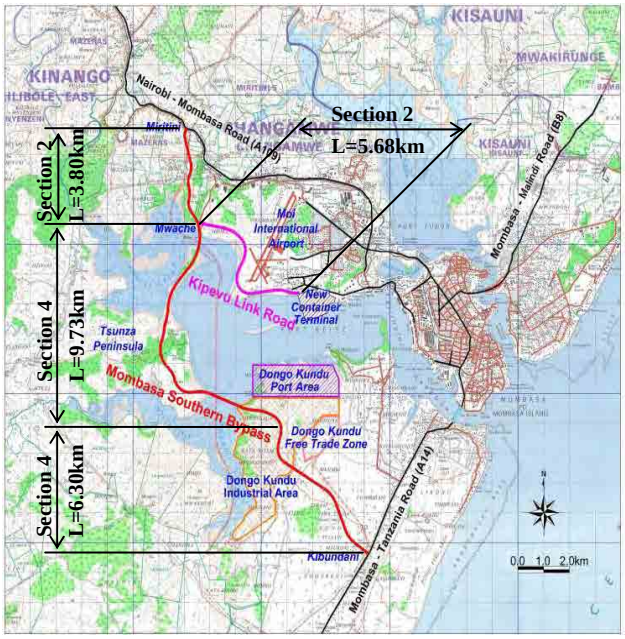
CHAPTER 6 BASIC DESIGN OF THE PROJECT FACILITIES

6.1 Outline of the Project Road

6.1.1 Location of the Project Roads

The Project roads are comprised of two roads, namely Mombasa Southern Bypass and Kipevu Link Road. Mombasa Southern Bypass branches off from Nairobi-Mombasa Road (A109) at Miritini then runs down to Tsunza Peninsula and Dongo Kundu, and finally emerges with Mombasa-Tanzania Road (A14). The Kipevu Link Road branches off from Mombasa Southern Bypass at Mwache then runs to Mombasa New Port Container Terminal.

Mombasa Southern Bypass is about 20.0 km and Kipevu Link Road is about 5.7 km.



Source: JICA Survey Team

Figure 6.1-1 Location of the Project Roads

6.1.2 Role of the Project Roads

Presently, Nairobi-Mombasa Road (A109) and Mombasa-Tanzania Road (A14) are not connected directly. The traffic between A109 and A14 has to use Likoni Ferry. The Bypass connects the road directly without using the ferry and passing through Mombasa Island. Therefore Mombasa Southern Bypass contributes to reduce travel time and mitigate traffic congestions in Mombasa Island.

Mombasa Southern Bypass provides transportation means for Dongo Kundu Area where the development of new port, industrial area and free trade zone are planned.

The Kipevu Link Road is the access way to Mombasa new container terminal which is under construction

Figure 6.1-2 Vehicles waiting Likoni

Figure 6.1-3 Mombasa New Container Terminal Construction Site

with the financial assistance of Japanese ODA loan and is scheduled to open at the end of 2015. Kipevu Link Road also serves for the traffic between the southern coastal area and Mombasa City where Moi International Airport is located.

6.1.3 Roadside Conditions

(1) Section 1: Northern Section of the Bypass (from Miritini Jct. to Mwache Jct.)

The road branches off from Nairobi-Mombasa Road then crosses with railway and runs through hilly mountains to go down to Mwache Creek. There are few houses on the road alignment. In most of the hills corn is cultivated by farmers. Since the topography is mountainous, deep excavations and high embankments are necessary to construct the Project road in this section.

Figure 6.1-4 View of Section 1

(2) Section 2: Kipevu Link Road (from Mwache Jct. to New Container Terminal)

Kipevu Link Road runs parallel to the coastline from Mwache to Port Reitz. The coast is mostly about 50 m high steep slopes which are covered with shrubs. Mangrove forest spreads along the coastline. The road passes the southern side of the runway of Moi International Airport. The works of about 2 km long gas pipeline installation is under construction along the road alignment at the southern side of the runway.

Figure 6.1-5 View of Section 2

(3) Section 3: Tsunza Section of the Bypass (from Mwache Creek to Mteza Creek)

Mombasa Southern Bypass crosses Mwache Creek immediately south of Mwache Junction. Mwache Creek is about 500 m wide and about 10 m deep at the center. Mangrove trees grow at the both coasts of the creek. The south of the creek is a narrow peninsula which is formed with tidal flat land covered with sand and mangrove trees. The southern part of the narrow peninsula is formed with about 20 m high narrow ridge.

Figure 6.1-6 Tidal Flat Land

The southern part of Tsunza Section is gentle hills covered with villager's residences and corn firms. The road route runs aside the residential area. Mteza Creek exists between Tsunza and Likoni. Mteza Creek is about 1,500 m wide and the depth is about 10 m or less. Tsunza side of the creek is covered with very thick mangrove forest.

(4) Section 4: Likoni Section of Mombasa Southern Bypass (from Mteza Creek to Kibundani Jct.)

The western half of the section runs through very hilly terrain where corn farms are mostly cultivated. The eastern half of the section runs through flat terrain where corn, fruits trees of mango, cashew, coconut and other fruits are planted. The roadside of Mombasa-Tanzania Road is residential area.

Figure 6.1-7 Flat Terrain in Sec. 4

6.1.4 Considerations in Road Facility Planning

In the planning of the Project road facility, the following were considered:

- Matching with natural conditions: Condition such as topographical, geological and hydrological are taken into consideration. Counter-measures for salt water should be considered on structures close to the sea.
- Matching with socio-economic conditions: The each road section should be designed reflecting its traffic volume, traffic component, roadside socio-economic activity condition and etc.
- Environmental and social consideration design: The Project route should be selected to minimize the environmental and social impact. Designs and construction methods should be planned to minimize the impact on the environment. Mitigation measures should be planned in cases that the negative environmental effect is foreseen.
- Cost effective design: The facilities should be designed to secure the required functions and durability. However, cost efficiency also be considered in the design.

6.2 Road Design

6.2.1 Design Criteria and Standard

(1) Design Specifications

The design specifications of Kenya are basically applied. However, AASHTO and Japanese specifications are referred and compared to establish the most suitable design criteria and standards for the Project. The design specifications referred are as follows:

- Road Design Manual Part 1 Geometric Design of Rural Roads, Roads Department, Ministry of Works, Republic of Kenya, January 1979
- A Policy on Geometric Design of Highways and Streets, AASHTO, 2001
- Geometric Design Standard, Japan Road Association, Japan, 1993

(2) Design Speed

The proposed design speed is shown in Table 6.2-1.

Table 6.2-1 Design Speed by Segment

Road Class	Segments	Design Speed
A	Mombasa Southern Bypass Route-B	80 km/h
B	Kipevu Link Road	
-	Slip Road of Grade Separated Junction	50 km/h

Source: JICA Survey Team

(3) Minimum Radius of Horizontal Curve

A comparison of the specifications and the proposed minimum radius of horizontal curve are shown in Table 6.2-2.

Table 6.2-2 Minimum Radius of Horizontal Curve

Design Speed	Kenya (m)	AASHTO (m)	Japan (m)	Proposed (m)
50 km/h	80	80	100 (80) *	80
80 km/h	350	230	280 (230) *	350

* The figure in ( ) can be applied where the standard is difficult to apply.
Source: JICA Survey Team

(4) Superelevation

The proposed standard of superelevation is shown in Table 6.2-3.

Table 6.2-3 Standard of Superelevation

Design Speed	50 km/h	80 km/h
E %	7 % (max.)	7 % (max.)
Radius (m)		
RC	1,200~800	2,500~2,000
2.5	800~360	2,000~1,200
3	360~270	1,200~900
4	270~180	900~500
5	180~130	500~450
6	130~100	450~350
7	100~80	350~270

Source: Road Design Manual Part 1 Geometric Design of Rural Roads
Road Department, Ministry of Works, Republic of Kenya, January 1979

A comparison of the specifications and the proposed super elevation runoff are shown in Table 6.2-4.

Table 6.2-4 Superelevation Runoff

Design Speed		Kenya		AASHTO		Japan		Proposed	
Maximum	50km/h	1.25	(1/80)	0.65	(1/154)	0.87	(1/115)	0.67	(1/150)
ΔS (%)	80km/h	0.50	(1/200)	0.50	(1/200)	0.67	(1/150)	0.50	(1/200)
Minimum ΔS (%)		0.30		(1/333)				0.30	(1/333)

Source: JICA Survey Team

(5) Stopping Sight Distance

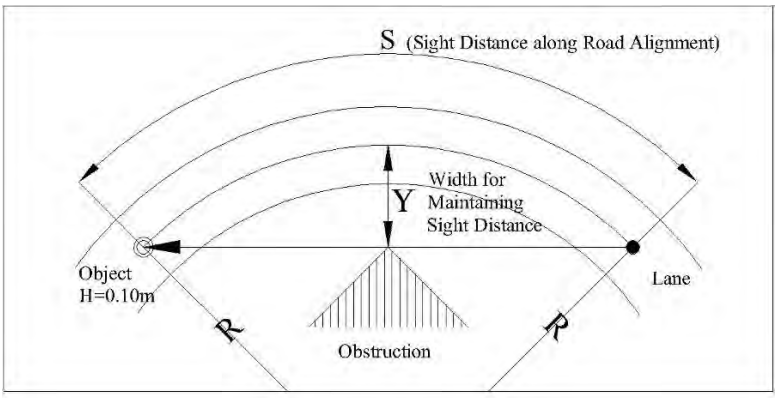
A comparison of the specifications and the proposed stopping sight distance is shown in Table 6.2-5.

Table 6.2-5 Standard of Stopping Sight Distance

Design Speed	Kenya (m)	AASHTO (m)	Japan (m)	Proposed (m)
50 km/h	60 (55) *	65	55	55
80 km/h	130 (100) *	130	110	110

* The figure in ( ) can be applied where the standard is difficult to apply.
Source: JICA Survey Team

Figure 6.2-1 and Table 6.2-6 describe why stopping distance of 110m is recommended. For example, if stopping distance is 130m and design speed is 80 km/h, larger than 626 m radius is required in case no widening or larger than 3 m widening is required in case radius is 350 m. Contrarily, if stopping distance is 110m and design speed is 80 km, larger than 500 m radius is applicable even no widening.



Source: JICA Survey Team

Figure 6.2-1 Concept of Width for Maintaining Sight Distance

Table 6.2-6a Calculation Sheet for Required Widening (in case of S=110m)

Type	Design Speed	S	Y	Minimum Radius without Widening		R	Y	Widening
I	80 km/h	110	3.050	496	m	350	4.321	1.271
II			3.375	448	m	500	3.025	Not Needed
III			2.875	526	m	500	3.025	0.150

Source: JICA Survey Team

Table 6.2-6b Calculation Sheet for Required Widening (in case of S=130m)

Type	Design Speed	S	Y	Minimum Radius without Widening		R	Y	Widening
I	80 km/h	130	3.050	693	m	350	6.036	2.986
II			3.375	626	m	500	4.225	0.850
III			2.875	735	m	500	4.225	1.350

Source: JICA Survey Team

(6) Vertical Alignment

A comparison of the specifications and the proposed maximum gradient is shown in Table 6.2-7.

Table 6.2-7 Maximum Gradient

Topography	50km/h			80km/h			Proposed	
	Kenya	USA	Japan	Kenya	USA	Japan	50km/h	80km/h
Flat	-	-		4	6	4	6	4
Rolling	7	6	6	5	6	7	6	5
Mountainous	9	14	9	-	-	-	6	6

Source: JICA Survey Team

The proposed minimum radius of vertical curve is shown in Table 6.2-8.

Table 6.2-8 Minimum Radius of Vertical Curve

Design Speed (km/h)	Stopping Sight Distance (m)	Vertical Curve Radii (m)				
			Kenya	USA	Japan	Proposed
50	60	Crest	400	700	800	800
		Sag	1,100	1,300	700	1,300
80	120	Crest	1,500	2,600	3,000	3,000
		Sag	2,800	3,000	2,000	3,000

Source: JICA Survey Team

(7) Typical Cross Section

The typical cross section proposed in the F/S (original design) is shown in Figure 6.2-2.

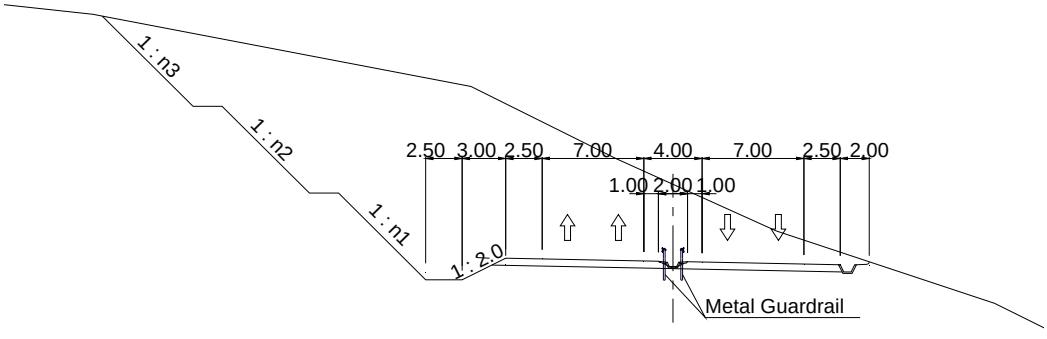


Figure 6.2-2 Typical Cross Section Proposed in F/S

Source: Preliminary Design Report, Consultancy Service for Feasibility Study, Environmental and Social Impact Assessment, Preliminary and Detailed Engineering Design and Tender Documentation for the Bypass Road Study

The typical cross sections proposed by JICA Survey Team are shown in Figure 6.2-3 to 6. The revised typical cross sections reduce quantity of excavation.

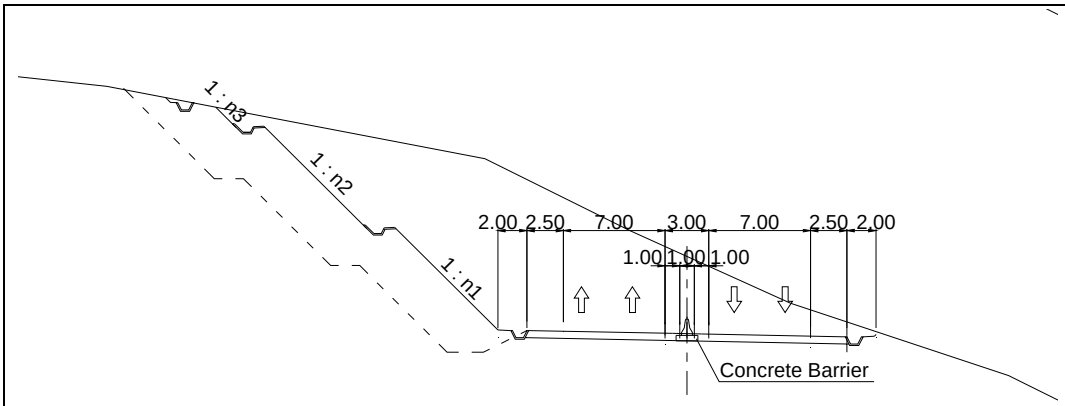


Figure 6.2-3 Typical Cross Section (4-lane Section)

Source: JICA Survey Team

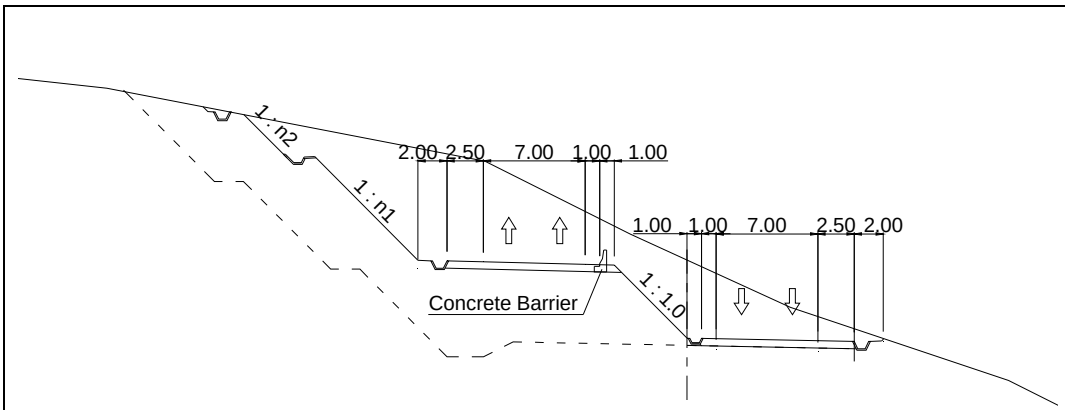


Figure 6.2-4 Typical Cross Section (Separate Section)

Source: JICA Survey Team

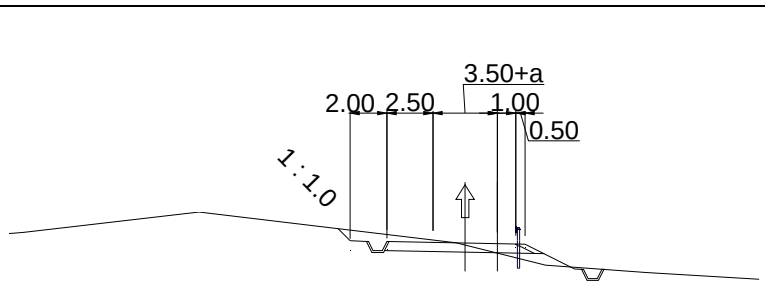


Figure 6.2-5 Typical Cross Section (One-Way Single Ramp)

Source: JICA Survey Team

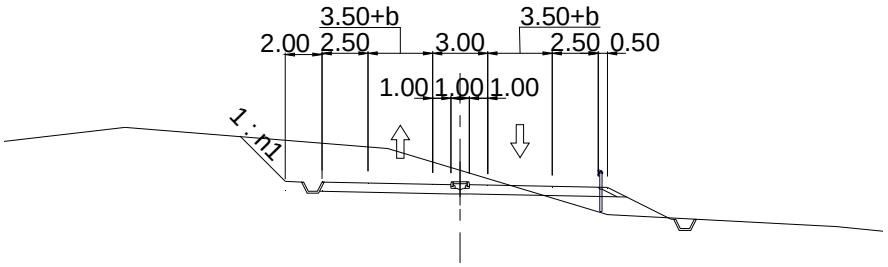


Figure 6.2-6 Typical Cross Section (Two Ways Dual Ramp)

Source: JICA Survey Team

(8) Grade Separated Junction

Geometric Standards of Main Road at Junction

Special geometric standard should be given to the main road sections at junctions for the traffic safety as specified in the Japanese specification.

