there a possibility that civil works, such as cutting and filling will cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides? ③ Is there a possibility that soil runoff will result from cut and fill areas, waste soil disposal sites, and borrow sites? Are adequate measures taken to prevent soil runoff?	①② Filling works are included in the construction. However, there are no steep slope areas to occur slope failures or landslides in and around the site. ③ Adequate filling works prevent accidental and sufficient soil runoff.
	(1) Resettlement	① Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? ② Is adequate explanation on relocation and compensation given to affected persons prior to resettlement? ③ Is the resettlement plan, including proper compensation, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? ④ Does the resettlement plan pay particular attention to vulnerable groups or persons, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? ⑤ Are agreements with the affected persons obtained prior to resettlement? ⑥ Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? ⑦ Is a plan developed to monitor the impacts of resettlement?	① To minimize the impacts on relocation, the most appropriate alignment has been selected. Consequently, removal of 15 structures and involuntary resettlement of 3 families or 17persons will be required. Additional land acquisition for relocation of existing power line will not required. ② The local government will conduct the explanation to the affected persons and estimation of the compensation in advance of the project implementation. ③ Adequate compensation will be provided to the project affected persons in conformity to the Tanzanian regulations and world bank's guidelines. ④ Vulnerable groups or persons are not included in the project affected persons. ⑤ Official agreement with the affected persons will be obtained in parallel with the EIA procedure in near future. ⑥ TANROADS, project implementing agency, has sufficient experiences in similar road development projects including world bank projects. Ministry of Works will include the compensation cost in the 2011 fiscal budget. ⑦ The monitoring on resettlement will be conducted in the environmental

4 Social Environment	(2) Living and Livelihood	① Where roads or railways are newly installed, is there a possibility that the project will affect the existing means of transportation and the associated workers? Is there a possibility that the project will cause significant impacts, such as extensive alteration of existing land uses, changes in sources of livelihood, or unemployment? Are adequate measures considered for preventing these impacts? ② Is there a possibility that the project will adversely affect the living conditions of inhabitants other than the affected inhabitants? Are adequate measures considered to reduce the impacts, if necessary? ③ Is there a possibility that diseases, including communicable diseases, such as HIV will be introduced due to immigration of workers associated with the project? Are adequate considerations given to public health, if necessary? ④ Is there a possibility that the project will adversely affect road traffic in the surrounding areas (e.g., by causing increases in traffic congestion and traffic accidents)? ⑤ Is there a possibility that roads and railways will cause impede the movement of inhabitants? ⑥ Is there a possibility that structures associated with roads (such as bridges) will cause a sun shading and radio interference?	①②③④⑤ The project will not cause significant changes and impacts on the livelihood of the local people and road traffic because the project is widening of existing road in urban area. Street venders around existing road will be able to continue their business except for some period during the construction works. ⑥ Impacts on sun shading and radio interference are none.
	(3) Heritage	① Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage sites? Are adequate measures considered to protect these sites in accordance with the country's laws?	① There are no cultural properties in and around the project sites.
	(4) Landscape	○ Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	① There are no valuable landscape sites in and around the project sites.
4 Social Environment	(5) Ethnic Minorities and Indigenous Peoples	① Where ethnic minorities and indigenous peoples are living in the rights-of-way, are considerations given to reduce the impacts on culture and lifestyle of ethnic minorities and indigenous peoples? ② Does the project comply with the country's laws for rights of ethnic minorities and indigenous peoples?	①② The project site is not the area where ethnic minorities and indigenous people having unique culture and lifestyle are living.
	(1) Impacts during Construction	① Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? ② If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? ③ If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts? ④ If necessary, is health and safety education (e.g., traffic safety, public health) provided for project personnel, including workers?	① The adequate mitigation measures and monitoring plans to reduce impacts of pollution during the construction will be prepared. ② The construction activities will not adversely affect the natural environment. ③ Because the construction works are conducted in urban area, countermeasures against traffic jam will be included in the execution scheme. ④ Because the construction works are conducted in urban area, safety education for the workers will be included in the environmental management plan.

5 Others	(2) Monitoring	① Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? ② Are the items, methods and frequencies included in the monitoring program judged to be appropriate? ③ Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? ④ Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	① The monitoring plans mentioned in the EIA report will be implemented during the construction and operation phase. ②③④ Because the EIA report is in progress, the specific monitoring plans have not been prepared yet. JICA study team submitted the draft monitoring plan to TANROADS.
6 Note	Reference to Checklist of Other Sectors	① Where necessary, pertinent items described in the Forestry Projects checklist should also be checked (e.g., projects including large areas of deforestation). ② Where necessary, pertinent items described in the Power Transmission and Distribution Lines checklist should also be checked (e.g., projects including installation of power transmission lines and/or electric distribution facilities).	① Deforestation is not included in the project. ② Relocation of existing power transmission lines will be limited in the right of way and has no serious environmental impacts.
	Note on Using Environmental Checklist	① If necessary, the impacts to transboundary or global issues should be confirmed, if necessary (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	① Impacts to transboundary or global environmental issues are none.

1) Regarding the term "Country's Standards" mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from the World Bank Safeguard Policy as other

internationally recognized standards or good practices established by developed countries such as Japan regarding environmental and social considerations, the background and rationale for this deviation, and the measures rectify it if necessary, are to be confirmed. In cases where local environmental regulations are yet to be established in some areas, considerations should be based on comparisons with international standards such as the Wo Bank Safeguard Policy, and appropriate standards of other countries(including Japan).

2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which it is located.

MONITORING FORM

1. Responses/Actions to Comments and Guidance from Government Authorities and the Public

Monitoring Item	Schedule	Responsible Person and Organization	Remarks (Location, Frequency, Method, etc.)	Monitoring Results
Status of implementation of the agreement on land acquisition	Detail design stage Construction phase	- TANROADS - Supervision consultant	Location : Area affected by land acquisition and/or on the ROW line on both sides Method : Visual observation, and interview and meeting with relevant agencies and project affected persons Frequency : Visual observation: Daily Interview and meeting: Monthly or as needed	

2. Environmental Pollution

- Air Quality (Dust)

Item	Standard	Schedule	Responsible Person and Organization	Remarks (Location, Frequency, Method, etc.)	Monitoring Results
Dust during construction phase	Serious impact of dust on local residents and pedestrians	Construction phase	- Supervision consultant - Construction contractor	Location : Construction site Method : Visual observation and interview to local residents and pedestrians Frequency : Visual observation: Daily Interview: Weekly or as needed	

- Waste

Monitoring Item	Schedule	Responsible Person and Organization	Remarks (Location, Frequency, Method, etc.)	Monitoring Results
Disposal methods of demolished buildings for land acquisition	Detail design stage Construction phase	- Municipality office - Supervision consultant	Location : Area affected by land acquisition and disposal site Method : Visual observation, and interview and meeting with waste disposer and project affected persons Frequency : Visual observation: Daily Interview and meeting: Monthly or as needed	
Disposal methods of construction waste	Construction phase	- Supervision consultant - Construction	Location : Construction site and disposal site Method : Visual observation	

		contractor	and meeting with contractor Frequency : Visual observation: Daily Meeting: Monthly or as needed	

- Noise

Item	Standard	Schedule	Responsible Person and Organization	Remarks (Location, Frequency, Method, etc.)	Monitoring Results
Noise during construction phase	Serious impact of noise on local people	Construction phase	- Supervision consultant - Construction contractor	Location : Construction site Method : Interview to local people Frequency : Weekly or as needed	
Noise by vehicular traffic during operation phase	Tanzanian environmental standards (Day 70dB, Night 60dB)	Operation phase	- TANROADS	Location : a point of the road side Method : Noise level meter Frequency : Yearly	

3. Natural Environment

- Needless felling of roadside trees

Monitoring Item	Schedule	Responsible Person and Organization	Remarks (Location, Method, Frequency, etc.)	Monitoring Results
Status of tree felling in the right of way	Construction phase	- Supervision consultant - Construction contractor	Location : Construction site Method : Visual observation and meeting with contractor Frequency : Visual observation: Daily Meeting: Monthly or as needed	

4. Social Environment

- Resettlement

Monitoring Item	Schedule	Responsible Person and Organization	Remarks (Location, Method, Frequency, etc.)	Monitoring Results
Status of compensation payment	Detail design stage Construction phase	- TANROADS - Supervision consultant	Location : Area affected by land acquisition Method : Interview and meeting with municipality office and project affected persons Frequency : Monthly or as needed	
Status of relocation or removal of buildings in the right of way	Detail design stage Construction	- Municipality office	Location : Area affected by land acquisition Method : Visual observation,	

	phase	- TANROADS - Supervision consultant	and interview and meeting with relevant organizations and project affected persons Frequency : Visual observation: Daily Interview and meeting: Monthly or as needed	

- Accident and risk during construction phase

Monitoring Item	Schedule	Responsible Person and Organization	Remarks (Location, Frequency, Method, etc.)	Monitoring Results
Opinions from local residents and pedestrians	Construction phase	- Supervision consultant - Construction contractor	Location : Construction site Method : Interview and meeting with to local residents and pedestrians Frequency : Monthly or as needed	
Status of street vendors in and around construction site	Construction phase	- Supervision consultant - Construction contractor	Location : Construction site Method : Visual observation and interview to street venders Frequency : Visual observation: Daily Interview: Monthly or as needed	

Appendix 5 Other Relevant Data

(Technical Note signed with the Government of Tanzania)

TANZANIA NATIONAL ROADS AGENCY

P.O Box 11364
3rd Floor
Maktaba Complex
Bibi Titi Mohamed Road
Dar es Salaam

Date: 1st September 2010

Our Ref: TRD/D/GEN/HQ/356/01/13

INGEROSEC CORPORATION
6-5-1 Nishi-Shinjuku. Shinjuku-Ku
Tokyo 163-1343, JAPAN
Phone +81-3-5324-0211, Facsimile +81-3-5324-0215
http:// www.ingerosec.co,

RE: THE PROJECT FOR WIDENING OF GEREZANI AREA ROAD

Sub: Technical Note to be used for the Project

Please refer to the above captioned heading.