Table 6.2-9 Proposed Geometric Standard at Junctions

Design Speed (km/h)		80	Remarks
Minimum Radius (m)		1,100 (800) *	
Maximum Gradients (%)		3.0 (4.0) *	
Minimum Vertical Radius (m)	Crest	12,000 (6,000) *	
	Sag	8,000 (4,000) *	

* The figure in ( ) can be applied where the standard is difficult to apply.
Source: Geometric Design Standard, Japan Road Association, 1993

Slip Road (Ramp)

The proposed geometric standards for slip road (ramp) are as shown in Table 6.2-10.

Table 6.2-10 Geometric Standards for Slip Road

Design Speed (km/h)		50	Remarks
Stopping Sight Distance (m)		60 (55)	
Horizontal Curve Radius (m)		80	
Superelevation (%)		7.0	
Gradients (%)	Up	5.0	
	Down	7.0	
Vertical Curves (m)	Crest	800	
	Sag	1,100	
Vertical Clearance (m)		5.0	
Widening a and b (m)		0.50	Radius 150m or less

Source: Chapter 6, Road Design Manual Part 1 Geometric Design of Rural Roads, Road Department, Ministry of Works, Republic of Kenya, January 1979

Acceleration Lane Length

A comparison of the specifications and the proposed length of acceleration lane and taper are shown in Table 6.2-11 and Figure 6.2-7.

Table 6.2-11 Acceleration Lane Length (Parallel Type)

	Kenya		USA		Japan		Proposed	
Parallel Type	Taper	L	Taper	L	Taper	L	Taper	L
	40m	150m	90m	115m	50m	160m	60m	150m

Source: JICA Survey Team

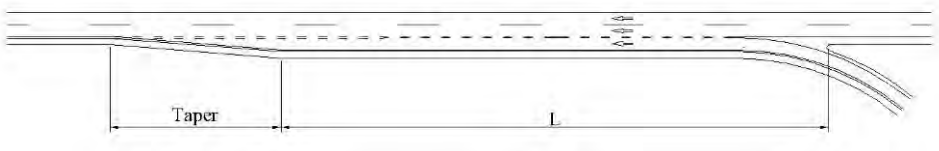


Figure 6.2-7 Acceleration Lanes (Parallel Type)

Deceleration Lane Length

A comparison of the specifications and the proposed length of parallel type deceleration lane and taper are shown in Table 6.2-12 and Figure 6.2-8.

Table 6.2-12 Deceleration Lane Length (Parallel Type)

	Kenya		USA		Japan		Proposed	
Parallel Type	Taper	L	Taper	L	Taper	L	Taper	L
	40m	75m	75m	90m	50m	80m	60m	90m

Source: JICA Survey Team

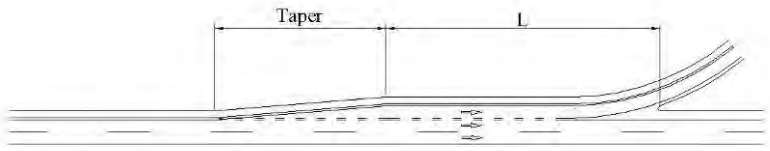


Figure 6.2-8 Deceleration Lanes (Parallel Type)

A comparison of the specifications and the proposed length of taper type deceleration lane and taper are shown in Table 6.2-13 and Figure 6.2-9.

Table 6.2-13 Deceleration Lane Length (Taper Type)

	Kenya		USA		Japan		Recommended	
Taper Type	Taper	L	Taper	L	Taper	L	Taper	L
	n/a	n/a	1/15~1/25	90m	1/15~1/20	80m	1/15~1/25	90m

Source: JICA Survey Team

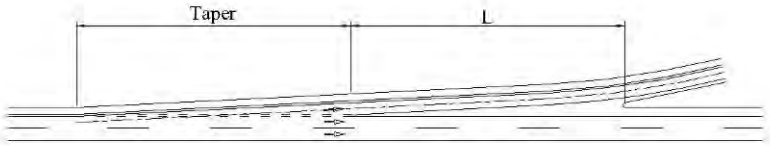


Figure 6.2-9 Deceleration Lanes (TaperType)

(9) Scheme of Stage Construction

Stage construction is proposed for the section from Mwache Jct. to Kibundani Jct. of Mombasa Southern Bypass. A scheme of the stage construction is shown in Figure 6.9-10 and 11.

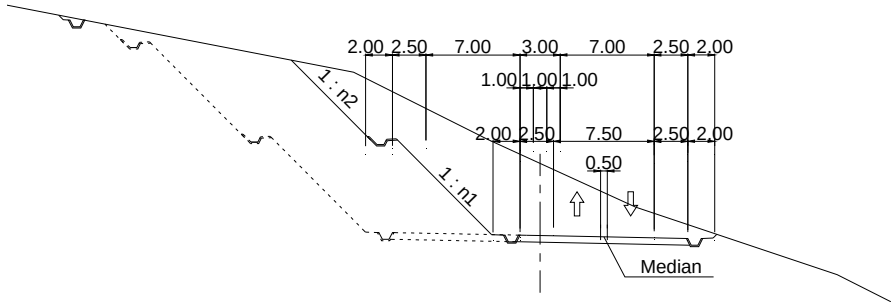


Figure 6.2-10 Scheme of Stage Construction (Cut Section)

Source: JICA Survey Team

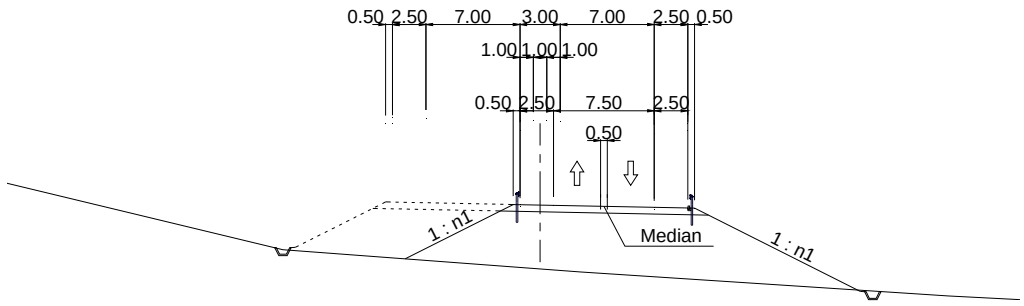


Figure 6.2-11 Scheme of Stage Construction (Embankment Section)

Source: JICA Survey Team

6.2.2 Review and Alternative Proposal of the Road Alignment

(1) Basic Policy of Road Alignment Review

1) To minimize resettlement

2) To minimize impact on natural environment

3) To satisfy the geometric standards

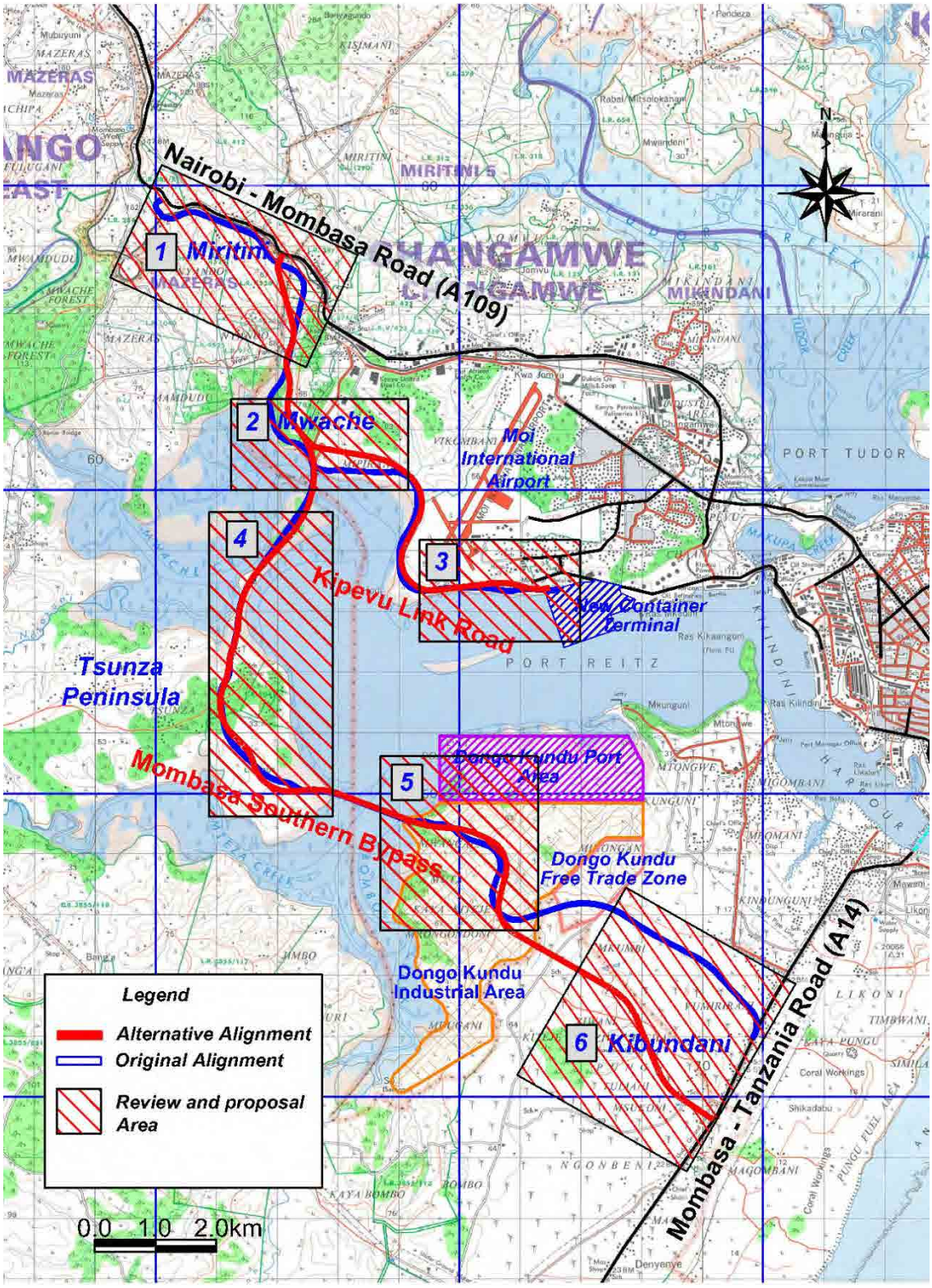
4) To provide smooth alignment for safety and performance

5) To secure the road reserve to accommodate required road facilities including future needs

(2) Comparison of Original Alignment and Proposed Alternative

Based on the above basic policy, the road alignment proposed in F/S (original alignment) was reviewed and an alternative road alignment was proposed. The major revisions were proposed at the particular sections as shown in Figure 6.2-12. The comparison between original and

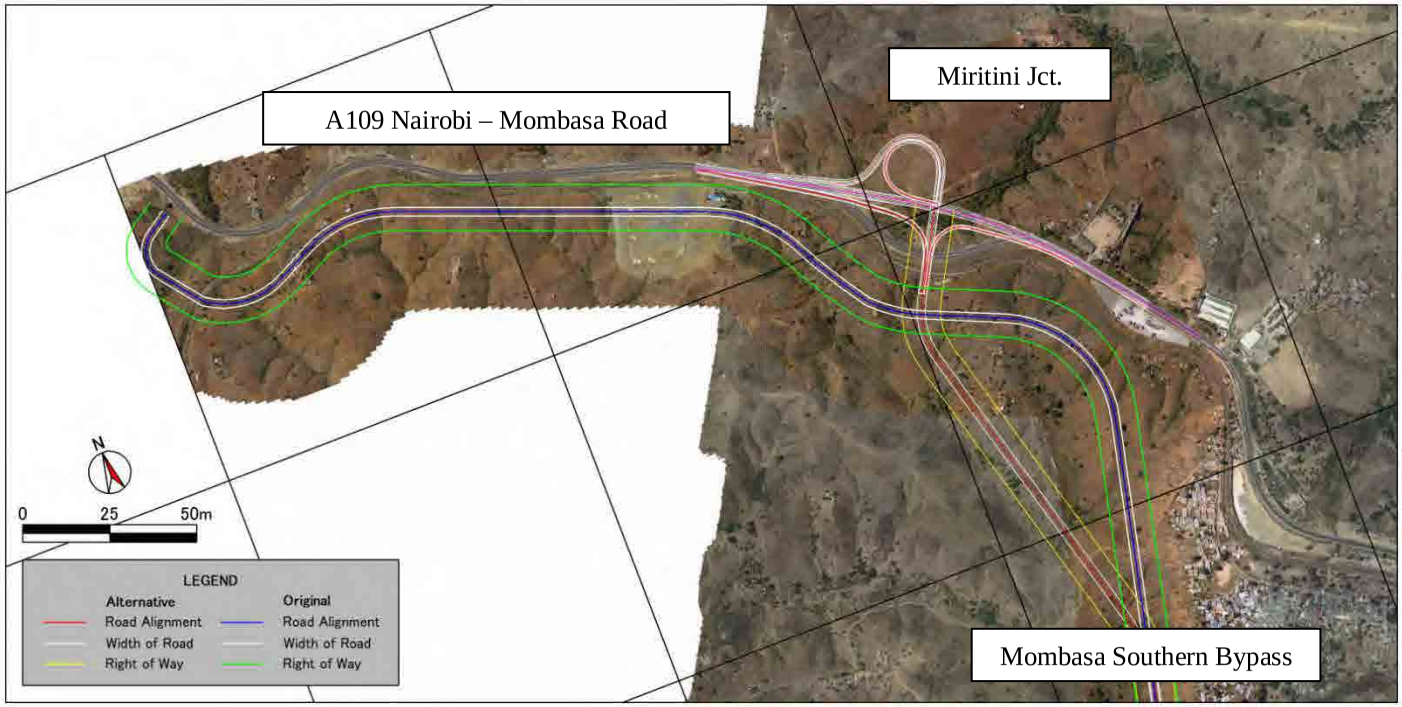
alternative road alignment is shown in Table 6.2-14. In addition, comparative items are rated into categories (i.e. ×: Bad, △: Moderate and ○: Good).



Source: JICA Survey Team

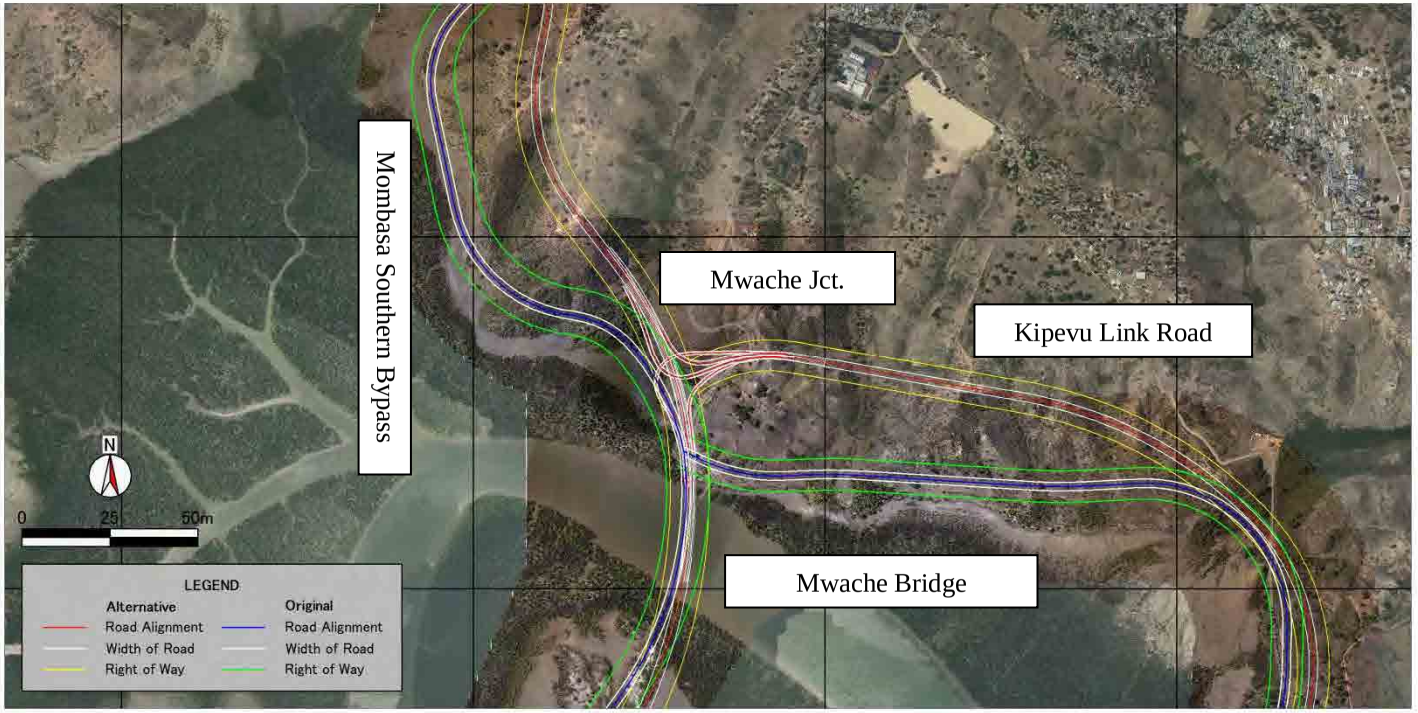
Figure 6.2-12 Location of Review and Revised Project Road Alignment

Table 6.2-14(1) Comparison of Original Alignment and Alternative Alignment

Plan	1) Miritini Junction (A109 Nairobi-Mombasa Road and Mombasa Southern Bypass)  			
Option	Original Alignment		Alternative Alignment	
Comparative Item	Location of Miritini Jct. to connect A109 (Nairobi – Mombasa Road) and Mombasa Southern Bypass			
Road Alignment	A109 : Min. Hor. Radius R=250m, Grade %	×	A109 : Min. Hor. Radius R=1200m, Grade 2.80%	○
No. of Affected Houses	Small (10 - 50)	△	Few (1 - 10)	○
Environmental Impact	Impact is bigger than the alternative alignment since the road is longer. Impacts are air & water pollution, waste, noise & vibration and modification of topography.	△	Impact is smaller than original alignment.	○
Other control Point	None	-	None	-
Construction Cost	Access road is longer, Crossing structure – 2 locations	△	Access road is shorter, Crossing structure - 2 locations	○
Recommendation			○	

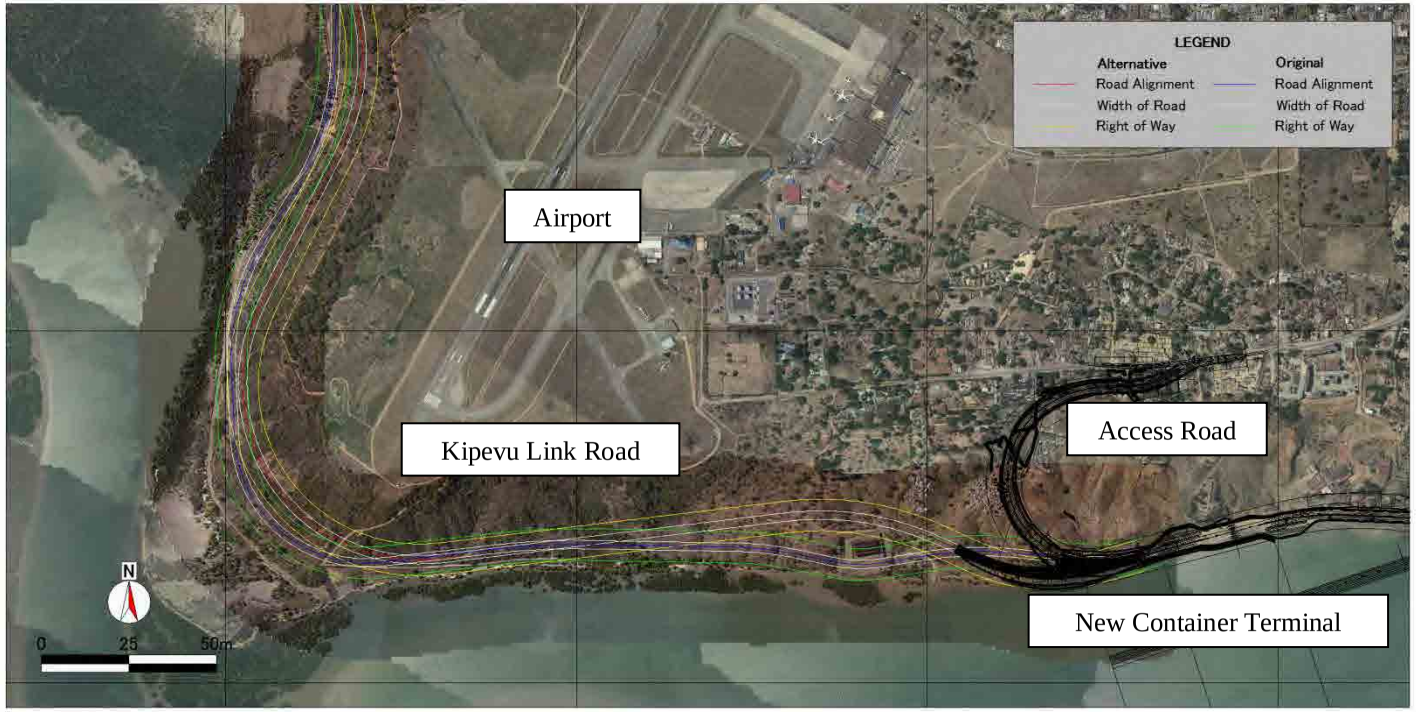
Source: JICA Survey Team

Table 6.2-14(2) Comparison of Original Alignment and Alternative Alignment

Plan	2) Mwache Junction (Mombasa Southern Bypass and Kipevu Link Road)  			
Option	Original Alignment		Alternative Alignment	
Comparative Item	Road Alignment of Mombasa Southern Bypass and Kipevu Link Road around MWACHE Jct.			
Road Alignment	Min. Hor. Radius R=350m, Grade 5.45%	×	Min. Hor. Radius R=1000m, Grade 4.00%	○
No. of Affected Houses	Few (1- 10)	○	Few (1 -10)	○
Environmental Impact	Impact is bigger than the alternative alignment since the road is close to the sea shore/mangrove. It is difficult to install anti-pollution facilities (grit chamber / sedimentation basin) during road construction.	×	Impact is smaller than original alignment. It is possible to install anti-pollution facilities (grit chamber/sedimentation basin) during road construction.	○
Other control point	None	-	None	-
Construction Cost	Average	△	Expensive (require surplus excavation)	×
Recommendation			○	

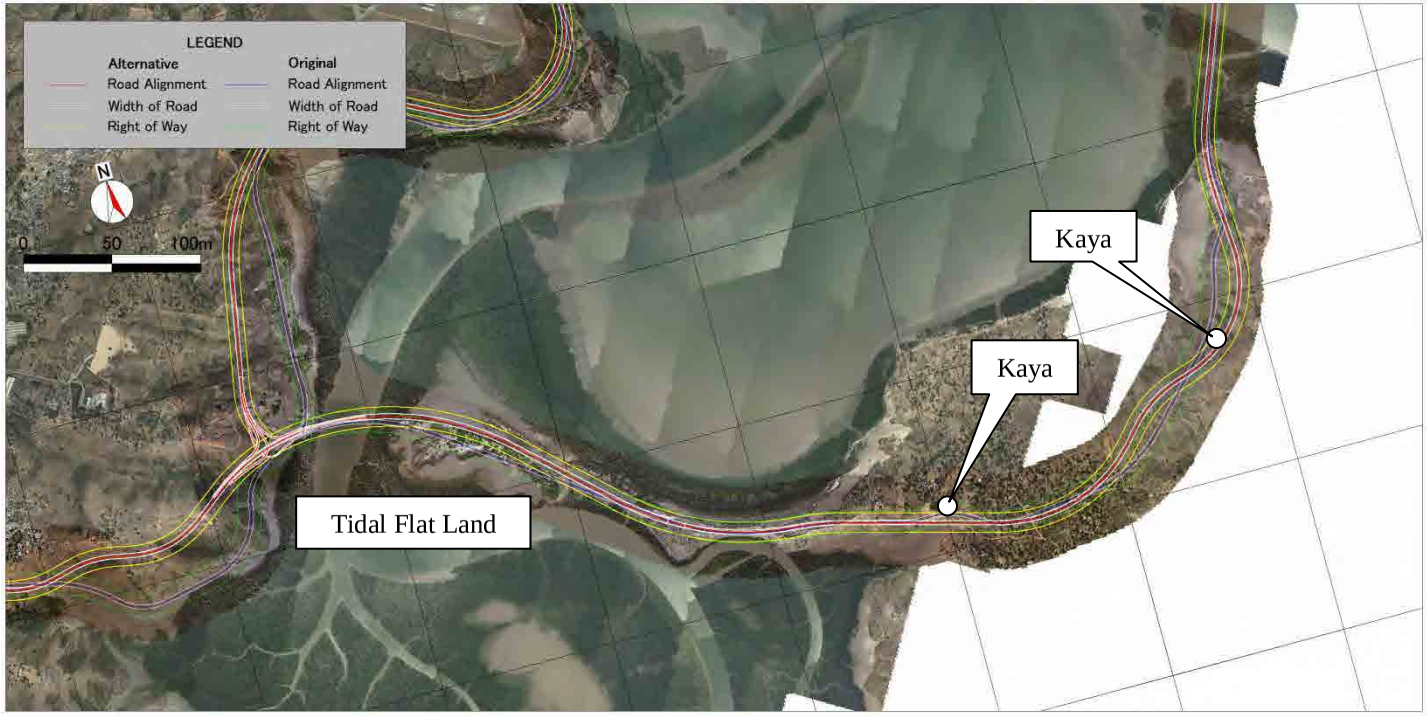
Source: JICA Survey Team

Table 6.2-14(3) Comparison of Original Alignment and Alternative Alignment

Plan	3) Kipevu Intersection (Kipevu Link Road and Access Road of New Container Terminal) 			
Option	Original Alignment		Alternative Alignment	
Comparative Item	Kipevu Link Road Alignment around Mombasa Airport and Access Road of New Container Terminal			
Road Alignment	Min. Hor. Radius R=350m, Grade 3.80%	○	Min. Hor. Radius R=500m, Grade 4.00%	○
No. of Affected Houses	Few (1 - 10)	○	Few (1 - 10)	○
Environmental Impact	Impact is bigger than the alternative alignment since the road is close to the sea shore/mangrove. It is difficult to install anti-pollution facilities (grit chamber/sedimentation basin) during road construction.	×	Impact is smaller than original alignment. It is possible to install anti-pollution facilities (grit chamber/sedimentation basin) during road construction.	○
Other control point	Gas pipe line and access to new container terminal	×	Gas pipe line and access to new container terminal	○
Construction Cost	Average	○	Average	○
Recommendation			○	

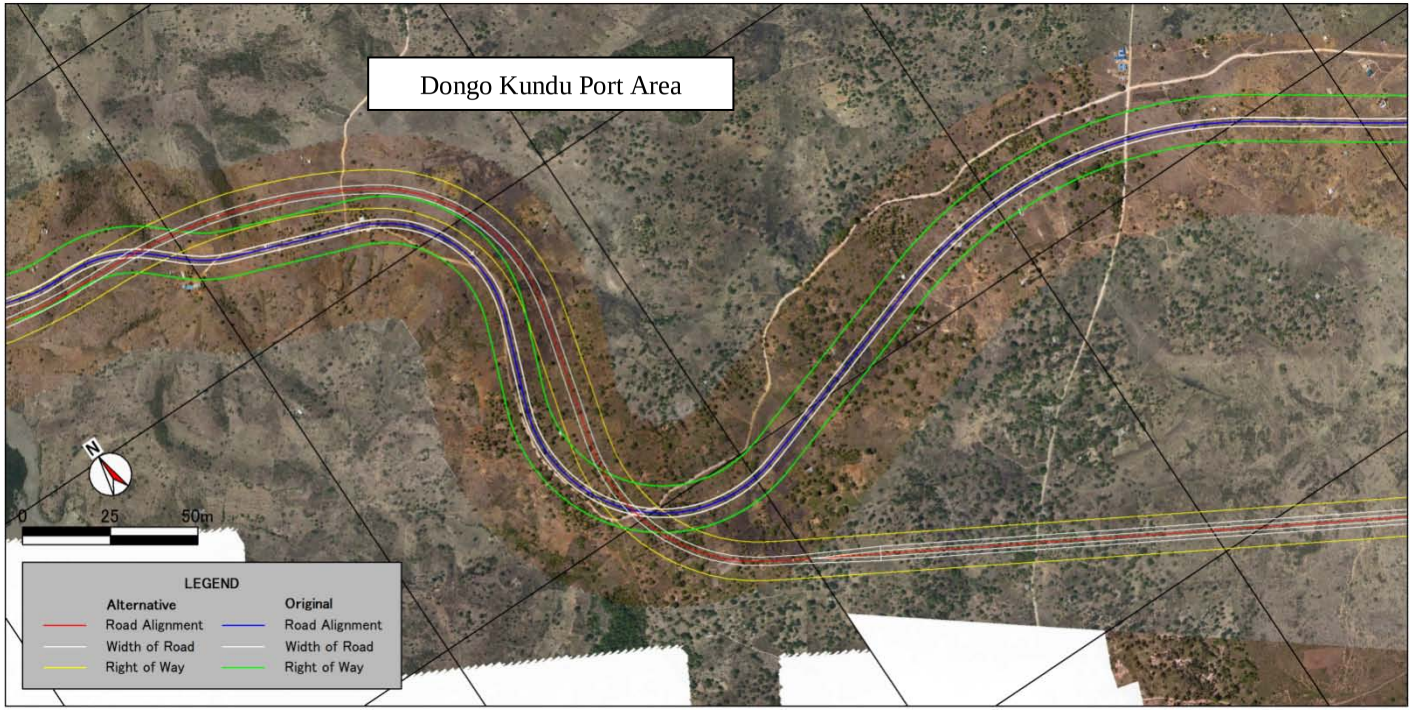
Source: JICA Survey Team

Table 6.2-14(4) Comparison of Original Alignment and Alternative Alignment

Plan	4) Tsunza Peninsula (Mombasa Southern Bypass) 			
Option	Original Alignment		Alternative Alignment	
Comparative Item	Road Alignment of Mombasa Southern Bypass in Tsunza Peninsula			
Road Alignment	Min. Hor. Radius R=350m, Grade 6.00%	△	Min. Hor. Radius R=500m, Grade 4.00%	○
No. of Affected Houses	Small (10 - 50)	△	Small (10 - 50)	△
Environmental Impact	Impact is bigger than the alternative alignment due to embankment on the tidal flat land.	×	Impact is smaller than original alignment since a viaduct is proposed instead of embankment for the tidal flat land.	△
Other control point	Kaya (2 - spots): affected	×	Kaya (2 - spots): avoided	○
Construction Cost	Average	△	Expensive (require environmental measures)	×
Recommendation			○	

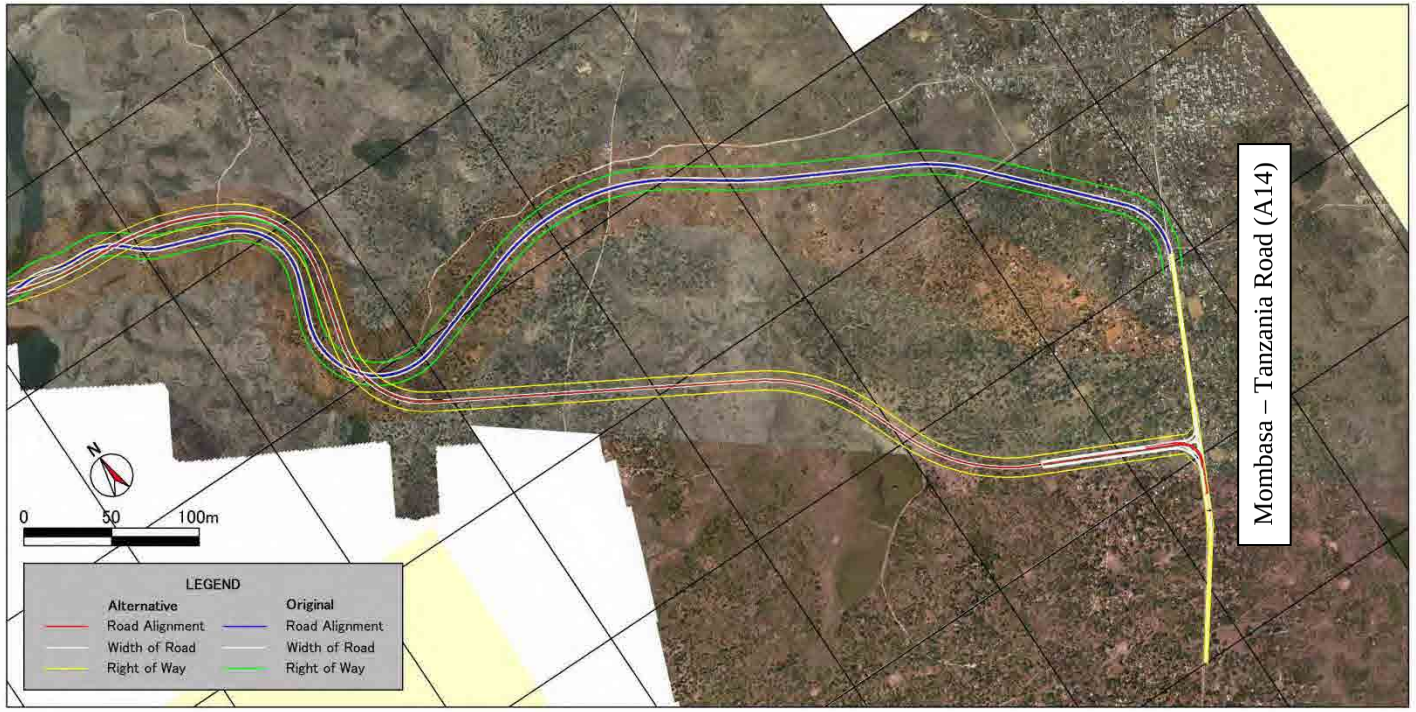
Source: JICA Survey Team

Table 6.2-14(5) Comparison of Original Alignment and Alternative Alignment

Plan	5) Dongo kundu Area (Mombasa Southern Bypass) 			
Option	Original Alignment		Alternative Alignment	
Comparative Item	Road Alignment of Mombasa Southern Bypass in Dongo Kundu			
Road Alignment	Min. Hor. Radius R=350m, Grade 6.00%	△	Min. Hor. Radius R=500m, Grade 4.50%	○
No. of Affected Houses	Small (10 - 50)	△	Few (1 - 10)	○
Environmental Impact	Same as the alternative alignment (not significant)	○	Same as original alignment (not significant)	○
Other control point	Dongo Kundu Port Area Access	△	Dongo Kundu Port Area Access	○
Construction Cost	Average	△	Average	△
Recommendation			○	