We wish to inform you that the Technical Note you submitted through your letter dated 26th August 2010 has been reviewed and found to be in line with the agreement reached during discussions held between your staff and our staff at TANROADS conference room on 25th August 2010.

In view of the above a go ahead is hereby granted to continue with the design using the parameters in the Technical Note.

Ephrem P. Kirenga
ACTING CHIEF EXECUTIVE

cc INGEROSEC CORPORATION
Tanzania Project Office
P.O.Box 71609
Dar es Salaam
Tel/Fax +255-(0)22-2170409

Tel: + 255 22 2152576/51639/50932/52140/52242/52186/2150485 Fax: + 255 22 2150022, E-Mail: tanroadshq@tanroads.org

Memorandum

26-August, 2010

Subject: Technical note of Design Value to be used for the Preparatory Survey on the Project for Widening Gerezani Area Road

The JICA Preparatory Survey Team will propose the following principal standard for the design of captioned project.

Description		Units	Value
Road			
Design Speed		Km/hr	40
No. of Lanes		No.	4
Right of Way width		m	45.0
Carriageway width		m	7.0 / direction
Shoulder width		m	0.5
Central Median width		m	9.0
Footpath width		m	2.0~3.0 (depend on other facilities)
Cross Fall on Carriageway		%	2.5
Minimum Radius of Horizontal Curve		m	50
Maximum Gradient		%	7 (Max = 10)
Maximum Superelevation		%	6
Fill Slope	Granular soil	Angle	1:1.5~2.0 (depend on soil type)
Cut Slope	Hard Rock	Angle	1:0.5
	Decomposed Rock	Angle	1:0.75
	Other than Rock	Angle	1:1.0~1.5 (depend on soil type)
Pavement Design Life		-	15 years
Pavement Type (Carriageway)		-	Asphaltic Concrete Surface
		-	
Gerezani Bridge			
Location		-	Near existing Gerezani Bridge
Live load		-	BS5400, Design Load = HA and HB (37.5 Units)
Horizontal Seismic coefficient		k_H	0.05
Carriageway width		m	8.0
Footpath width		m	2.0

Sheet 1/2

Clearance value from existing Railway	m	Vertical Clearance= 5.8m from existing rail top Horizontal Clearance = 3.0m from existing outer rail gauge center
Type	-	Concrete bridge
Others	-	Demolition of existing Gerezani Bridge excluded from the project Utility weight of 0.200t/m considered on each side

Note:

1) Existing ROW

ROW for Bandari Road = 30m, Gerezani Road and Sokoine Street = 20m

2) Proposed horizontal road alignment

Alignment will be traced to the selected route (Alternative Route 1 Plan, ALT-1, TANROADS Letter No. TRD/T/GEN/HQ/356/01/6, 15th July, 2010)

3) Major Intersection

- Kamata Junction = At grade intersection + Traffic Signal (Existing traffic signal replacement will be studied for adoption of multi lane traffic)
- Gerezani Roundabout = At grade intersection + Traffic Signal
- Railway crossing (near BP)= Level crossing
- Bandari/Kilwa Junction = At grade intersection + Roundabout

4) Safety facilities

- Traffic Hump = Hump will be studied before and after Railway crossing near BP depot
- Street light = Street light (connection to the existing power line excluded) will be studied at major junction and/or bus stop.

5) Social and Environmental consideration

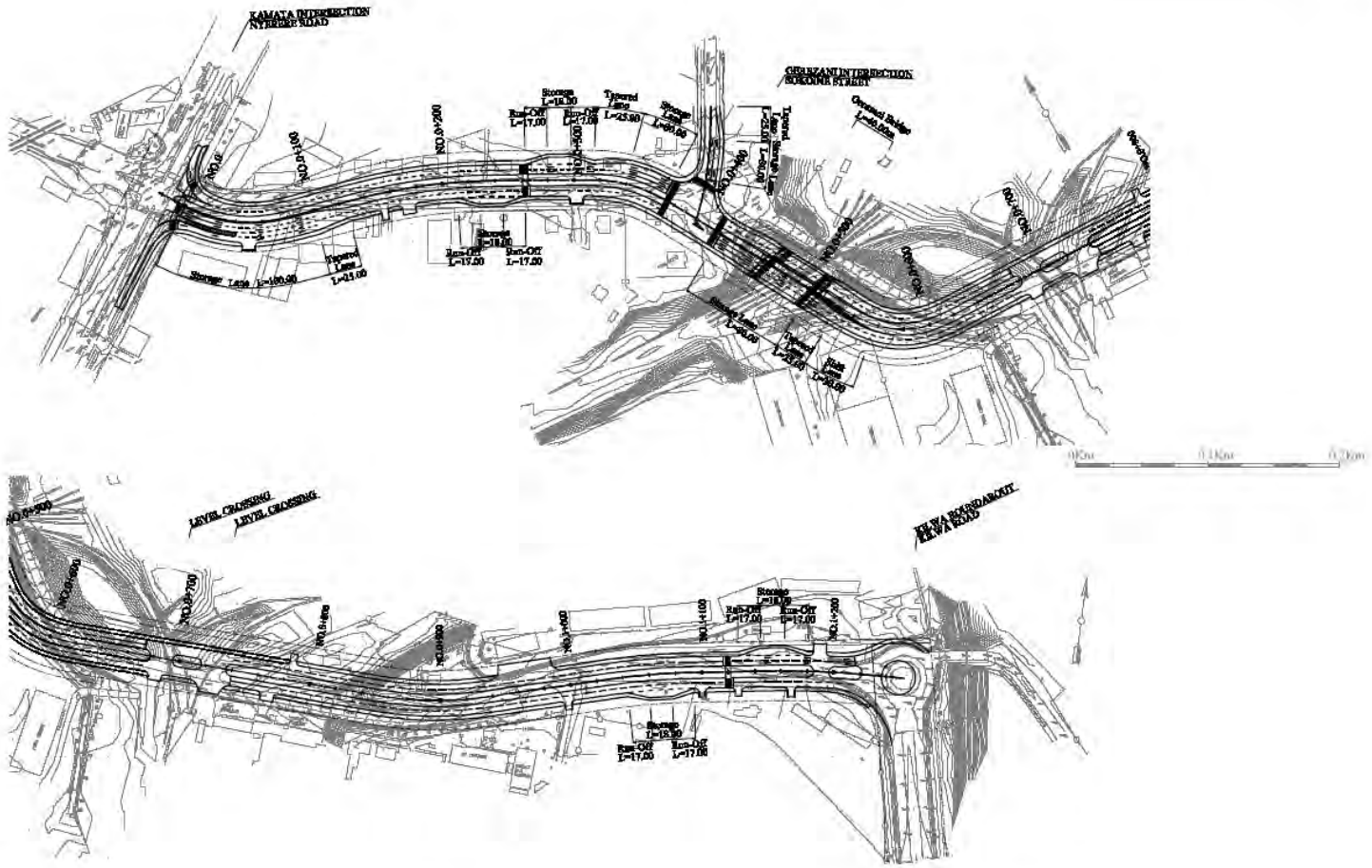
- Necessary procedure concerning the environmental assessment will be conducted in accordance with the "Minutes of Discussions on the Preparatory Survey" of the project
- Removal and Relocation
  * Removal of existing steel tower and electricity line required
  * Removal of existing private properties (house and other structures)
  * Relocation of Public Utilities (water, telecom, electricity, etc.)
- Adequate disposal area for rubble of the demolished structures and construction waste shall be secured.