Source: JICA Survey Team

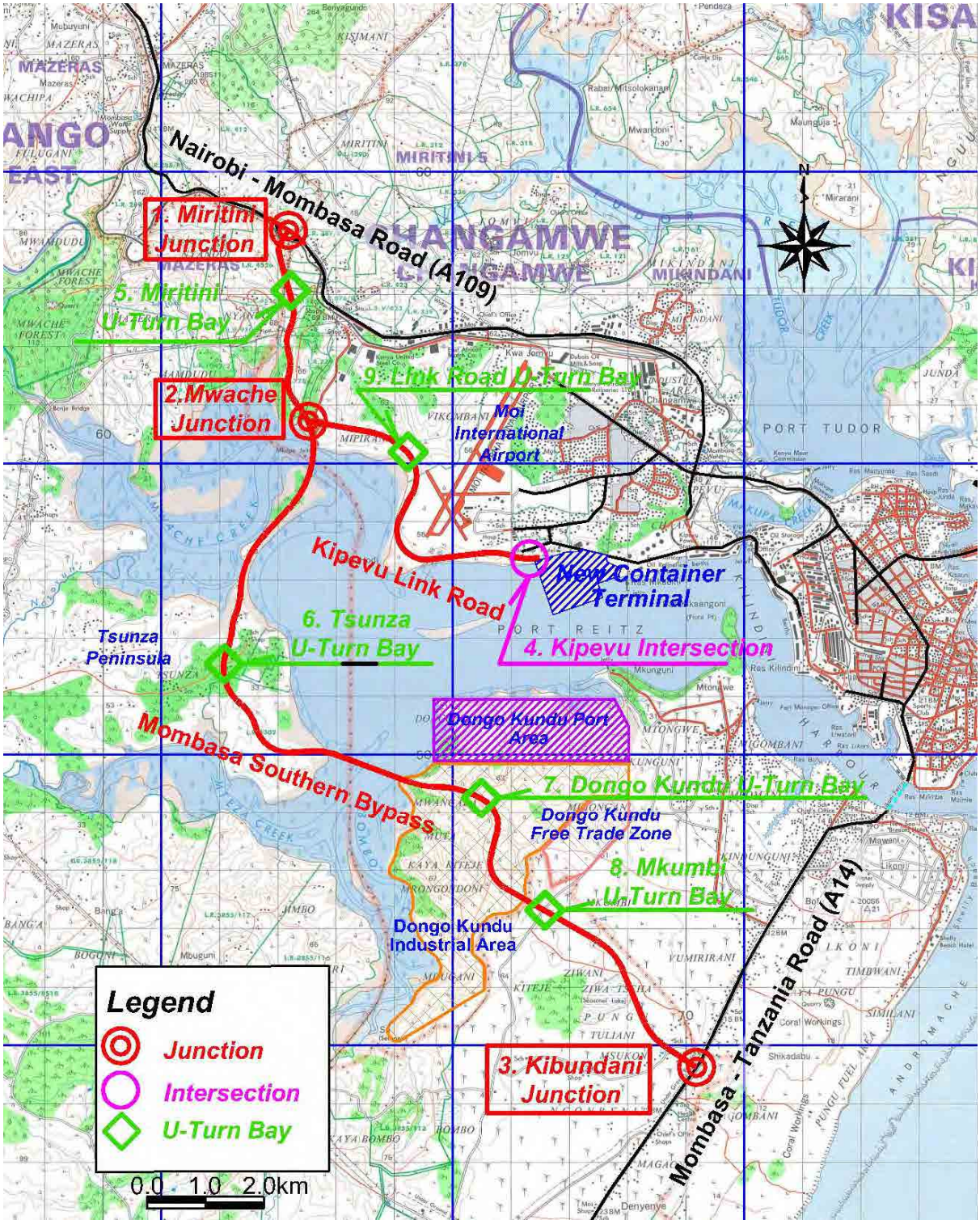
Table 6.2-14(6) Comparison of Original Alignment and Alternative Alignment

Plan	6) Kibundani Junction (Mombasa Southern Bypass and A14 Mombasa-Tanzania Road) 			
Option	Original Alignment		Alternative Alignment	
Comparative Item	Road Alignment of Mombasa Southern Bypass from Dongo Kundu Industrial Area to Mombasa – Tanzania Road.			
Road Alignment	Min. Hor. Radius R=400m, Grade 6.00%	△	Min. Hor. Radius R=500m, Grade 4.50%	○
No. of Affected Houses	Large (more than 50)	×	Small (10 - 50)	△
Environmental Impact	Same as the alternative alignment (not significant)	○	Same as original alignment (not significant)	○
Other control point	None	-	None	-
Construction Cost	Average	△	Average	△
Recommendation			○	

Source: JICA Survey Team

6.2.3 Junctions and U-Turn Bay Design

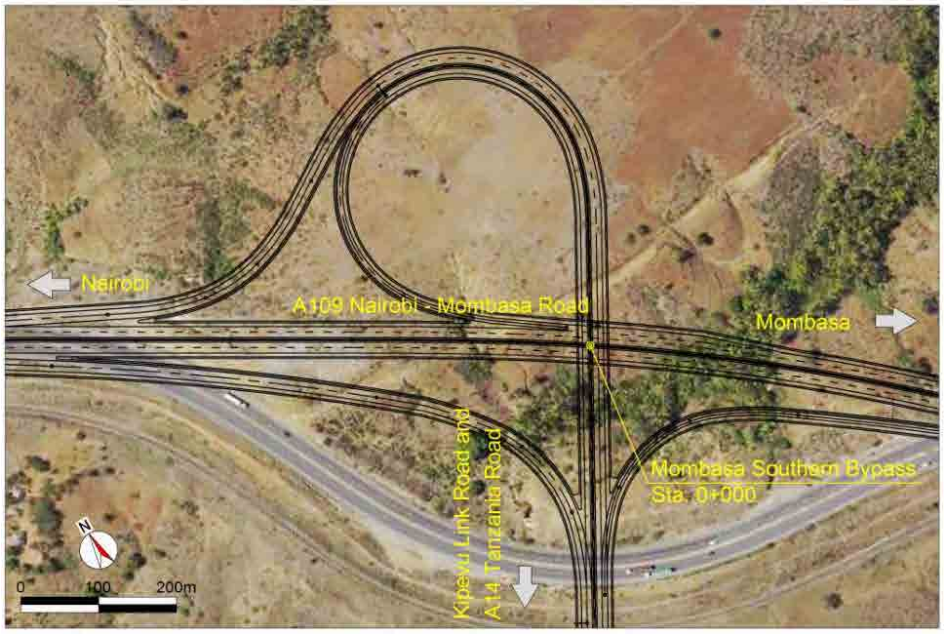
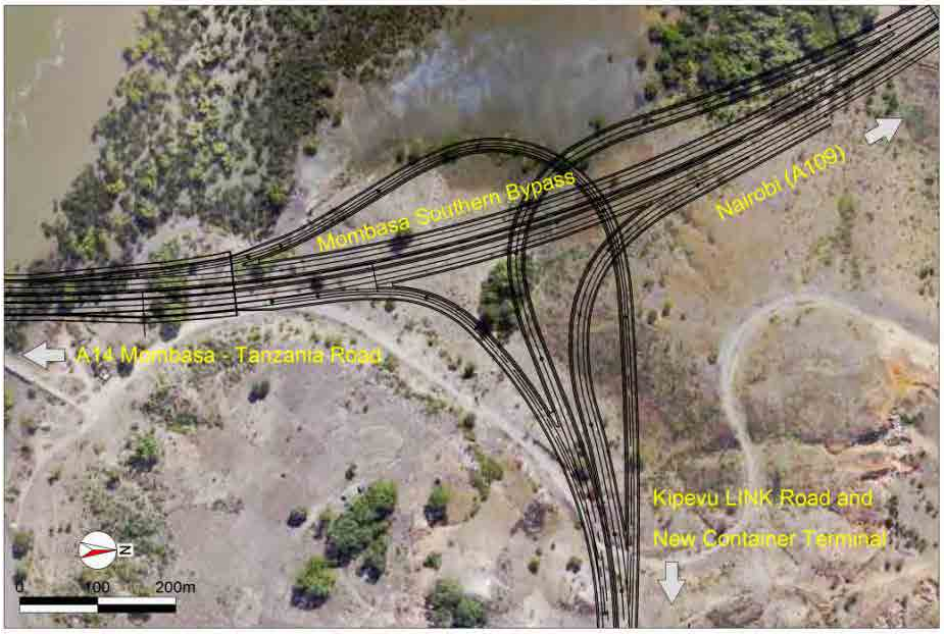
Location of road facilities such as Junction, Intersection and U-Turn Bay in the entire alignment are shown in Figure 6.2-13. Plans of junctions are presented in Table 6.2-15.

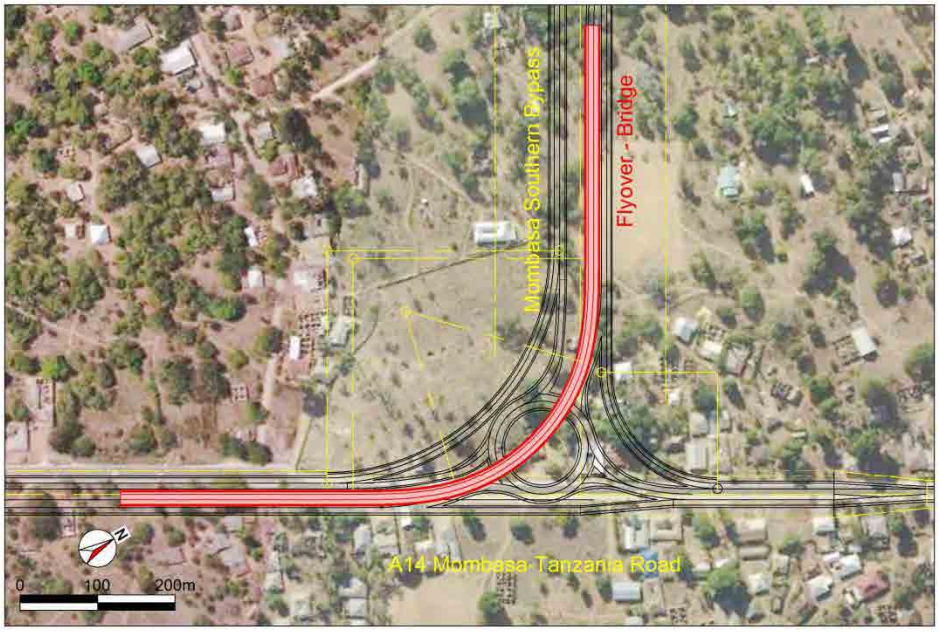
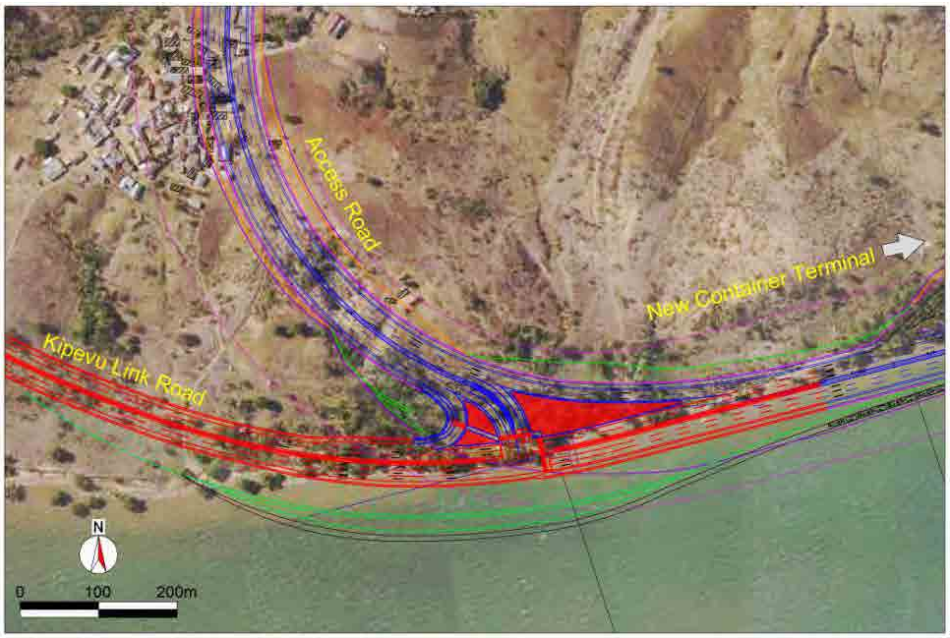


Source: JICA Survey Team

Figure 6.2-13 Location of Junction, Intersection and U-Turn Bay

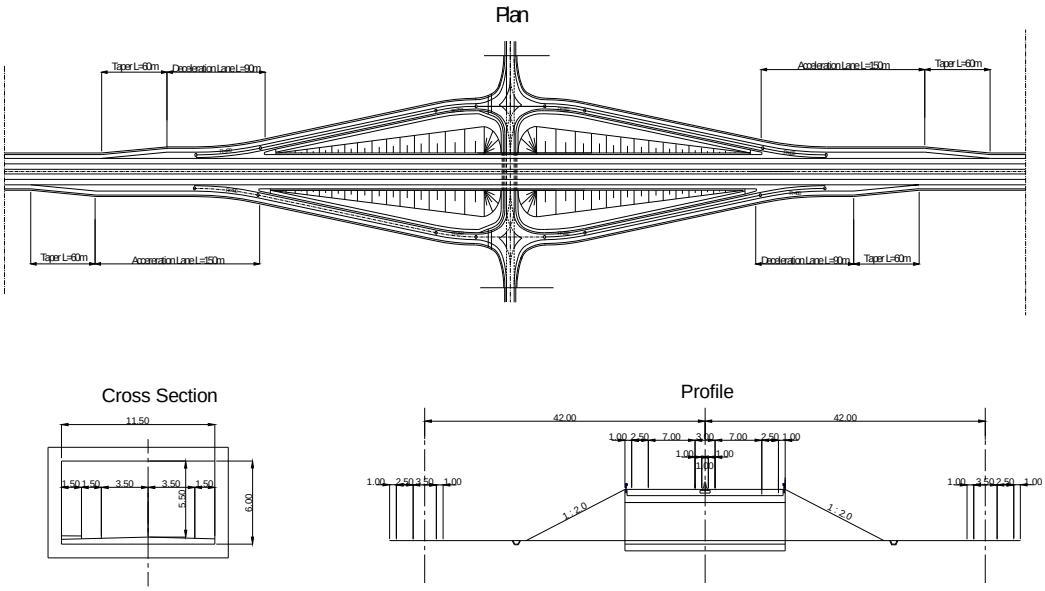
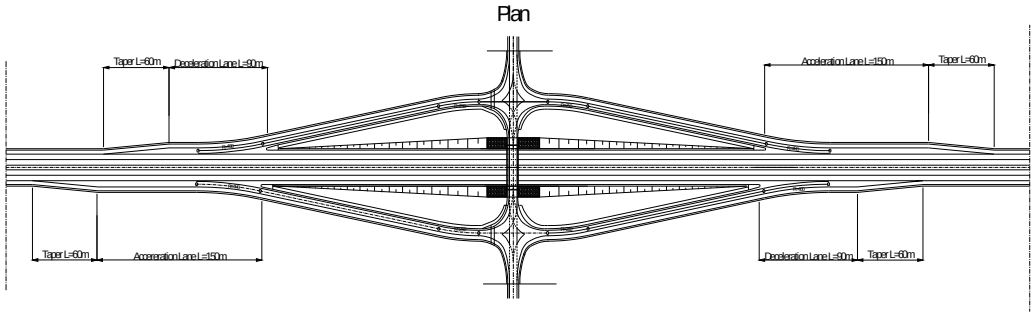
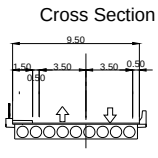
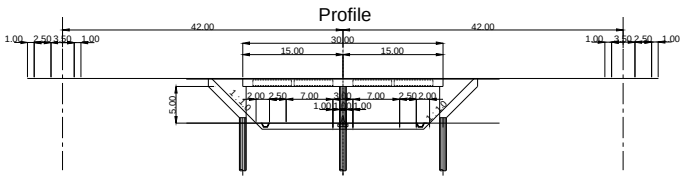
Table 6.2-15 Junction Plans

No.	Sta./Name	Mombasa Southern Bypass Sta.0+000	Miritini Junction
1	Plan Illustration		
	Location and Type	Miritini Junction connects Mombasa Bypass with Nairobi-Mombasa Road (A109). It is Trumpet type junction. The ramps to/from Nairobi are 2-lane and ramps to/from Mombasa are 1-lene. A109 will be re-aligned to be straight and horizontal (presently curved and depressed) to secure the space for the junction and to improve the road safety and performance of A109. The depressed area will be embanked to construct A109 and the Bypass. The Bypass is planned to under-pass A109 and railway which runs paralleled to A109.	
No.	Sta./Name	Mombasa Southern Bypass Sta.3+800	Mwache Junction
2	Plan Illustration		
	Location and Type	Mwache Junction connects Kipevu Link Road with Mombasa Southern Bypass. It is Y-type junction. The ramps to/from Nairobi are 2-lane and ramps to/from Kibundani are 1-lane. The ramp from New Container Terminal to Nairobi crosses the Bypass with viaduct. The ramp from Kibundani to New Container Terminal crosses the Bypass with a box culvert.	