Hideaki MORITA
Chief Consultant of JICA Survey Team
The Project for Widening Gerezani Area Road
Ingérosec Corporation, JAPAN

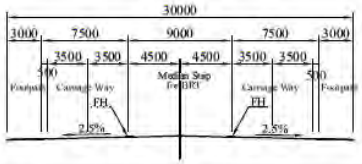
Appendix 6 References (Outline Design Drawings)

List of Outline Design Drawings

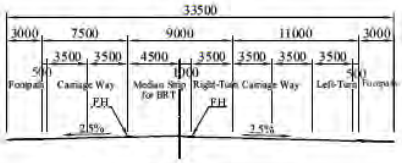
No.	Drawing Contents	Number of Drawings
1	Standard cross-section, road top view and profile	5
2	General bridge drawings	1
3	Drainage facilities structural drawings	2
4	Auxiliary facilities structural drawings	6



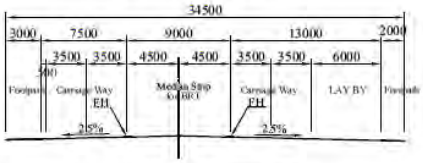
GENERAL SECTION



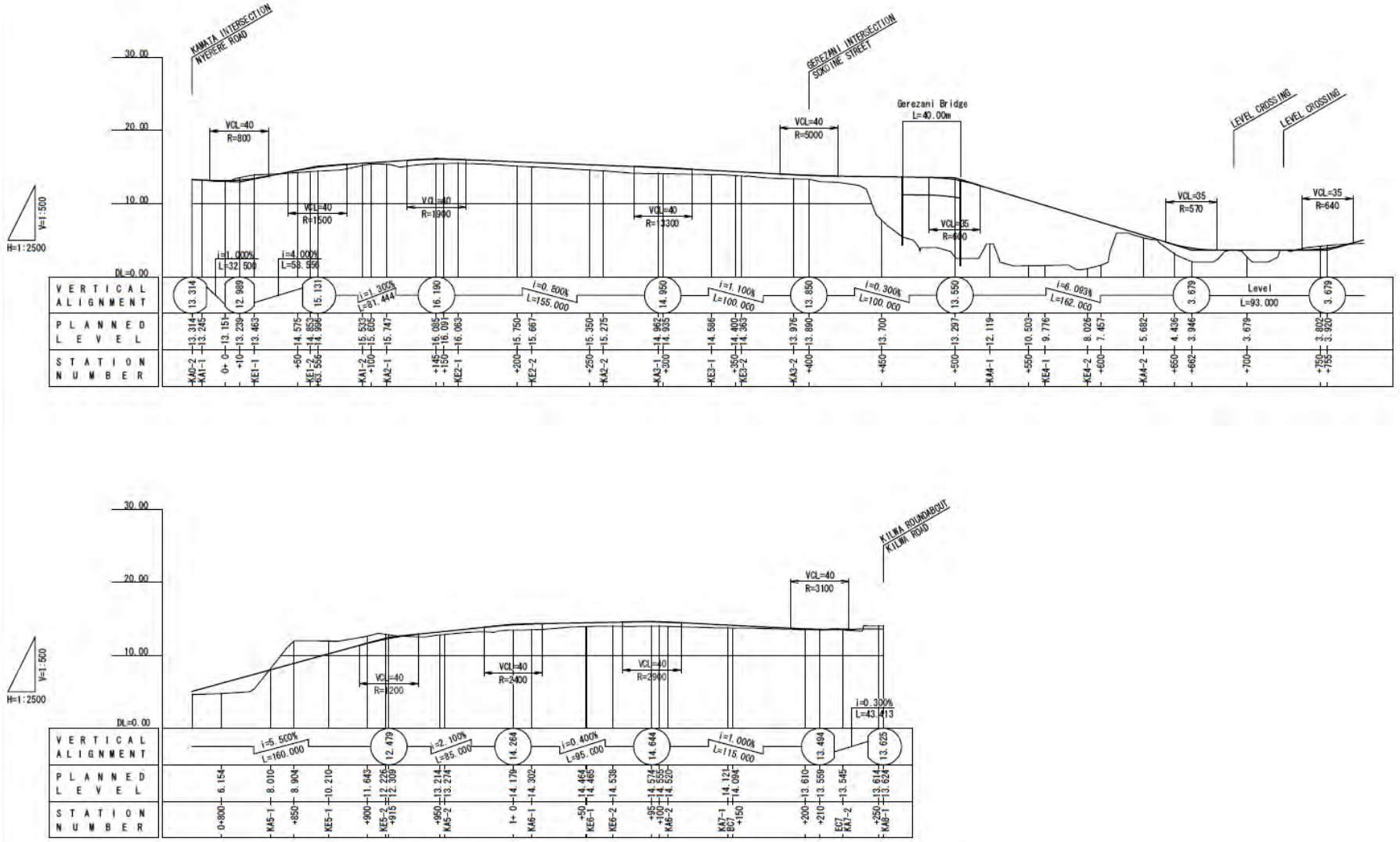
INTERSECTION



LAY BY SECTION



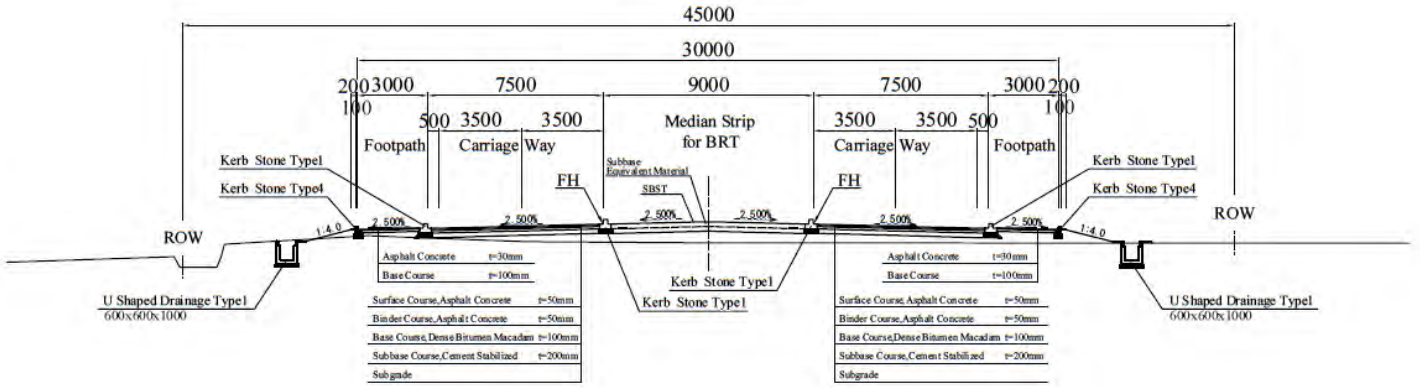
MINISTRY OF WORKS (MOW) THE UNITED REPUBLIC OF TANZANIA JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	DATE:	DRAWING No.:
	INGEROSEC CORPORATION, JAPAN	THE PROJECT FOR WIDENING GEREZANI AREA ROAD	PLAN	PREPARED BY: CHECKED BY:	DBD-1



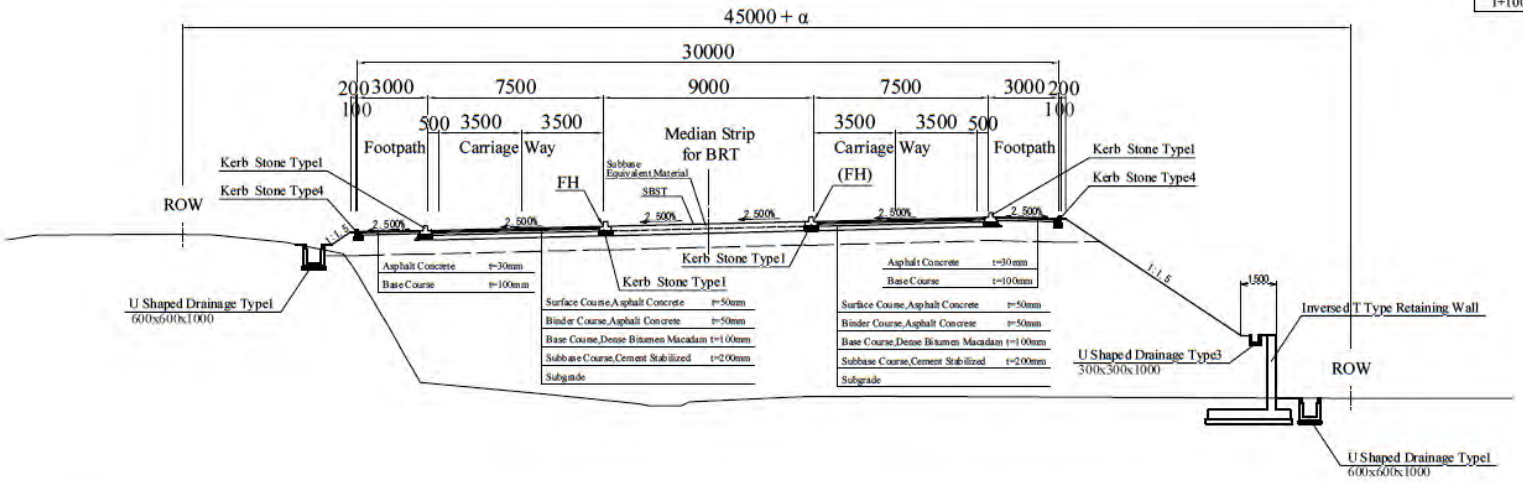
MINISTRY OF WORKS (MOW) THE UNITED REPUBLIC OF TANZANIA JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: INGEROSEC CORPORATION, JAPAN	PROJECT NAME: THE PROJECT FOR WIDENING GEREZANI AREA ROAD	DRAWING TITLE: PROFILE	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : DBD-2