No.	Sta./Name	Mombasa Southern Bypass Sta.20+200	Kibundani Junction
3	Plan Illustration		
	Location and Type	Kibundani Junction connects Mombasa Southern Bypass with Mombasa-Tanzania Road (A14). It is T-type junction with roundabout. The ramp from Nairobi/Mwache to Tanzania is 2-lane flyover. The ramp from Tanzania to Nairobi/Mwache is at grade 2-lane. The roundabout is planned to avoid the traffic conflict at the intersection.	
No.	Sta./Name	Kipevu Link Road Sta.5+675	Kipevu Intersection
4	Plan Illustration		
	Location and Type	Kipevu Intersection connects Kipevu Link Road with Access Road of New Container Terminal. It is at grade T-type intersection. Kipevu Link Road and Access Road are both 4-lane. The major traffic flow is along Kipevu Link Road to/from New Container Terminal. The traffic volume along Access Road is estimated not large since Port Reitz Road (the extension of the other side of Access Road) is 2-lane.	

Source: JICA Survey Team

Table 6.2-16 U–Turn Bay Plan

No./ Location	5. Miritini U-Turn Bay	Mombasa Southern Bypass	Sta.1+140
	8. Mkumbi U-Turn Bay	Mombasa Southern Bypass	Sta.16+140
	9. Link Road U-Turn Bay	Kipevu Link Road	Sta. 1+400
Plan Illustration	 		
Type	Culvert Box Type		
No./ Location	6. Tsunza U-Turn Bay	Mombasa Southern Bypass	Sta.8+800
	7. Dongo Kundu U-Turn Bay	Mombasa Southern Bypass	Sta.13+525
Plan Illustration	  		
Type	Over Bridge Type		

Source: JICA Survey Team

6.3 Bridge Design

6.3.1 Bridge Design Standards and Specifications

The following Standards and Specifications will be adopted for the bridge design:

- Road Design Manual Part IV Bridge Design, Ministry of Road and Public Works of Kenya, 1982
- British Standard BS5400

6.3.2 Bridge Design Criteria

The particular design criteria are as follows:

(1) Design Live Load

Design HA Loading and 30 Units of HB Loading of BS5400 shall be applied for the bridge design.

(2) Other Loads

- Temperature change：from +15℃ to +40℃
- Seismic coefficient: 0.05 (same as Kilifi Bridge design)
- Wind speed: 30 m/sec (same as Kilifi Bridge design)

6.3.3 Basic Design of Long Bridges (Mwache Bridge and Mteza Bridge)

(1) Bridge Length

Based on the profile along the road alignment, Mwache Bridge length was planned 900 m and Mteza Bridge length was planned 1,450 m.

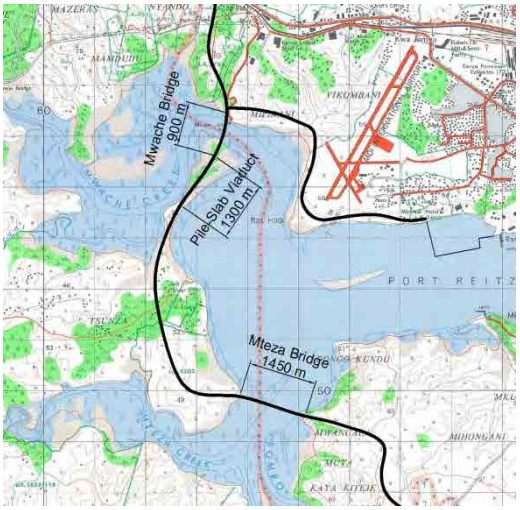


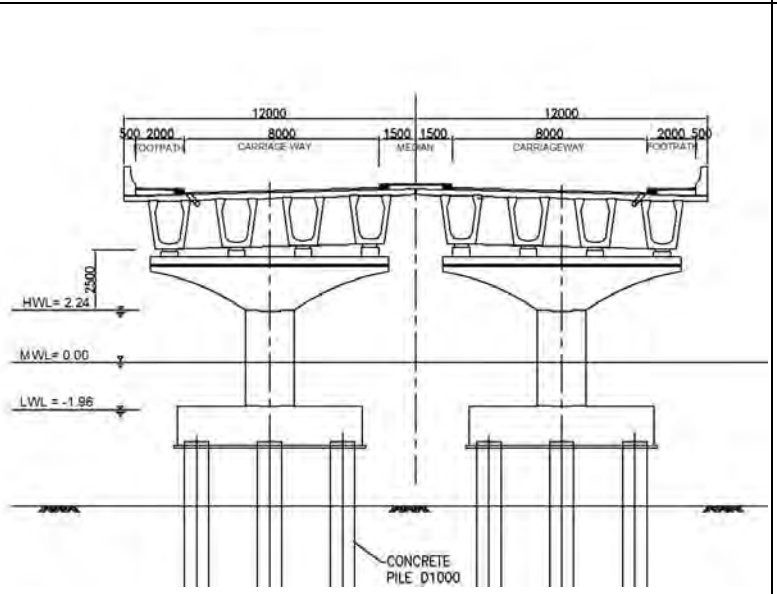
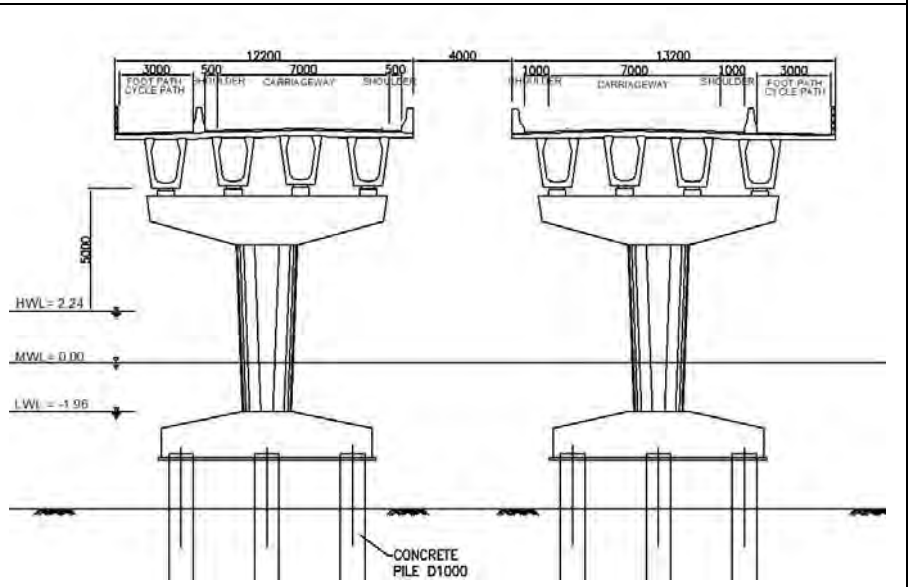
Figure 6.3-1 Location of Long Bridges

(2) Basic Structure of Long Bridges

Based on the bridge plan proposed in the F/S, its appropriateness was reviewed and some structure items were revised in this Survey. The original structure and the revised structure with the reasons of its revision are shown in Table 6.3-3.

Use of epoxy coated reinforcing bars is proposed for the structures near the sea to secure the durability of the bridge.

Table 6.3-1 Basic Structure of Long Bridges

	Original Structure	Proposed Structure
Cross Section		
Cross Sectional Component	- No cycle path. - No barrier between carriageway and footpath. - Bridges are combined with median strip.	- 3m wide footpath is provided to accommodate bicycles. - Concrete barrier is installed between footpath and carriageway. - Bridges are separated to provide sunshine for under bridge mangrove.
Bridge Height	- Navigation clearance is 2.5m.	- Navigation clearance is 5m. (To avoid to cut mangrove trees under the bridges and to provide 5m navigation clearance for path of commuter boats, fishing boats and pleasure boats.)
Pile Type	- Cast in place concrete (D=1000mm)	- Same as original deign
Superstructure	- 40m span PC U-shape precast girder - Simple supported	- 40m span PC U-shape precast girder - 5-span connected (Girders and slab are connected with RC)
Substructure	- Inverted T-type pier - Top of pile cap EL is set at LWL	- Same as original design

Source: JICA Survey Team

6.3.4 Pile-Slab Type Viaduct for Tidal Flat Land in Tsunza Peninsula

The south of Mwache Bridge is about 1300 m long flat tidal land. Embankment was proposed to construct road for this section in the F/S. Instead of the embankment, pile-slab type viaduct was planned in the Survey as shown in the Table 6.3-2. The H-beams which were used for the temporary jetty for the construction of the long bridges above the sea are planned to be re-used for the pile foundation for the viaduct.

6.3.5 Viaduct for Junction Ramps

The junction ramp bound from Mombasa New Container Terminal to Nairobi-Mombasa Road (A109) crosses over Mombasa Southern Bypass with 180 m long viaduct. Another ramp viaduct is 230 m long right-turn flyover from the south bound of the Bypass to the south bound Mombasa-Tanzania Road (A14) which crosses over the north bound of Mombasa-Tanzania Road.

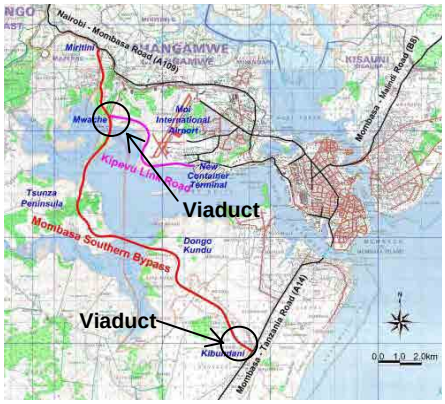


Figure 6.3-2
Location of Junction Ramp

RC hollow slab type viaduct was proposed for the viaducts. The structure of the RC hollow slab type viaduct is shown in Figure 6.3-3.

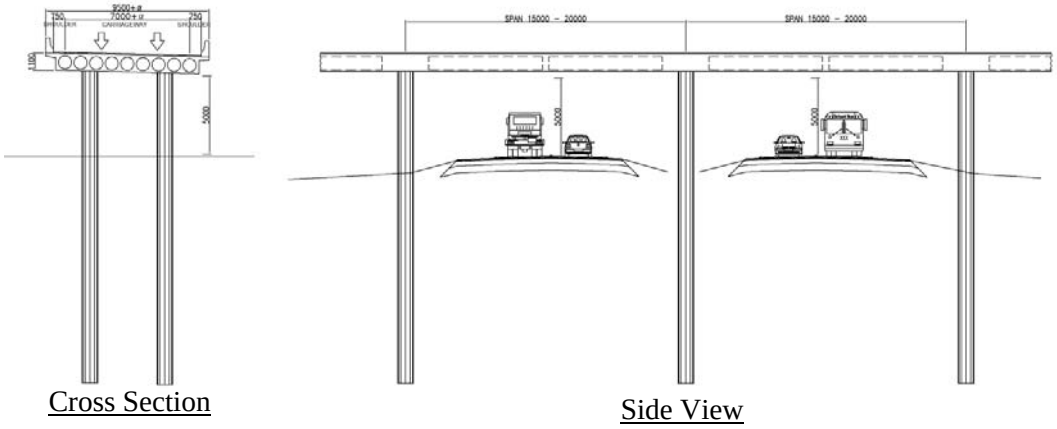
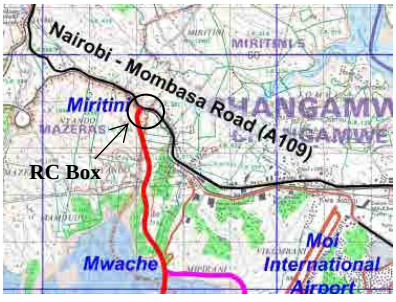


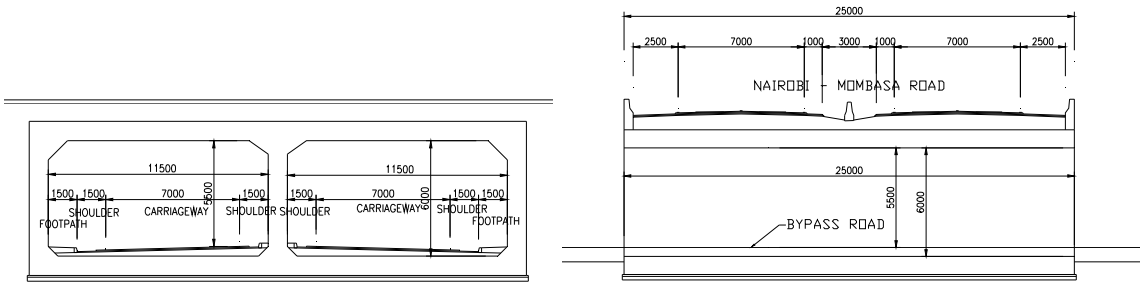
Figure 6.3-3 RC Hollow Slab Type Viaduct for Junction Ramp

6.3.6 RC Box for Grade Separation

RC box was planned to be installed at the grade separation intersection along Mombasa Southern Bypass crossing with Nairobi-Mombasa Road (A109) and



Nairobi-Mombasa Railway. The cross section and side view of the RC boxes is shown in Figure 6.3-4.

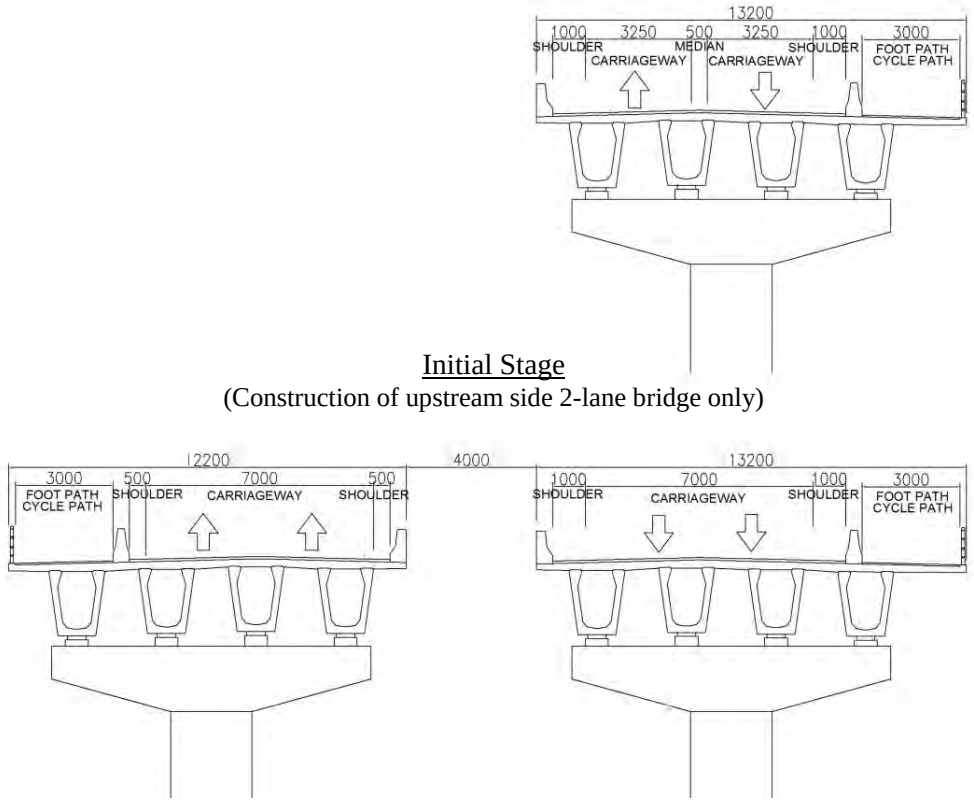


Cross Section Side View

Figure 6.3-4 RC Box for Grade Separation Intersection

6.3.7 Stage Construction of Long Bridges

Stage construction scheme was proposed to reduce the initial project cost. In this case, 2-lane bridge will be constructed firstly then another 2-lane bridge will be constructed when traffic increased. The structure of the long bridges for the staged construction scheme is shown in Figure 6.3-5.

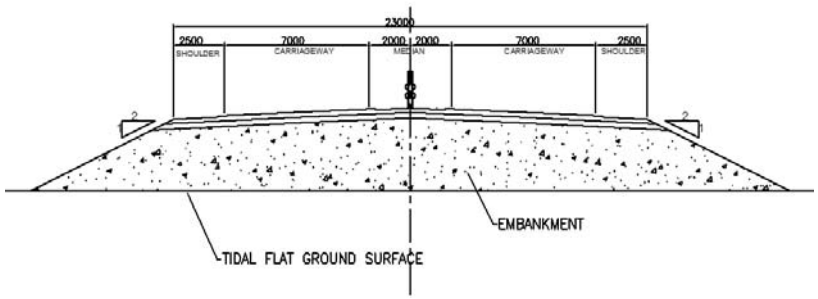
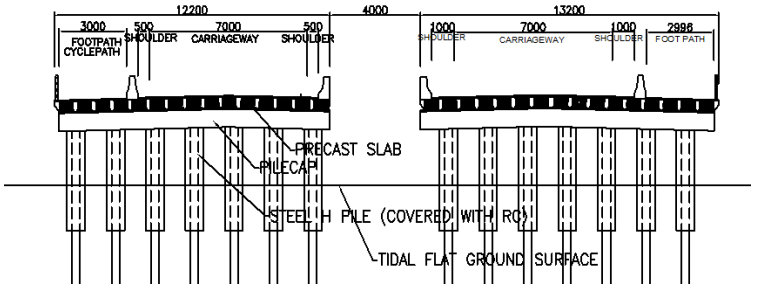


Initial Stage
(Construction of upstream side 2-lane bridge only)

Final Stage
(Construction of downstream side 2-lane bridge)

Figure 6.3-5 Stage Construction Scheme of Long Bridges

Table 6.3-2 Pile-Slab Viaduct for Tidal Flat Land in Tsunza Peninsula

	Original Scheme: Embankment	Proposed Scheme: Pile-Slab Viaduct
Road Cross Section		
Description of Road Structure	Embankment on the tidal plat land after installation of paper drains in the cohesive soft subsoil.	Construct viaduct using H-piles (H-piles are covered with RC columns after driven into the ground. H-piles are firstly used for temporary jetty for construction of the bridges above the sea) and precast slabs. Span is 10m.
Stability and Durability	The surface of the ground is erosive sandy soil. Floods will possibly erode the road slope. Therefore the embankment is not stable and durable.	Viaduct is stable and durable against tide and floods.
Environmental Impact	Impact due to embankment is significant.	Impact due to construction of viaduct is less than Embankment.
Maintenance Requirement	Maintenance to repair residual settlement and erosion on slopes will be frequently needed.	Maintenance to repair viaduct is minimal.
Construction Cost	Construction cost is less than viaduct.	Construction cost is higher than embankment.
Evaluation	Pile-Slab Viaduct is superior to embankment scheme.	