TYPICAL CROSS SECTION (1)　SCALE　A3 1:200

FLAT SECTION



EMBANKMENT SECTION



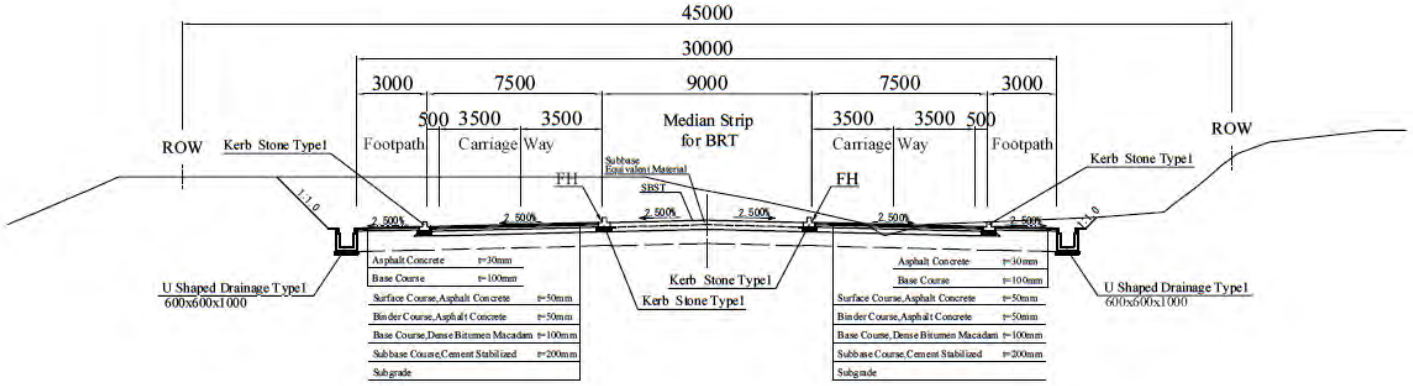
Thickness of Subgrade

Station	Minimum Thickness (cm)
0+0.000 – 0+100.000	60
0+600.000 – 0+900.000	60
1+100.000 – E.P	30

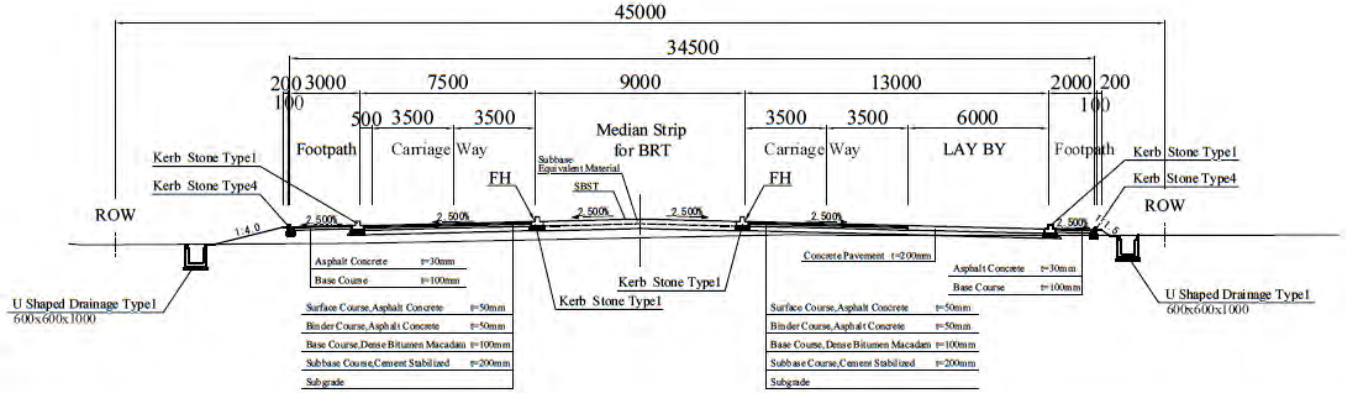
MINISTRY OF WORKS (MOW) THE UNITED REPUBLIC OF TANZANIA JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: INGEROSEC CORPORATION, JAPAN	PROJECT NAME: THE PROJECT FOR WIDENING GEREZANI AREA ROAD	DRAWING TITLE: TYPICAL CROSS SECTION (1)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : DBD-3

TYPICAL CROSS SECTION (2) SCALE A3 1:200

CUT SECTION



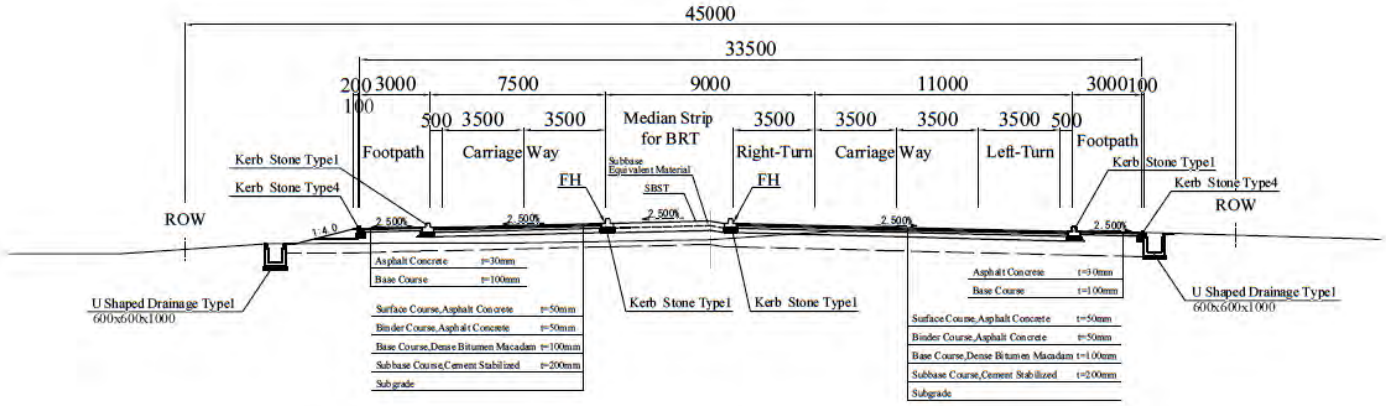
LAY BY SECTION



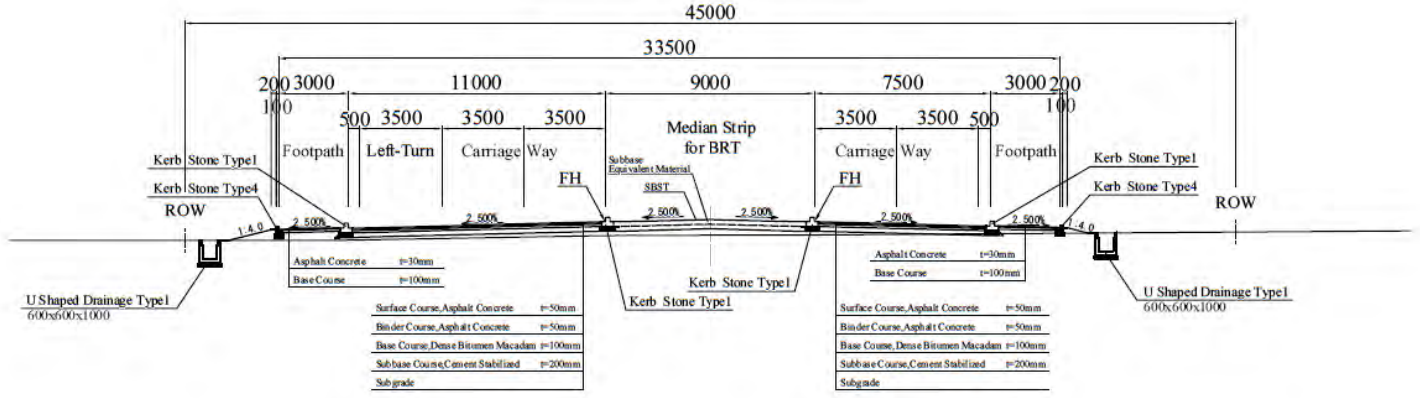
MINISTRY OF WORKS (MOW) THE UNITED REPUBLIC OF TANZANIA JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: INGEROSEC CORPORATION, JAPAN	PROJECT NAME: THE PROJECT FOR WIDENING GEREZANI AREA ROAD	DRAWING TITLE: TYPICAL CROSS SECTION (2)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : DBD-4

TYPICAL CROSS SECTION (3)　SCALE　A3 1:200

INTERSECTION (Kamata)

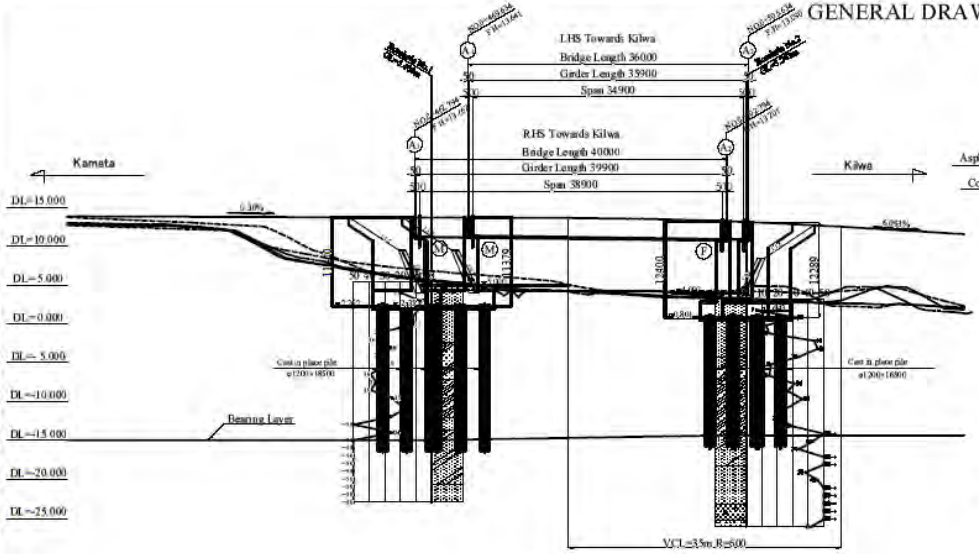


INTERSECTION (Gerezani)