Source: JICA Survey Team

6.4 Pavement Design

6.4.1 Pavement Design Data

Pavement design data are as follows:

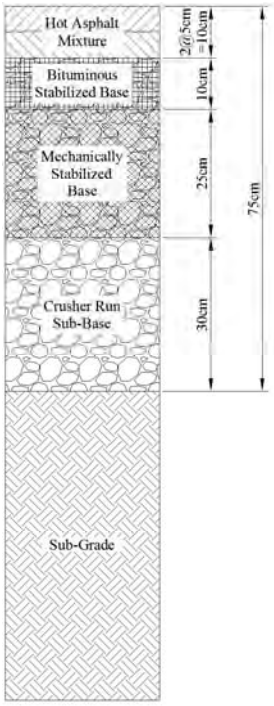
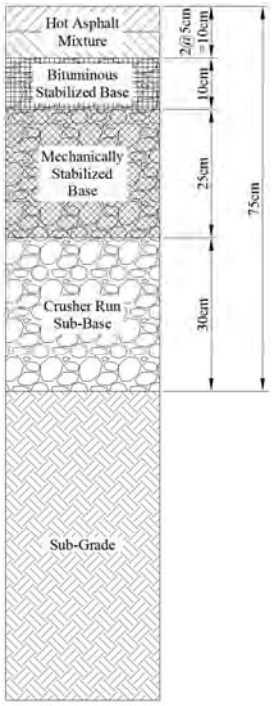
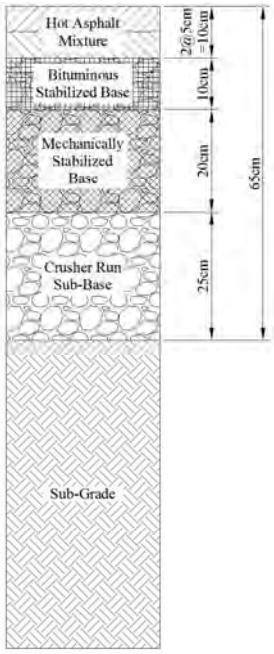
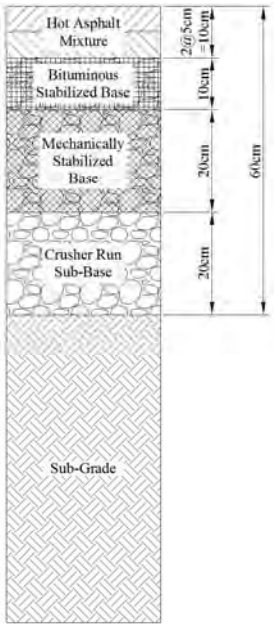
- Pavement structure design method: Guide for Pavement Structures 1993, AASHTO.
- Design Period: 15 years after opening
- Design Load: ESAL (18-kip Equivalent Single Axle Load) is derived from the traffic volume during the design period by vehicle type multiplied by ESAL per vehicle by vehicle type.
- ESAL per vehicle by vehicle type: the average vehicle equivalence factors mentioned in Road Design Manual, Roads Department of Kenya 1987 is referred.
- Design CBR: CBR=10 is proposed based on the CBR test of the soils deemed to be used for the subgrade embankment of the Project road.

6.4.2 Pavement Structure

The pavement structures designed based on the above data is shown in Table 6.4-1. The pavement design calculation is shown in Appendix 5.

The pavement structure proposed in this Survey should be reviewed in the detailed design based on detailed material survey, updated forecasted traffic volume and axle load data. The axle load data should consider the increase of loading limit of trailers.

Table 6.4-1 Pavement Structure

Section-1 Miritini Jct. - Mwache Jct	Section-2 Mwache Jct. - New Container Terminal	Section-3 Mwache Jct. - Dongo Kundu	Section-4 Dongo Kundu Kibundani Jct.
			

Source: JICA Survey Team

6.5 Miscellaneous Facilities Design

6.5.1 Drainage Facilities

The following drainage facilities will be installed along the Project road. The structure of the drainage facilities are shown in Figure 6.5-1.

- Roadside ditches, Berm ditches, Vertical ditches
- Kerbstone
- Where mangrove forest exists, an oil separator tank will be installed at the outlet of the drain.

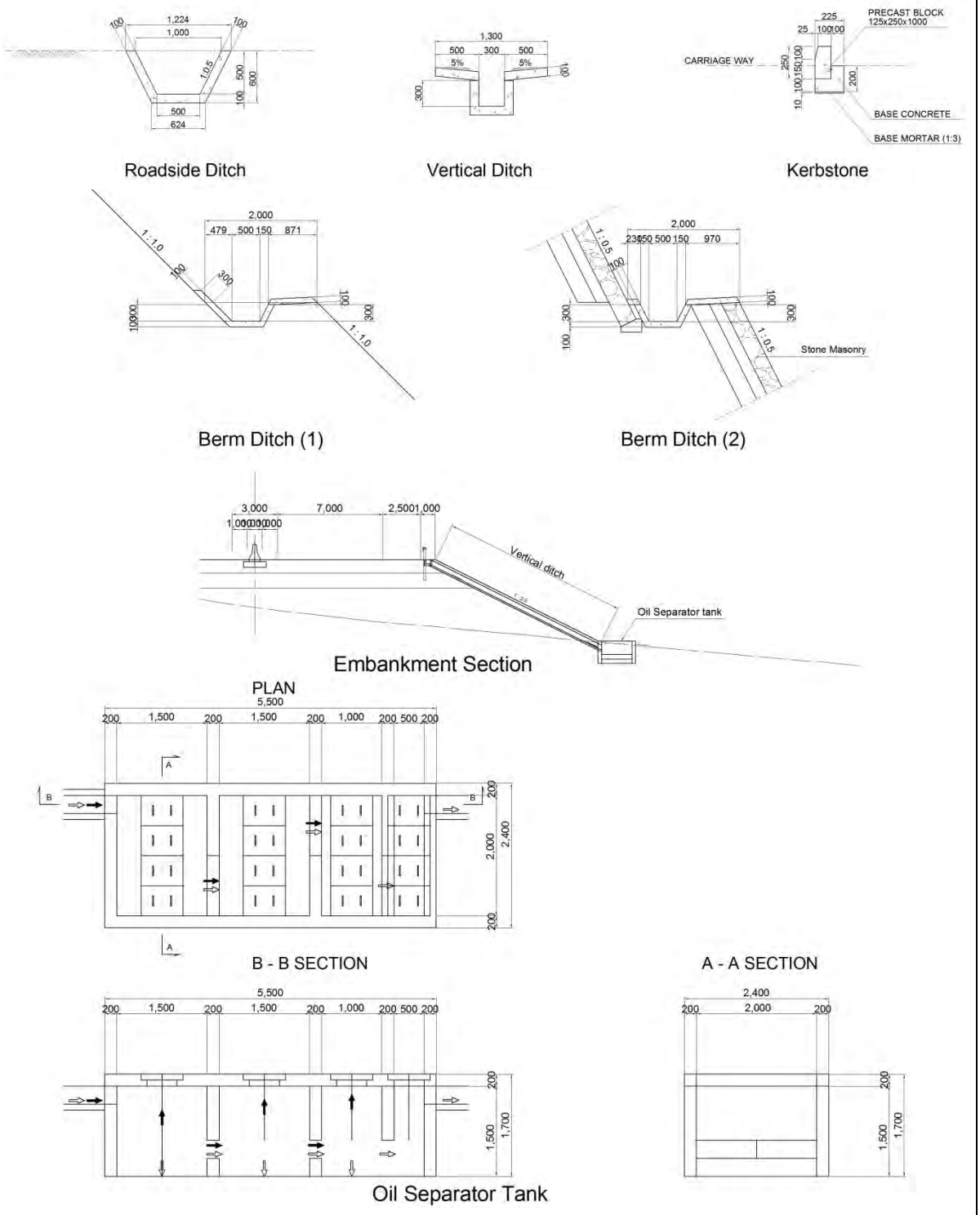


Figure 6.5-1 Drainage Facilities

Source: JICA Survey Team

6.5.2 Slope Protections

The following slope protection will be installed along the Project road. The structure of the stone masonry and stone pitching is shown in Figure 6.5-2.

- For cut slopes (grade 1:0.5) : Stone masonry
- For cut slopes (grade 1:1.0~1:1.5) : Seeding
  : Stone Pitching (occasionally)
- For embankment : Sodding
  : Riprap (along sea shore)

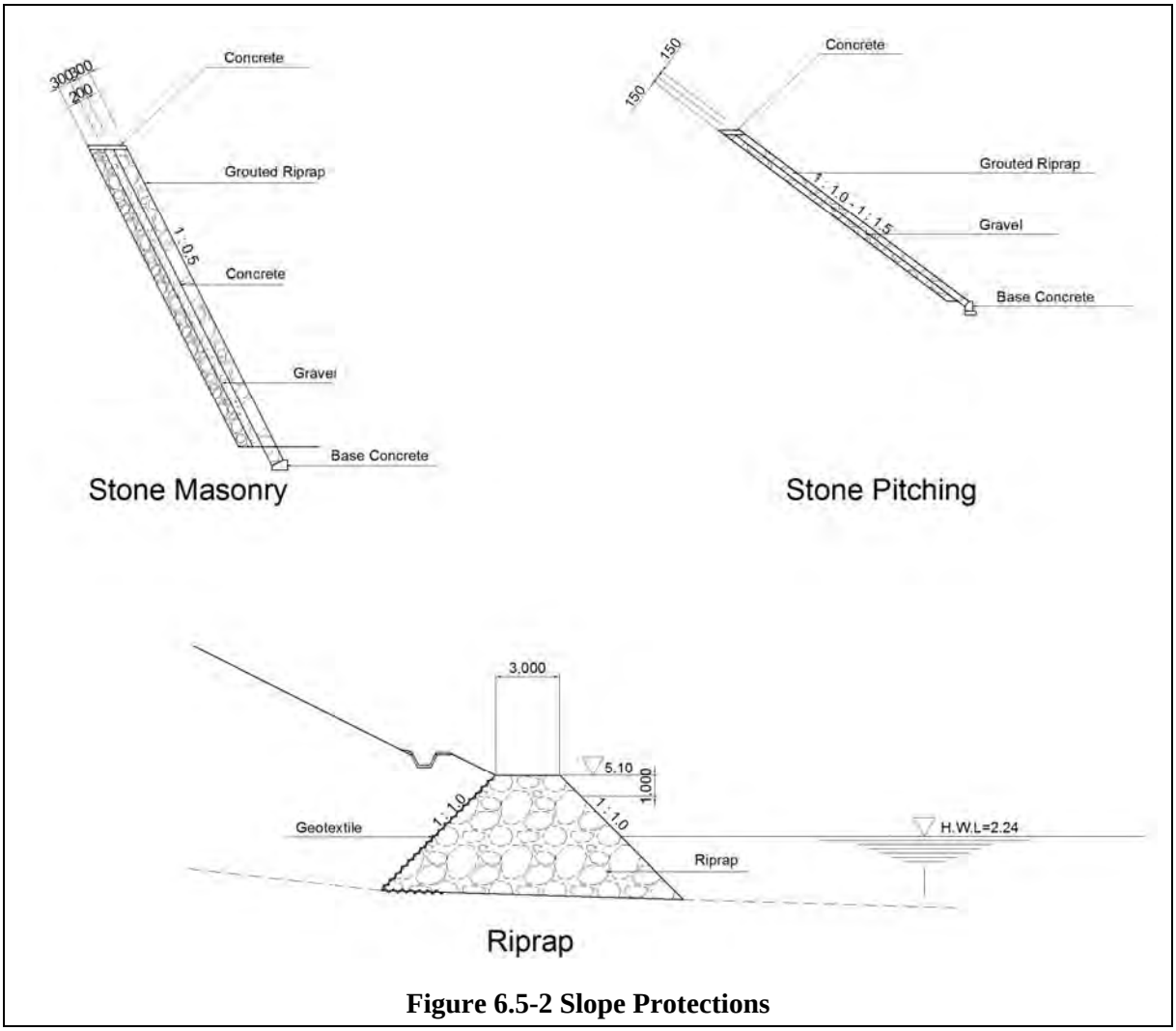


Figure 6.5-2 Slope Protections

Source: JICA Survey Team

6.5.3 Traffic Safety Facilities

The following traffic safety facilities will be installed along the Project road. The structure of the traffic safety facilities are shown in Figure 6.5-3.

- Guide sign boards
- Road marking
- Reflector (only for 2 lane road centerline)
- Concrete Barriers (instead of guardrail)

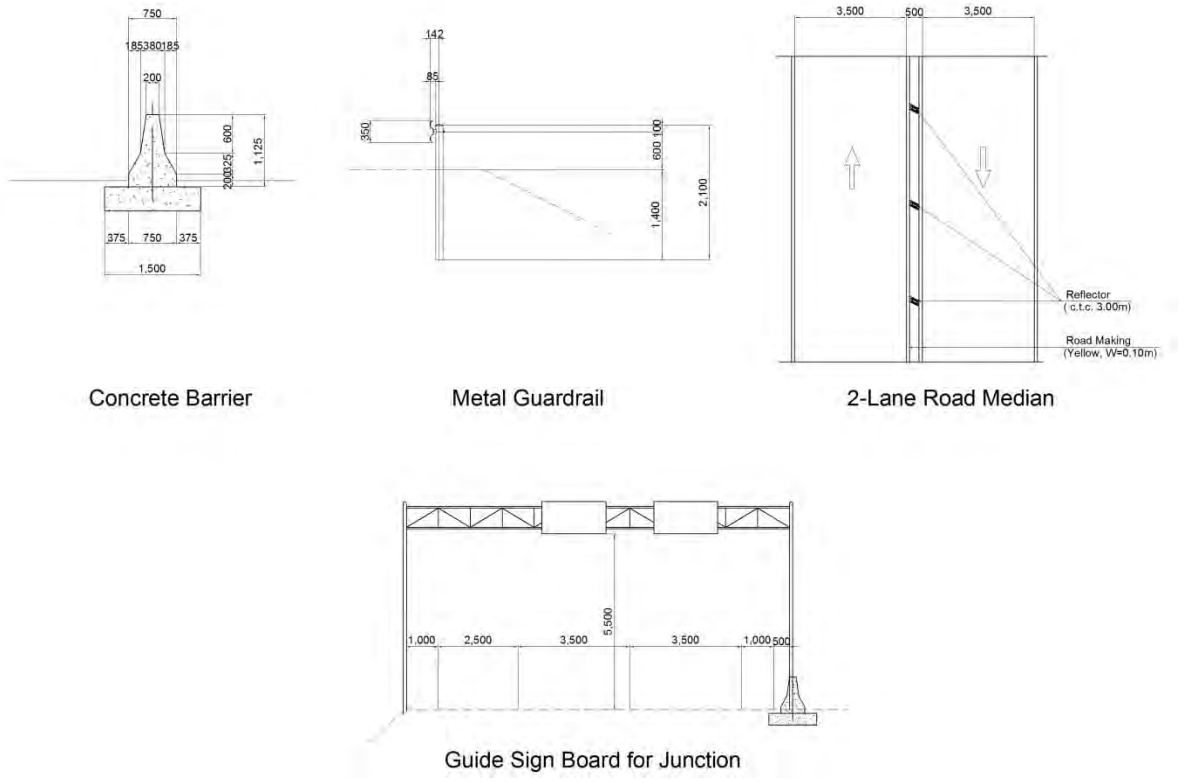


Figure 6.5-3 Traffic Safety Facilities

Source: JICA Survey Team

CHAPTER 7 PROJECT COST

7.1 Component of the Project Cost

The Project cost is composed of the following components.

- Construction Cost
- Consulting Services
- Utility Relocation
- Land Acquisition
- Administration Cost — 5% of Construction Cost, Consulting Services, Land Acquisition and Utility Relocation
- VAT — Tax Free
- Import Tax — Tax Free

The construction cost is composed of the following costs.

- Cost: Machinery, labor, materials, overhead & profits and P & Gs
- Tax: All taxes and duties, and other direct payment to the Government
- Price contingency: Local procurement 8.2% per year; Japanese procurement 1.6% per year
- Physical contingency — 10% for Construction Cost, Consulting Services, Land Acquisition and Utility Relocation

7.2 Unit Rate

The unit rates of the machinery, labor, materials and etc., were determined based on the quotations and price data obtained from local and international contractors, manufacturers and vendors in Mombasa and Nairobi. The unit rate of the works are established based on the assessment of such cost data.

7.3 Quantity of Works

Quantity of the works of the Project is calculated based on the preliminary basic design drawings reviewed this time as described in the previous chapter. Since the basic design is under progressing, the work quantity is not yet final. The draft summary of the Project work quantity is shown in Table 7.3-1.

In the quantity of earthwork, it is assumed that the excavation consists of 40% of soil, 30% of gravel, 20% of soft rock and 10% of hard rock.

Table 7.3-1 Summary of the Project Work Quantity

Items	Description	Unit	Quantity		
			Package 1	Package 2	Package 3
Earth Work					
Cut in Soft Material & Haul	Cut, stockpile, load, haul 1.5km	m3	734,180	69,376	81,228
Cut in Hard Material & Haul	Cut, stockpile and haul 1.5km	m3	550,635	52,032	60,921
Cut in Soft Rock & Haul	Cut, stockpile and haul 1.5km	m3	367,090	34,688	40,614
Cut in Hard Rock & Haul	Cut, stockpile and haul 1.5km	m3	183,545	17,344	20,307
Road Bed Fill	Spread, trim, compact material	m3	114,615	41,510	29,535
Embankment Fill	Spread, water, compact material	m3	1,011,815	104,255	159,365
Level Bank	Spread, water, compact material	m3	36,430	1,840	9,750
Borrow M. Embankment Fill	Spread, water, compact borrow M.	m3		112,435	980
Riprap Embankment	Riprap with excavated rock	m3	25,485	25,835	5,400
Slope Protection					
Build Cut Slope Surface		m2	93,960	11,500	9,780
Build Embankment Slope Surface		m2	135,735	26,600	20,730
Topsoiling 50mm	Deliver and Hand Spreading	m2	229,695	38,100	30,510
Grassing	Deliver and Plant Grass Springs	m2	229,695	38,100	30,510
Build Terrearme wall	Concrete skin & strips	m2			1,200
Spread & Compact Fill	Backfill of Terrearmee	m3			6,000
Drainage					
In-situ Concrete Ditch	500*500, Class 20/20 concrete	m	37,622	9,320	13,560
Single Drain Pipe 0.6m	Supply pipes & Place	m	780	240	347
Single Drain 0.6m Inlet/Outlet	25N/mm2	No.	34	12	26
Road Pavement					
Surface Course AC, t=50	Supply and Lay AC	m3	12,282	2,643	5,799
Binding Course AC, t=50	Supply and Lay AC	m3	14,381	3,585	7,155
Asphaltic Base Course, t=100	Supply and Lay Asphaltic Base Course	m3	28,973	7,216	1,727
Base Course, t=150	Supply, lay & compact	m3	73,743	14,621	28,914
Sub-base Course, t=200	Supply, lay & compact	m3	105,814	18,570	43,068
Grade Road Bed Surface	Supply, lay & compact	m2	307,569	76,165	149,523
Prime Coating	Provide, Heat and Spray MC30	litre	387,537	95,968	188,399
Tack Coating	Spray K160	litre	132,254	32,751	64,295
Box Tunnel					
Vehicle Tunnel	Inner dimension 11.5m*6.0m	m	48		24
Pedestrian Tunnel	Inner dimension 3.0m*3.0m	m	60	28	
Bypass under A109	Box Underpass 11.5m*6m*2 boxes	Sum	1		
Bypass under railway	Box Underpass 11.5m*6m*2 boxes	Sum	1		
Bridge					
Mwache bridge	PCU Girder, L=900m, B=12.2m	Sum		1	
Tsunza Viaduct	PC Slab Girder, L=1300m, B=12.2m	Sum		1	
Mteza bridge	PCU Girder L=1450m, B=12.2m	Sum		1	
Link Road Overbridge	Hollow Slab, B=10.5m, L=200m	Sum	1		
Tsunza Overbridge	Hollow Slab, B=10.5m, L=30m	Sum		1	
Dongo-Kundu Overbridge	Hollow Slab, B=10.5m, L=30m	Sum			1
A14 Interchange Overbridge	Hollow Slab, B=10.5m, L=230m	Sum			1
Road Furniture					
Single Guardrailing	Provide Posts & Rails, Erect	m	5,706	2,330	1,670
Build Median Barrier	In situ manufacturing	m	8,333	0	0
Precast Kerbs	1000*250*125	m	15,224	4,660	10,220
Paint Road Line Marking	b=100	m	78,731	21,468	40,584
Set Road Sign	dia. 600 -750	No.	64	23	45
Build Overhang Traffic Sign	Interchange Destination Sign	No.	13	2	
Set Cat Eyes	Provide & Set, Both sides	No.	0	2,787	2,260
Build Illumination	H=8m, 360W	Set	308	36	
Build Traffic Signal	2 Aspects *8 & 3 aspects *8	No.	1		
Miscellaneous					
Soundproofing Tree Zone	H=3.0 - 3.5m @1.5m, staggered	m	1,400	900	2,000
Annimal Pass Tunnel	dia. 900, L=30m	No.	3	3	5
Plant Mangrove		m2		18,000	
Mangrove Maintenance	Monitoring & Maintenance	year		3	
Temporary Maintenance Shaft	Inner Dimension 1.5m*2.0m	m	40		

Source: JICA Survey Team

7.4 Cost Estimates

The Project cost and its estimate condition are shown below in Table 7.4-1.

Table 7.4-1 Project Cost

	Base Year for Cost Estimation:	Nov, 2011		
	Exchange Rates:	1 US$ =	76.8	Yen
		1 US$ =	96.4	Ksh
		Ksh	= Yen	0.8
	Price Contingency:	FC:	1.6%	per year
		LC:	8.2%	per year
	Physical Contingency for Construction:	10%		
	Physical Contingency for Consulting Services:	10%		
		FC & Total: million Yen,		LC: million Ksh

Item		Total		
		FC	LC	Total
A. ELIGIBLE PORTION				
Ⅰ)	Procurement / Construction	8,444	19,251	23,845
	Package1 :Miritini-Mwache-Kipevu	257	6,388	5,367
	Package2 :Mwache-Tunza-Mteza	6,624	4,544	10,259
	Package3 :Mteza-Kibundani	244	1,704	1,607
	Utility Relocation	0	0	0
	Base cost for JICA financing	7,125	12,636	17,233
	Price escalation	551	4,865	4,444
	Physical contingency	768	1,750	2,168
Ⅱ)	Consulting services	1,425	2,461	3,394
	Base cost	1,226	1,684	2,573
	Price escalation	70	554	512
	Physical contingency	130	224	309
Total (Ⅰ+Ⅱ)		9,869	21,712	27,239
B. NON ELIGIBLE PORTION				
a	Procurement / Construction	2,111	5,190	6,263
	Package1 :Miritini-Mwache-Kipevu	64	1,597	1,342
	Package2 :Mwache-Tunza-Mteza	1,656	1,136	2,565
	Package3 :Mteza-Kibundani	61	426	402
	Utility Relocation	0	285	228
	Base cost	1,781	3,444	4,537
	Price escalation	138	1,274	1,157
	Physical contingency	192	472	569
b	Land Acquisition	0	1,553	1,242
	Base cost	0	1,211	969
	Price Contingency:	0	201	160
	Physical contingency	0	141	113
c	Administration cost	0	2,172	1,737
d	VAT	0	0	0
e	Import Tax	0	0	0
Total (a+b+c+d+e)		2,111	8,915	9,243
TOTAL (A+B)		11,980	30,627	36,482

Note: In the amount of loan the commitment charge and the loan interest during the construction period are added separately.

Source: JICA Survey Team

It is assumed that local labor, local materials and local machinery would be used as much as possible in the works. However, bridge foreman and artisan, large size structural steel sections, deformed rebar, and most machinery, equipment, spare parts and particular materials for the construction of bridges, such as PC strands, bridge shoes, epoxy-coated rebar, etc., have been included in the foreign component. But cost of the materials such as diesel, gasoline, bitumen, emulsion, small size steel sections, etc., is included in the local component because these items can be purchased locally as imported goods.

CHAPTER 8 PROJECT IMPLEMENTATION SCHEDULE

8.1 Basic Conditions and Concepts

The following concepts were employed in the Project implementation schedule:

- To commence the construction as early as possible
- To open the road for traffic as early as possible
- To minimize the project cost
- To reflect realistic environmental/social consideration measures
- To secure the work quality, safety and other requirements
- To harmonize with other projects (Mombasa Port New Container Terminal is scheduled to be opened in the end of 2015.

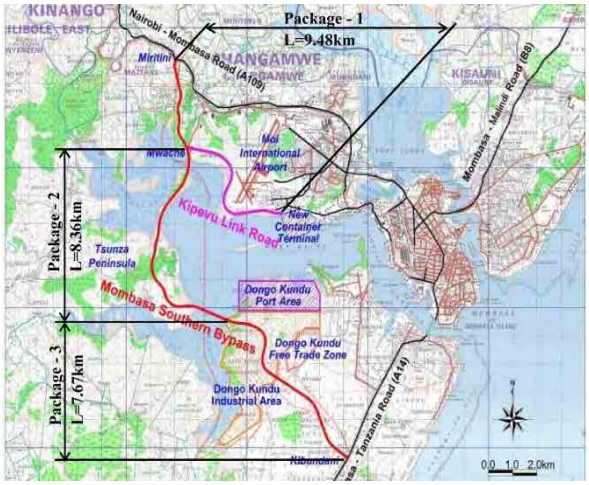
The following timing and duration conditions are considered:

- Fund Procurement: Loan Agreement is to be concluded in March 2012.
- Selection of Consultant: 10 months duration is assumed
- Selection of Contractor: 21 months duration is assumed including prequalification which can start before the completion of the detailed design.
- Detailed Design and Construction: Duration is estimated based on the work quantities.

8.2 Project Implementation Schedule

To optimize the Project implementation and to activate contractors' participation for the Project, the Project road is divided into 3 packages as shown in Figure 8.2-1.

The proposed implementation schedule is shown in Table 8.2-1.



Source: JICA Survey Team

Figure 8.2-1 Project Packaging

Table 8.2-1 Proposed Project Implementation Schedule

	2012	2013	2014	2015	2016	2017	2018	2019
Loan Agreement								
Selection of Consultant	(10M)							
Land Acquisition				(26M)				
Utility Relocation				(18M)				
Detailed Design								
Package-1: Miritini - Mwache - Kipevu		(9 M)						
Package-2: Mwache -Tunza - Mteza		(12 M)						
Package-3: Mteza - Kibundani		(9 M)						
Tendering								
Package-1: Miritini - Mwache - Kipevu				(15M)				
Package-2: Mwache -Tunza - Mteza				(15M)				
Package-3: Mteza - Kibundani				(15M)				
Construction								
Package-1: Miritini - Mwache - Kipevu						(24 M)		
Package-2: Mwache -Tunza - Mteza							(41 M)	
Package-3: Mteza - Kibundani						(24 M)		

Source: JICA Survey Team

CHAPTER 9 PROCUREMENT AND CONSTRUCTION PLAN

9.1 Procurement Plan

9.1.1 Material Procurement Plan

The list of major materials necessary for the Project and their procurement sources are shown in Table 9.1-1.

Table 9.1-1 Material Procurement Plan

Items	Descriptions	Procurement Source		
		Kenya	Japan	Third country
Fuel	Gasoline, Diesel	O		
Bitumen & Emulsion		O		
Cement	Bagged/Bulk	O		
Stone, Gravel & Sand	Aggregates, Crushed Stones	O		
Timber & Plywood		O		
Twisted Re-bar		O		
Deformed Bar	High Yield		O	O
	Epoxy Coated		O	
Small Size Steel Sections	Angles, Channels, H-beams	O		
Large Size Steel Sections	ditto		O	O
PC Strands & Accessories			O	O
Bridge Accessories	Bearing Shoes, Expansion Joints		O	O
Steel Sheet Piles			O	O
Steel Products	Guardrails, Lighting Posts	O		
Concrete Products	Pipes, Blocks, Kerbs	O		
PVC Pipes		O		

Source: JICA Survey Team

9.1.2 Equipment Procurement Plan

The list of major equipment necessary for the Project and their procurement sources are shown in Table 9.1-2.

Table 9.1.2 Equipment Procurement Plan

Items	Descriptions	Procurement Source		
		Kenya	Japan	Third country
Earthworks Machinery	Backhoe, Bulldozer	O		
Road Paving Machinery	Roller, Asphalt Paver	O		
H-pile Driving Machinery	Vibrating Hammer		O	O
Hauling Trucks	Flatbed, Dump, Trailer	O		
Crawler Cranes	Lifting 50-100 ton	O		
Mobile Cranes	Lifting 20 -25 ton	O		
Bored Piling Machinery			O	O
Hot-mix Asphalt Plant		O	O	O
Ready-mixed Concrete Plant		O	O	O

Source: JICA Survey Team

9.2 Construction Plan

9.2.1 Plant Construction Plan

The plant construction plan for each package is shown in Table 9.2-1.

Table 9.2.1 Plant Construction Plan

Plant/Yard	Package 1 Miritini–Mwache-Kipevu	Package 2 Mwache–Tsunza-Mteza	Package 3 Mteza-Kibundani
Ready-mixed Concrete Plant	Contractor prepares his own plant. Also commercial plant is available when Mombasa Cement starts the Ready-mixed Concrete business.	No commercial plant is available around the site. Contractor needs to prepare his own plant and access way including temporary bridges.	No commercial plant is available around the site. Contractor needs to prepare his own plant.
Hot-mixed Asphalt Plant	Ditto	Ditto	Ditto
Bridge Girder Fabrication Yard	-	Two girder fabrication yards are required to be located around the bridge site	-
Quarry	There are many commercial quarries available along A109 and Jaribuni.	No commercial quarry is available. Contractor needs to prepare his own quarry around the site.	Same as Package 2
Remarks	Bamburi Cement Company is scheduled to start supply ready-mixed concrete in Mombasa sites in 2011.	Due to long distant, hauling aggregate from quarry along A109 is unpractical.	Due to use of ferry, haulage of commercial concrete, asphalt concrete & quarry products from A109 is unpractical.

Source: JICA Survey Team

9.2.2 Road Construction Plan

The pavement construction method is show in Figure 9.2-1.

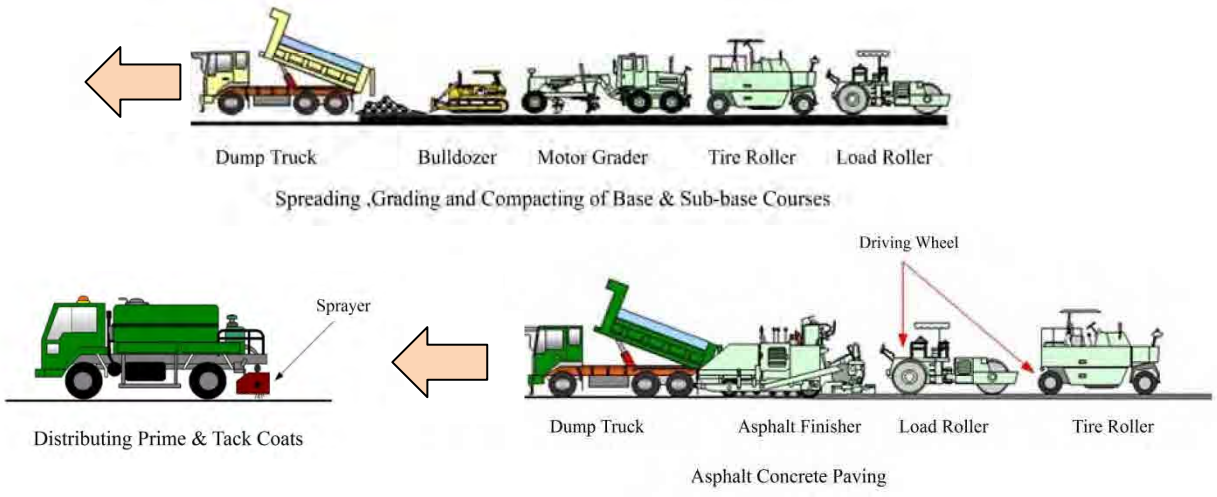


Figure 9.2-1 Pavement Construction Method

9.2.3 Bridge Construction Plan

A concept of the temporary bridges which are necessary for construction of over sea bridges is shown in Figure 9.2-2. Using temporary bridge around the sea shore is proposed to minimize the damage on the mangrove forest.

Figure 9.2-2 Concept of Temporary Bridge

A concept of temporary cofferdams which are necessary for the construction of concrete piles and pile-caps is shown in Figure 9.2-3.

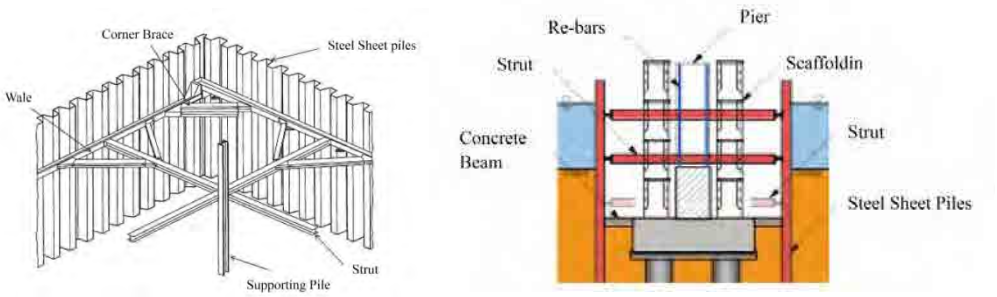


Figure 9.2-3 Concept of Temporary Cofferdam

In-situ-concrete piles are proposed for Mwache Bridge and Mteza Bridge. The construction method of the piles is shown in Figure 9.2-4.