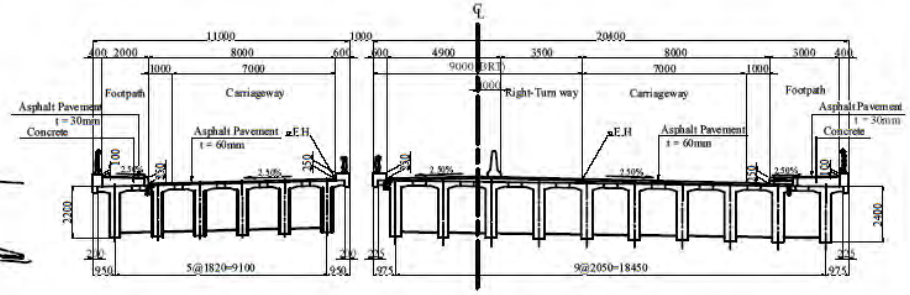


MINISTRY OF WORKS (MOW) THE UNITED REPUBLIC OF TANZANIA JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: INGEROSEC CORPORATION, JAPAN	PROJECT NAME: THE PROJECT FOR WIDENING GEREZANI AREA ROAD	DRAWING TITLE: TYPICAL CROSS SECTION (3)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : DBD-5

GENERAL DRAWING OF GEREZANI BRIDGE

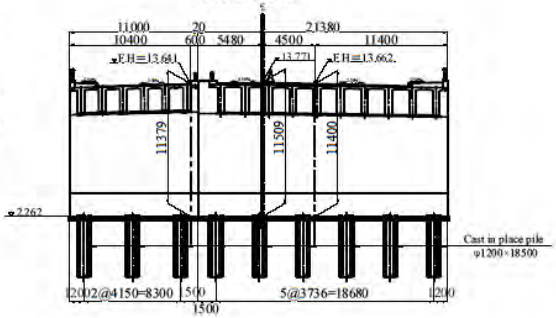


ELEVATION SCALE 1:300

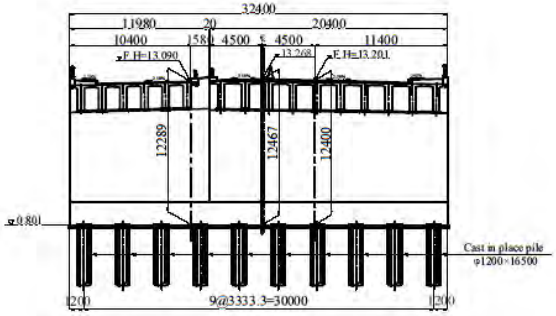


DECK SECTION SCALE 1:100

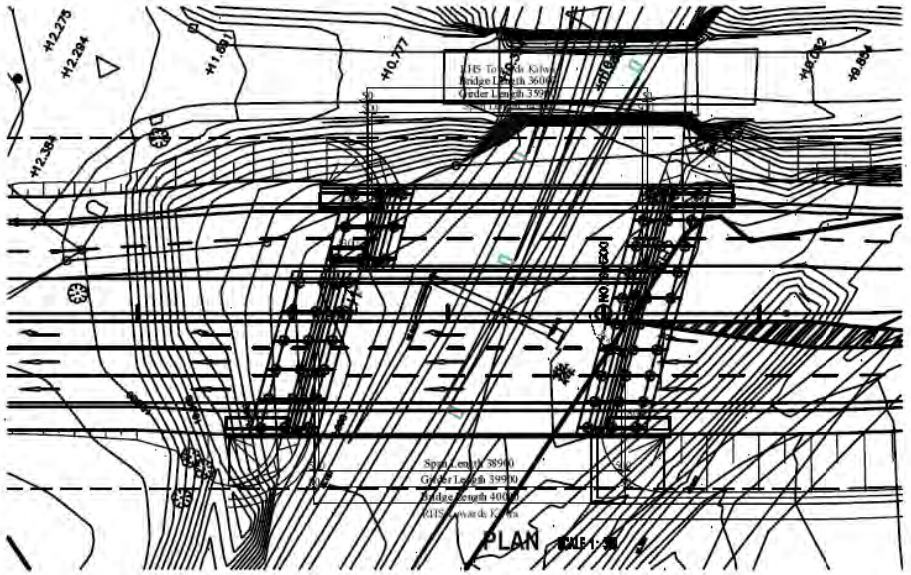
A1 ABUTMENT



A2 ABUTMENT



ABUTMENT SECTION SCALE 1:200

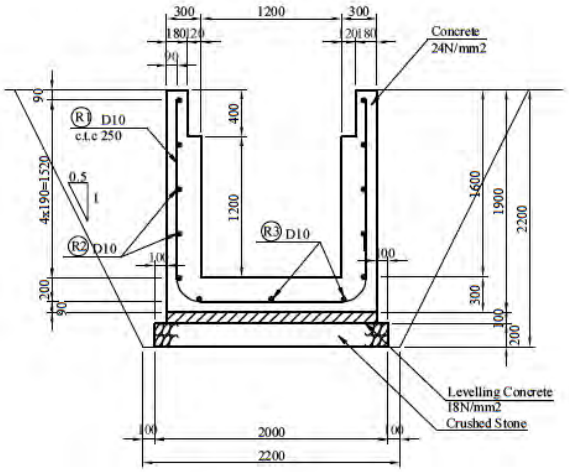


MINISTRY OF WORKS (MOW) THE UNITED REPUBLIC OF TANZANIA JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: INGEROSEC CORPORATION, JAPAN	PROJECT NAME: THE PROJECT FOR WIDENING GEREZANI AREA ROAD	DRAWING TITLE: GENERAL DRAWING GEREZANI BRIDGE	DATE: PREPARED BY: CHECKED BY:	DRAWING No.: DBD-6

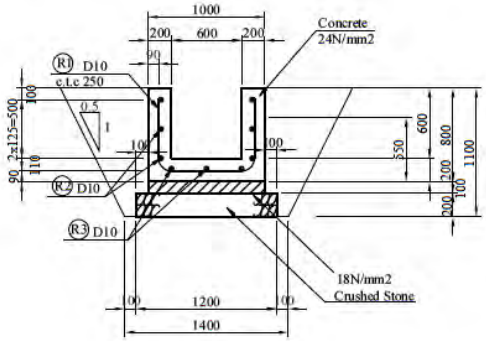
DRAINAGE DETAILS (1) SCALE A3 1:20

U SHAPED DRAINAGE

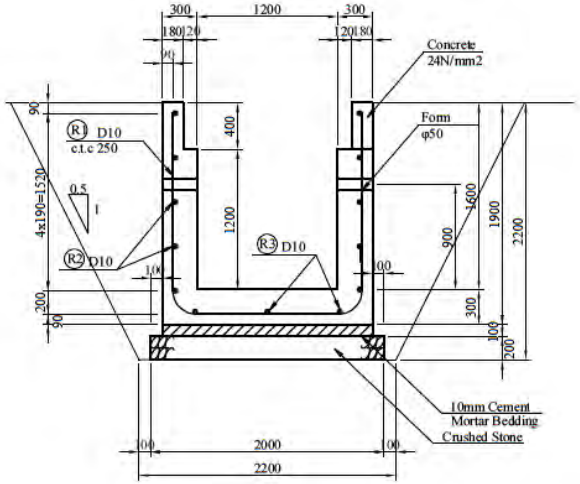
TYPE1



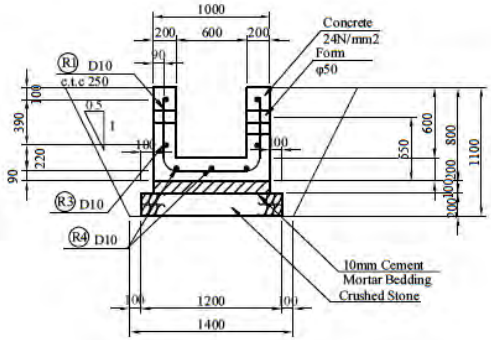
TYPE3



TYPE2 (Precast)

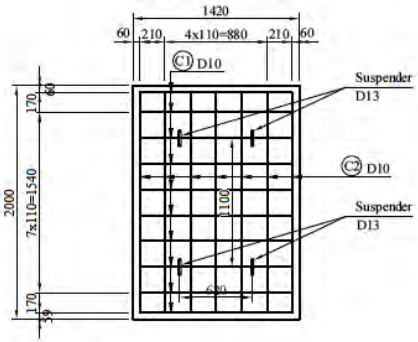


TYPE4 (Precast)

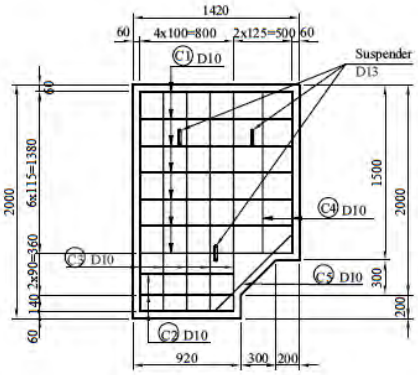


COVER (Precast)

TYPE1
for Under Access Road



TYPE2
for Chute

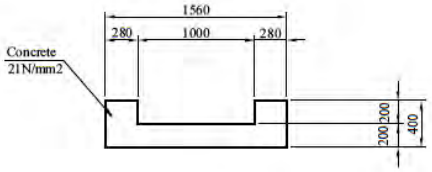


Note :
1) Concrete strength shall be measured by cylinder crushing strength (Cube crushing strength shall be used cylinder crushing strengthx1.25 value)
2) N/mm2 = Mpa

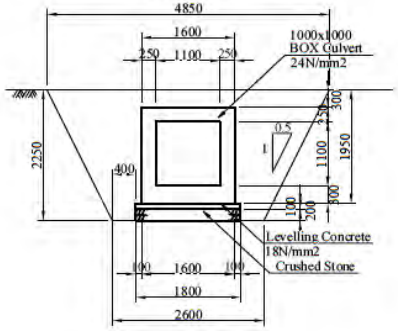
MINISTRY OF WORKS (MOW) THE UNITED REPUBLIC OF TANZANIA JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	DATE:	DRAWING No. :
	INGEROSEC CORPORATION, JAPAN	THE PROJECT FOR WIDENING GEREZANI AREA ROAD	DRAINAGE DETAILS (1)	PREPARED BY: CHECKED BY:	DBD-7

DRAINAGE DETAILS (2) SCALE A3 1:20

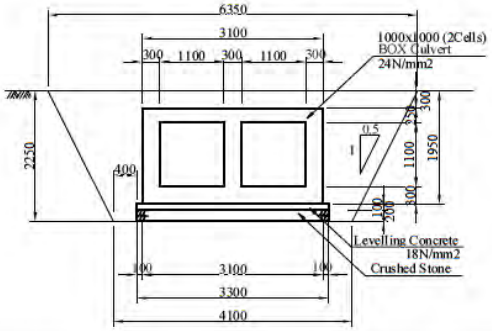
Chute (Precast)



BOX CULVERT 1100×1100



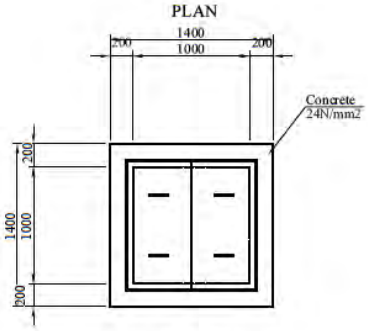
BOX CULVERT 1100×1100 (2CELLS)



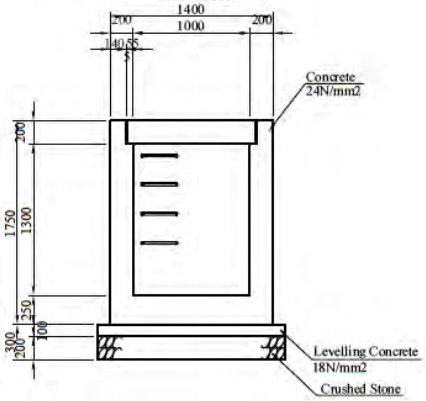
CATCH BASIN

TYPE1

PLAN

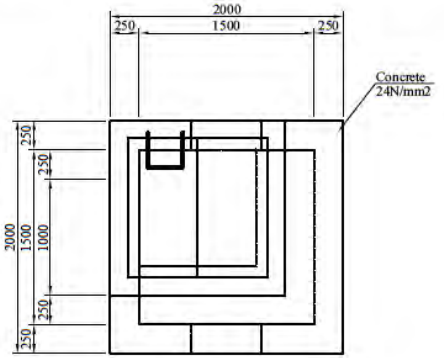


SECTION

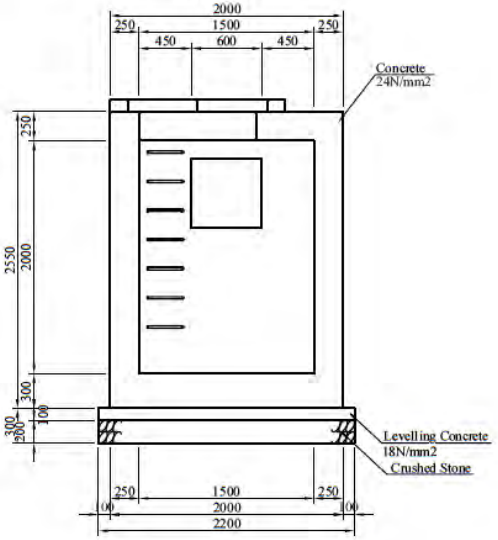


TYPE2

PLAN



SECTION

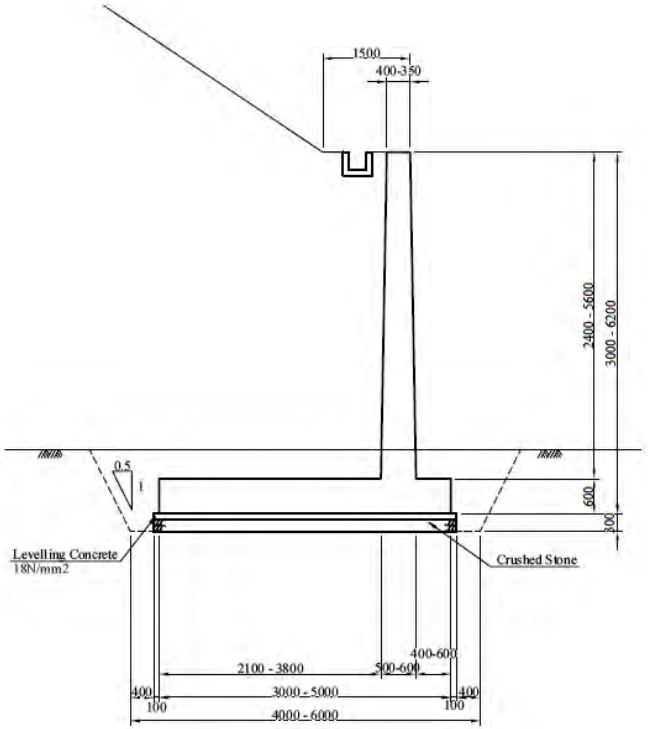


Note :
1) Concrete strength shall be measured by cylinder crushing strength (Cube crushing strength shall be used cylinder crushing strengthx1.25 value)
2) N/mm2 = Mpa

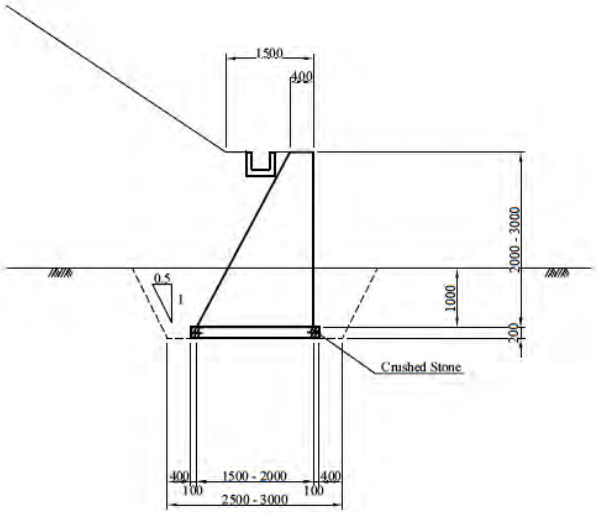
MINISTRY OF WORKS (MOW) THE UNITED REPUBLIC OF TANZANIA JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: INGEROSEC CORPORATION, JAPAN	PROJECT NAME: THE PROJECT FOR WIDENING GEREZANI AREA ROAD	DRAWING TITLE: DRAINAGE DETAILS (2)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : DBD-8

RETAINING WALL DETAILS SCALE A3 1:80

Inversed T Type Retaining Wall



Gravity Retaining Wall

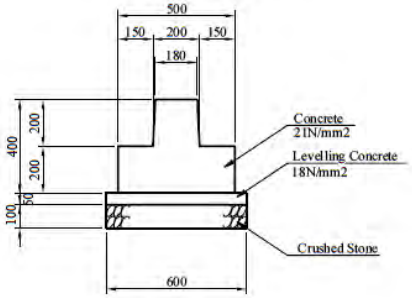


Note :
1) Concrete strength shall be measured by cylinder crushing strength (Cube crushing strength shall be used cylinder crushing strengthx1.25 value)
2) N/mm2 = Mpa

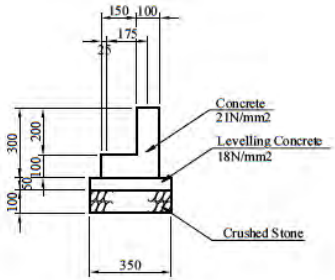
MINISTRY OF WORKS (MOW) THE UNITED REPUBLIC OF TANZANIA JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: INGEROSEC CORPORATION, JAPAN	PROJECT NAME: THE PROJECT FOR WIDENING GEREZANI AREA ROAD	DRAWING TITLE: RETAINING WALL DETAILS	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : DBD-9

KERB STONE DETAILS SCALE A3 1:20

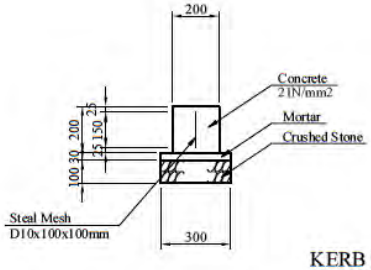
KERB STONE TYPE1
for MEDIAN STRIP
for FOOTPATH SIDE

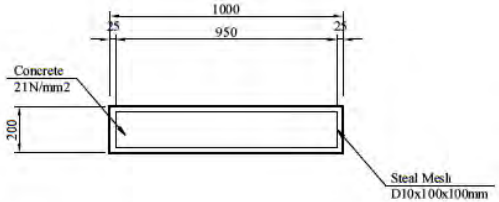


KERB STONE TYPE4
for EDGE of FOOTPATH

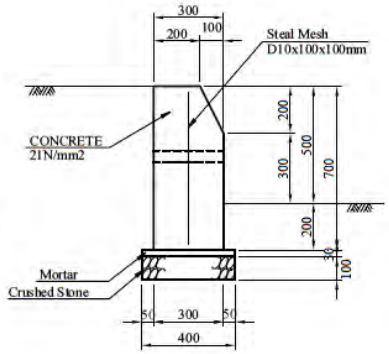


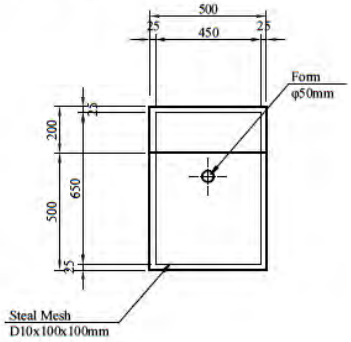
KERB STONE TYPE2
for EDGE of FOOTPATH



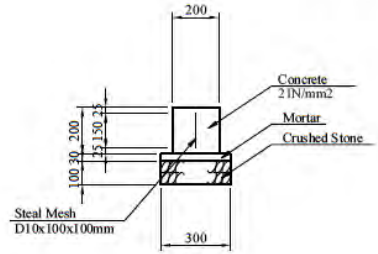


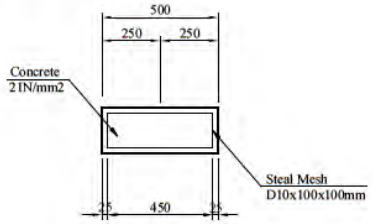
KERB STONE TYPE5
for KILWA Roundabout





KERB STONE TYPE3
for EDGE of FOOTPATH





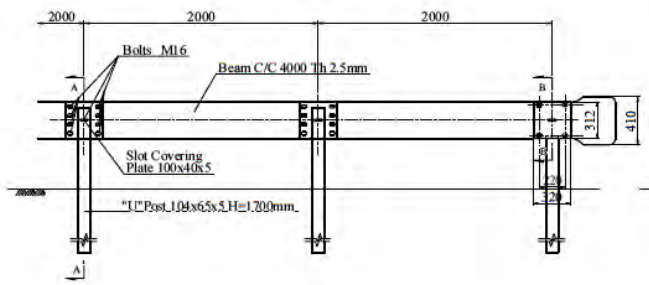
Note :
1) Concrete strength shall be measured by cylinder crushing strength (Cube crushing strength shall be used cylinder crushing strengthx1.25 value)
2) N/mm2 = Mpa

MINISTRY OF WORKS (MOW) THE UNITED REPUBLIC OF TANZANIA JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: INGEROSEC CORPORATION, JAPAN	PROJECT NAME: THE PROJECT FOR WIDENING GEREZANI AREA ROAD	DRAWING TITLE: KERB STONE DETAILS	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : DBD-10

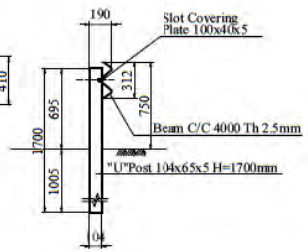
TRAFFIC SAFETY DETAILS (1) SCALE A3 1:40

GUARD RAIL

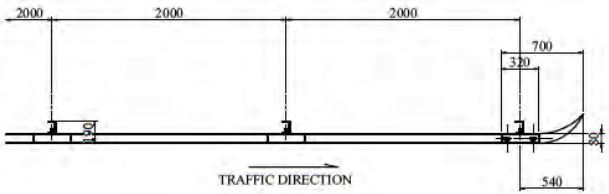
VIEW



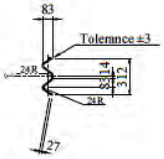
SECTION A - A



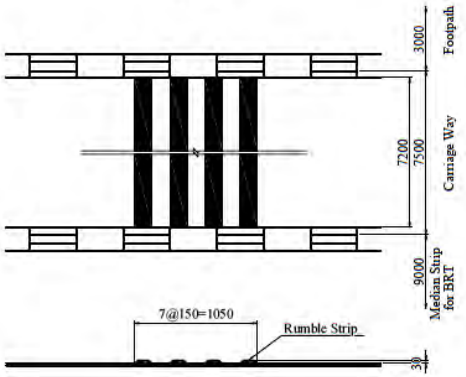
PLAN



SECTION B - B

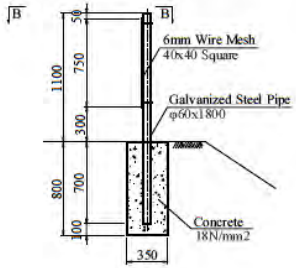


HUMP

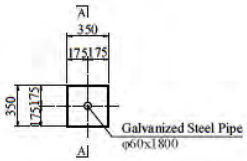


GUARD FENCE

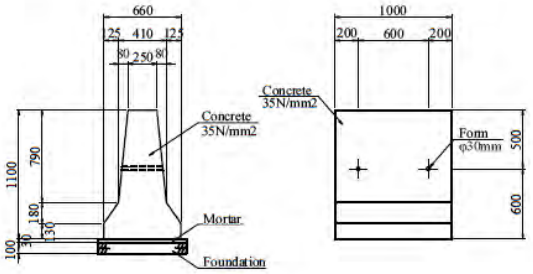
SECTION A - A



SECTION B - B



STIFFNESS GUARD FENCE



Note :
1) Concrete strength shall be measured by cylinder crushing strength (Cube crushing strength shall be used cylinder crushing strengthx1.25 value)
2) N/mm2 = Mpa

MINISTRY OF WORKS (MOW) THE UNITED REPUBLIC OF TANZANIA JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	DATE:	DRAWING No. :
	INGEROSEC CORPORATION, JAPAN	THE PROJECT FOR WIDENING GEREZANI AREA ROAD	TRAFFIC SAFETY DETAILS (1)	PREPARED BY: CHECKED BY:	DBD-11

TRAFFIC SAFETY DETAILS (2)

WARNING SIGNS

① W.1.1 DANGEROUS BEND TO THE LEFT

② W.3.1 STEEP ASCENT

③ W.3.2 STEEP DESCENT

④ W.6 UNEVEN ROAD

⑤ W.17.1 DANGEROUS INTERSECTION

⑥ W.17.2 DANGEROUS INTERSECTION WITH THE LYA-OUT OF THE INTERSECTION

⑦ W.18 ROUNDABOUT

⑧ W.21 PEDESTRIAN CROSSING

⑨ W.33 LEVEL CROSSING

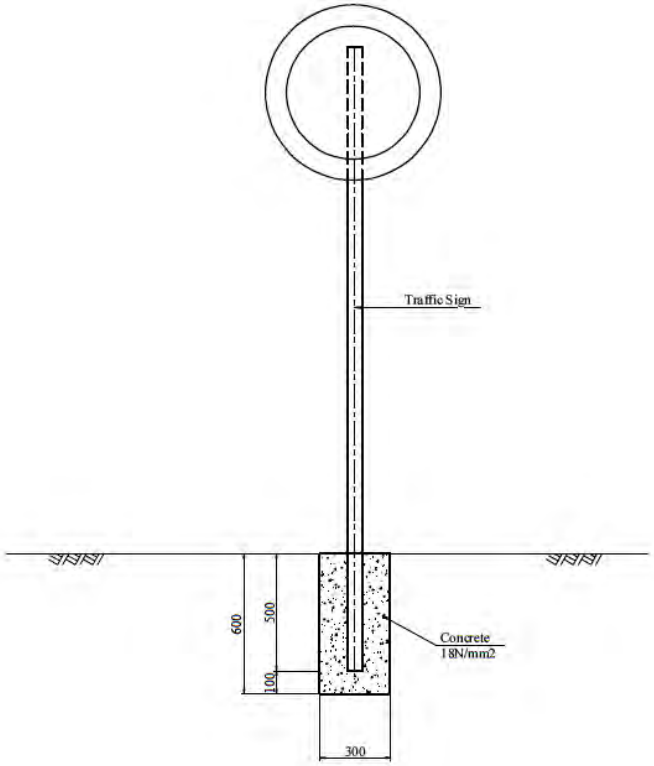
⑩ P.17 SPECIAL SPEED LIMIT (40 km/h)

⑪ I.5 BUS STOP

⑫ SIDE ROAD ON THE LEFT

SIGN POST DETAILS

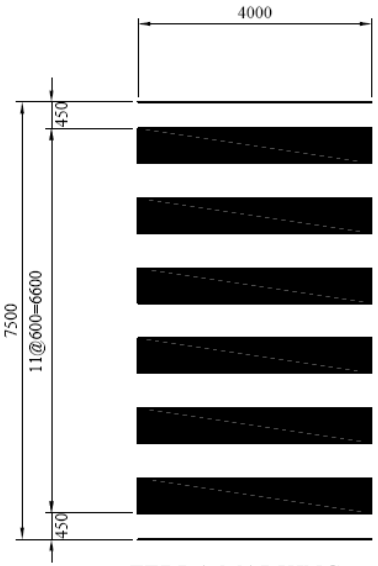
SCALE A3 1:20



MINISTRY OF WORKS (MOW) THE UNITED REPUBLIC OF TANZANIA JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: INGEROSEC CORPORATION, JAPAN	PROJECT NAME: THE PROJECT FOR WIDENING GEREZANI AREA ROAD	DRAWING TITLE: TRAFFIC SAFETY DETAILS (2)	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : DBD-12

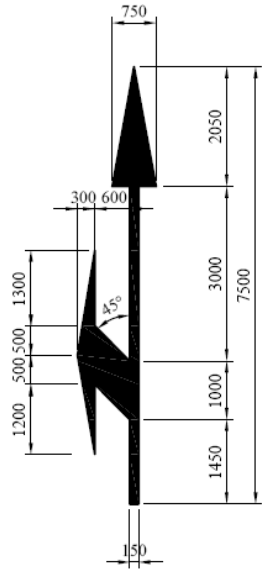
TRAFFIC MARKING DETAILS SCALE A3 1:80

PEDESTRIAN-CROSSING

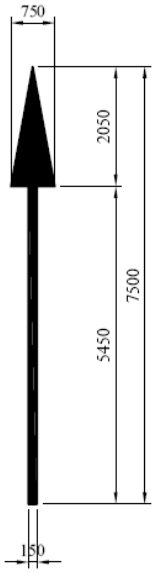


ARROW MARK

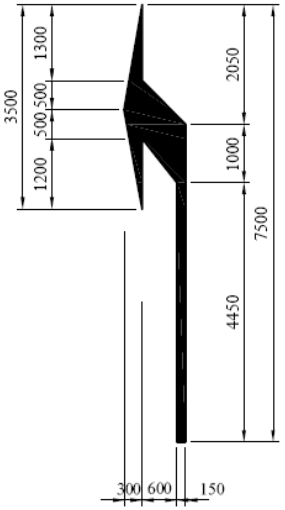
STRAIGHT-LEFT-TURN



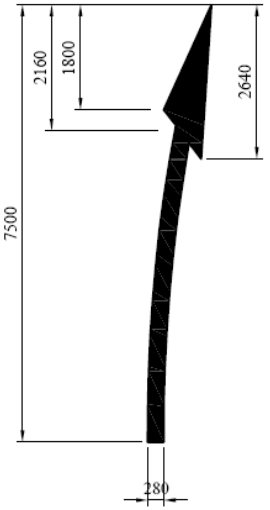
STRAIGHT



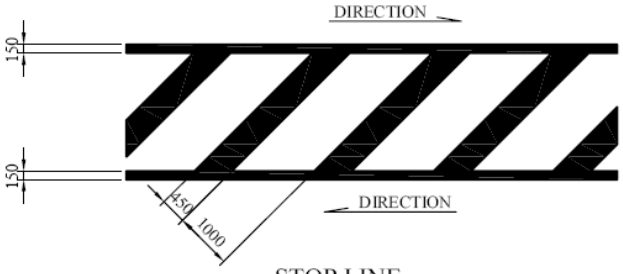
TURN



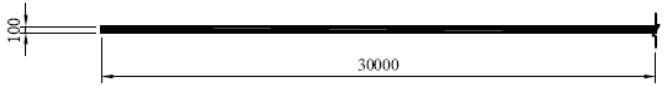
DEFLECTING-APROWS



ZEBRA MARKING

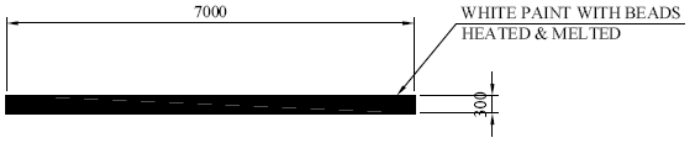


CONTINUOUS LINE

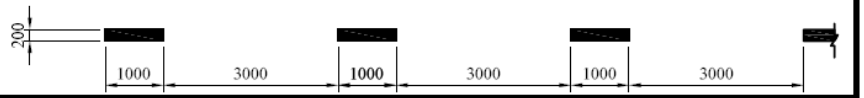


LANE LINE

STOP LINE



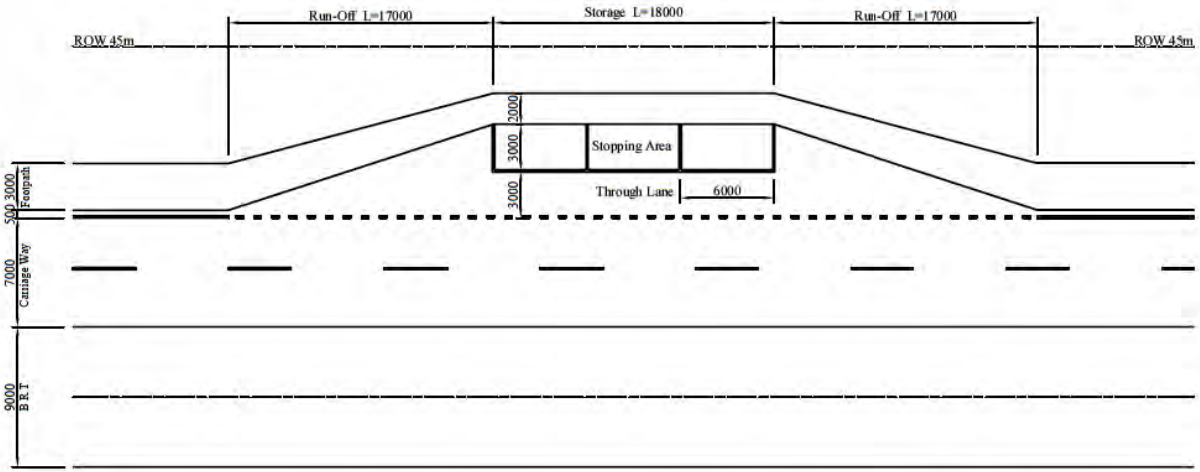
LAY BY



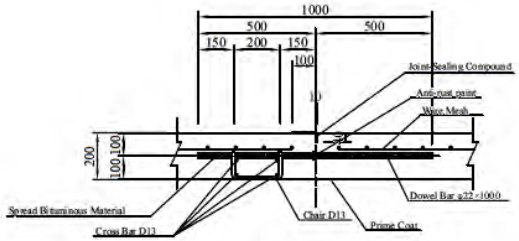
MINISTRY OF WORKS (MOW) THE UNITED REPUBLIC OF TANZANIA JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: INGEROSEC CORPORATION, JAPAN	PROJECT NAME: THE PROJECT FOR WIDENING GEREZANI AREA ROAD	DRAWING TITLE: TRAFFIC MARKING DETAILS	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : DBD-13

LAY BY DETAILS

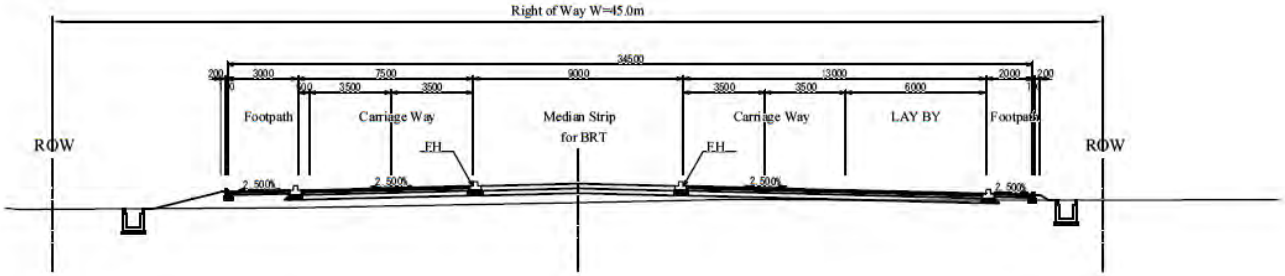
PLAN OF LAY BY SCALE A3 1:300



Detail of Joint SCALE A3 1:10



TYPICAL LAYOUT OF LAY BY SCALE A3 1:200



MINISTRY OF WORKS (MOW) THE UNITED REPUBLIC OF TANZANIA JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS: INGEROSEC CORPORATION, JAPAN	PROJECT NAME: THE PROJECT FOR WIDENING GEREZANI AREA ROAD	DRAWING TITLE: LAY BY DETAILS	DATE: PREPARED BY: CHECKED BY:	DRAWING No. : DBD-14