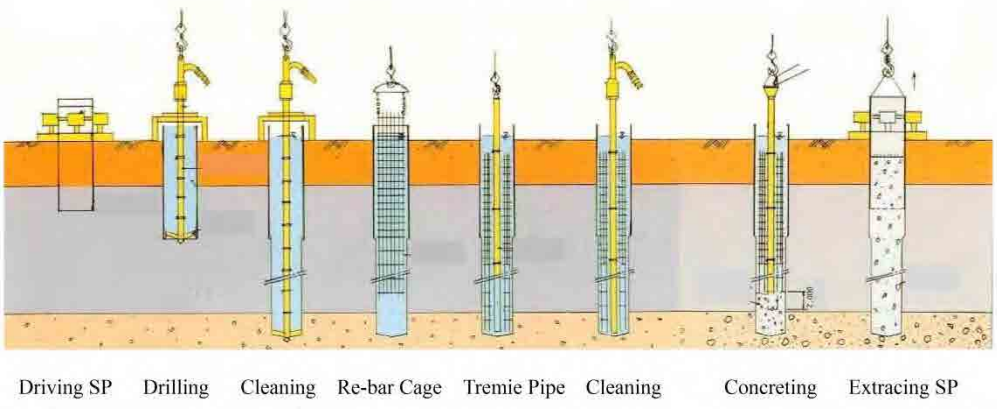


Figure 9.2-4 Construction Method of In-Situ-Concrete Pile

Pre-stressed concrete U-shape girders which will be fabricated near the bridge site will be launched and erected. A concept of PC girder erection is shown in Figure 9.2-5.

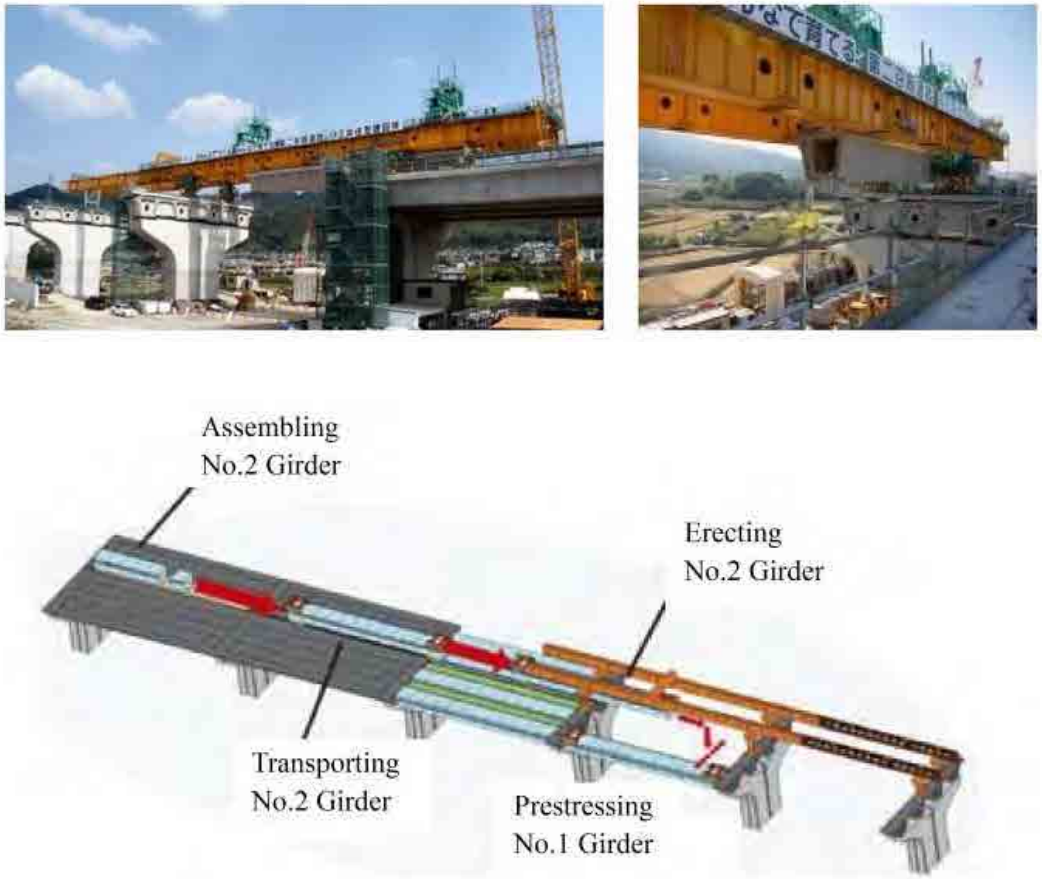


Figure 9.2.5 Concept of PC Girder Erection Method

9.3 Consultant and Contractor Procurement Plan

This Project is expected to be implemented with Japanese ODA loan. The employment of consultant and procurement of goods and services under the project financed by ODA loans from JICA will be carried out in accordance with the general principles and procedures stipulated in the Guidelines for the Employment of Consultants under Japanese ODA Loans and Guidelines for Procurement under Japanese ODA Loans. The way how the guidelines are to be applied specifically to the Project is to be stipulated in the Loan Agreement.

9.3.1 Procurement of Consultant

Once the employment of a consultant was decided, Terms of Reference for consulting services will be drafted in the course of the appraisal undertaken by JICA mission. (A draft ToR will be prepared in the Survey.) The selection of a consultant for the Project is the responsibility of the implementing agency.

The following procedures are normally required in the selection of a consultant:

- Preparation of a short list of consultants
- Preparation of request of proposal
- Invitation to submit proposal
- Evaluation of proposal
- Negotiation and conclusion of a contract

9.3.2 Procurement of Contractors

JICA normally requires the implementing agency to procure contractors through International Competitive Bidding (ICB) in accordance with procedures stipulated in the Guidelines. In this Project, construction of bridges requires complicated technical capability which Kenyan contractors have demonstrated less. Therefore, selection of the contractors through ICB is recommended.

9.4 Introduction of Japanese Technology

Where appropriate, Japanese construction technology will be introduced for the Project. The following are proposed.

- Using epoxy coated reinforcing bars: It reduces dimensions of concrete structures over the sea and secure the durability of the structure
- Continuous bridge structure: Simply supported PC girders are composited with RC diaphragms and deck slabs to be continuous structure. It reduces bridge expansion joints which require frequent maintenance and are uncomfortable to pass

Figure 9.4-1 Epoxy Coated Reinforcing Bars

9.5 Utility Relocation Plan

Utilities listed below cross the Project road. They are necessary to be relocated before the start of the construction.

Table 9.5-1 Utility Relocation Plan

Utility	Owner	Relocation Plan	Location
Water Supply Line	Mombasa Water & Sewerage Company	Dia.700, ductile pipe, L=approx. 1,100m	Bypass Sta. 0+000 Along Nairobi-Mombasa Road (A109)
		Dia. 350, steel pipe, L=approx. 200m	Bypass Sta.1+900
		Dia. 200, steel pipe, L=approx. 500m	Bypass Sta. 20+000 Along Tanzania Road (A14)
		Dia. 150, PVC pipe, L= approx. 200m	Bypass Sta.16+100
Electric Power Line	Kenya Power & Lighting Company	High voltage line, L= approx. 1,200m	Bypass Sta. 0+000 Along Nairobi-Mombasa Road (A109)
		High voltage line, L= approx. 600m	Bypass Sta. 20+000 Along Tanzania Road (A14)
		Low voltage line, L= approx. 150m	Bypass Sta. 19+500
		Low voltage line, L= approx. 150m	Bypass Sta. 16+100
		Low voltage line, L= approx. 150m	Bypass Sta. 14+900
		Low voltage line, L= approx. 150m	Bypass Sta. 13+500
Communication Line	Telkom Kenya	Optic cable line, L= approx. 750m	Bypass Sta. 0+000 Along Nairobi-Mombasa Road (A109)

CHAPTER 10 TECHNICAL AND FINANCIAL CAPACITY OF THE IMPLEMENTING AGENCY

10.1 Technical Capability of the Implementing Agency

10.1.1 Progress of Ongoing Development/Special Projects

Presently KeNHA is implementing 38 development/special projects with total length of 1,980 km and cost of Ksh. 127.3 Billion.

The progress status of the individual project (development/special) is shown in Table 10.1-1. The summary of progress status in terms of physical completion and financial expenditure of the projects (development/special) is shown in Table 10.1-2.

According to the data, many development/special projects are uncompleted and still progressing even after the projected completion dates. One of the major ongoing development/special projects of KeNHA is Nairobi - Thika Road Project financed by the African Development Bank and Chinese Government, which was commenced in January 2009 and scheduled to be completed in July 2011. However, the completion data was re-scheduled to be March 2012.

10.1.2 Progress of Ongoing Maintenance Projects

Presently KeNHA is implementing 70 maintenance projects with total length of 2,230 km and cost of Ksh. 9.44 Billion.

The progress status of the individual project (maintenance) is shown in Table 10.1-3. The summary of progress status in terms of physical completion and financial expenditure of the projects (maintenance) is shown in Table 10.1-4.

According to the data, many maintenance projects are not yet started or still progressing even after the projected completion dates.

10.1.3 Technical Capability of the Implementing Agency

KeNHA has many experiences of implementation of national highway development projects which are similar to this Project, such as Nairobi - Thika Road Project and Northern Corridor Transport Improvement Project. However, delay of project progress is common according to the project progress data. The common causes of the delays in development/special projects are supposed to be the follows:

- Delay of resettlement of affected persons and land acquisitions
- Delay of relocation of utilities

- Delay in coordination with other agencies

Against above common problems in the project implementations, the following measures are recommendable to avoid such problems. By adopting the recommended measures in this Project, KeNHA is deemed to have adequate technical capacity to implement this Project.

- To employ a competent international consultant to carry out the Project
- To establish the Project management team in Special Project Department of KeNHA
- To station a liaison officer at the Project site
- To establish RAP implementation team and RAP committee organized with related authorities

Road maintenance is programmed and managed by Maintenance Department of KeNHA. Routine inspection is undertaken by inspection teams of the Maintenance Department. In case repair/rehabilitation is necessary, works are undertaken by contactors under supervision of inspectors of the Maintenance Department and the regional office of KeNHA. The common causes of the delays in maintenance projects are supposed to be the follows:

- Inadequate technical and management capacity of maintenance program/plan and work supervision
- Inappropriate cost estimate for maintenance work
- Inadequate technical manual of road maintenance

To increase the technical and management capacity in road maintenance of KeNHA, 3-year long project type technical cooperation “Strengthening of Capacity on Roads Maintenance Management through Contracting” has been underway in cooperation with JICA since May 2010. After the technical cooperation, the technical and management capacity of road maintenance of KeNHA and maintenance contractors will be improved.

Table 10.1-1 Progress of Ongoing Projects (Development / Special Projects)

#	Name of Project	Project Description	Road Length (km)	Length Completed to Date (km)	Commence-ment Date	Projected Completion Date	Physical Completion (%)	Financial Expenditure (%)	Status (Pending / Ongoing / Stalled)	Remarks
1	Lewa / Isiolo (A2)	Rehabilitation	29.5	29.5	15/08/2008	14/02/2010	100.0	92.6	Ongoing	
2	Nairobi / Thika (A2) (Lot 1)	Improvement	12.4	1.0	28/1/2009	25/07/2011	7.0	10.0	Ongoing	
3	Nairobi / Thika (A2) (Lot 2)	Improvement	14.0	1.1	26/1/2009	25/07/2011	8.0	12.0	Ongoing	
4	Nairobi / Thika (A2) (Lot 3)	Improvement	23.9	2.6	22/1/2009	25/07/2011	11.0	14.0	Ongoing	
5	Isiolo / Merille (A2)	Construction	136.0	126.4	2007/7/2011	22/07/2010	90.0	90.0	Ongoing	
6	Athi River / Namanga (A104)	Rehabilitation	136.0	129.3	2007/5/2011	2010/4/11	72.2	63.2	Ongoing	
7	Maai-Mahiu / Narok (B3)	Rehabilitation	89.4	89.4	2006/2/2009	30/1/2010	100.0		Ongoing	Additional Works due to Washouts
8	Murang'a / Sagana (C71)	Rehabilitation	55.0	50.0	13/9/2005	2006/1/8	90.0	93.0	Ongoing	
9	Marikani / Kilifi (C107)	Construction	56.0	3.0	27/11/2007	27/11/2010	27.0	23.7	Ongoing	
10	Ena / Ishiara / Meru (C92/E789)	Construction	60.0	42.1	2007/1/2004	15/08/2010	80.0	82.0	Ongoing	
11	Dundori / Olkalou / Njabini (C66)	Construction	100.3	100.0	15/03/2007	14/05/2010	99.0	100.0	Completed	
12	Bomet / Litein (C24)	Rehabilitation	42.0	43.1	2008/8/2004	2010/3/8	90.0	72.0	Ongoing	
13	Rongo / Homa Bay (C20)	Rehabilitation	39.5	28.0	22/04/2008	2010/12/10	98.6	100.0	Ongoing	
14	Emali / Oloitokitok (C102)	Construction	100.0	93.6	2007/5/2011	2010/8/7	99.0	78.5	Ongoing	
15	Ebuyangu / Ekero (C33)	Construction	31.0	27.0	20/4/2007	15/11/10	90.0	85.0	Ongoing	
16	Stand Khisa / Khumusalaba (C39)	Construction	25.0	15.0	2007/1/2010	30/10/2009	65.0	60.0	Ongoing	
17	Owimbi / Luanda Kotieno(C28)	Construction	25.0	25.0	2007/4/2004	2008/4/4	100.0	100.0	Completed	
18	Kendu Bay / Homa Bay (C19)	Construction	48.0	Nil	28/03/2009	27/09/2011	27.3	22.0	Ongoing	
19	Homa Bay /Mbita (C19)	Construction	43.0	Nil	2010/3/2002	2012/3/8	1.0	0.7	Ongoing	
20	Ndori / Ng'iya (C27)	Construction	20.0	Nil	2010/12/2008	2012/11/2	2.0	Nil	Ongoing	
21	Londiani / Fort Tenan (C35)	Construction / Rehabilitation	63.0	Nil	20/07/2010	19/7/2012	Nil	Nil	Ongoing	
22	Rang'ala / Siaya / Bondo (C28/D246)	Construction	42.5	Nil	2009/5/10	2011/5/1	30.0	35.0	Ongoing	

#	Name of Project	Project Description	Road Length (km)	Length Completed to Date (km)	Commence-ment Date	Projected Completion Date	Physical Completion (%)	Financial Expenditure (%)	Status (Pending / Ongoing / Stalled)	Remarks
23	Timboroa - Eldoret (A104)	Rehabilitation	73.0	Nil	N/A	N/A	N/A	Nil	Pending	Procurement Process Ongoing
24	Eldoret - Webuye (A104)	Rehabilitation	60.0	Nil	N/A	N/A	N/A	Nil	Pending	
25	Webuye - Malaba (A104)	Rehabilitation	61.0	Nil	N/A	N/A	N/A	Nil	Pending	
26	Voi - Mwatate (A23)	Rehabilitation	26.0	Nil	N/A	N/A	N/A	Nil	Pending	
27	Marsabit - Turbi (A2)	Construction	121.0	Nil	N/A	N/A	N/A	Nil	Pending	
28	Lanet / Dundori (C66)	Reconstruction		Nil	N/A	N/A	N/A	Nil	Pending	
29	Kisii - Kilgoris (C17)	Rehabilitation	74.0	29.4	26/12/2006	26/06/2009			Completed	
30	Rehabilitation and Reconstruction of Miritini - Maji ya Chumvi Contract RD-0416-(A109)	Rehabilitation, Dualling 5km	35	35	2006/10/2001	2007/8/9	100.0	100.0	Completed	Completed and Handed Over to KeNHA
31	Rehabilitation and Reconstruction of Lanet - Nakuru - Njoro Turnoff Contract RD-0419 (A104)	Rehabilitation, Dualling 12km	16.5	16.5	2006/9/2010	19/12/ 2008	100.0	100.0	Completed	Completed and Handed Over to KeNHA
32	Rehabilitation and Reconstruction of Njoro Turnoff - Mau Summit - Timboroa Contract RD-0420	Rehabilitation	83.5	83.5	2006/9/2010	2010/3/2	100.0	90.7	Completed	Project is under Defect Liability Period
33	Rehabilitation and Reconstruction of Machakos Turnoff - JKIA Contract RD-0418 (A109/A104)	Rehabilitation, Dualling 12km	33.4	26	2006/11/2010	2011/1/4	91.0	93.1	Slowdown in Works	Arrangements Ongoing for Resumption
34	Rehabilitation and Reconstruction of Machakos Turnoff – Ulu Sultan Hamud Contract RD-0417 (A109)	Rehabilitation	55	50.5	2006/11/2010	2011/1/3	91.6	92.0	Ongoing	
35	Rehabilitation of Mausummit - Kericho Contract RD-0421(B1)	Rehabilitation	58	0	19/10/2010	19/7/2012	2.0	10.0	Ongoing	
36	Rehabilitation of Kericho – Nyamasaria Contract RD-0422(A1/B1)	Rehabilitation	76.00	0.00	19/10/2010	19/1/2013	2.0	10.0	Ongoing	
37	Emergency Replacement Of Stony Athi Bridge (A109)and Rehabilitation Of Roads At JKIA Interchange (A104)	Rehabilitation, Bridge, Access Roads	4.00	3.00	2010/2/2009	2010/8/9	47.0	37.0	Ongoing	
38	1: Kisat Bridge to Airport, Airport access and toll booth. 2: Emergency Maintenance of Kisumu / Kisian Road (GOK)	Rehabilitation, New Access	12.00	0.70	2010/9/2009	2011/3/29	40.0	36.0	Ongoing	

Source: Kenya National Highways Authority (June 2011)

Table 10.1-2 Summary of Progress of Ongoing Projects (Development / Special Projects)

Progress Level	Pending	Less than 20%	20 - 40%	40 - 60%	60 - 80%	Over 80% or Completed	Total
Road Length (km)	424.0	390.7	162.5	n/a	303.0	699.7	1979.9
	21.4%	*19.7%*	*8.2%*	*0.0%*	*15.3%*	*35.3%*	*100.0%*
Original Sum (Ksh Billion)	19.72	51.30	8.34	n/a	12.88	35.07	127.31
	15.5%	*40.3%*	*6.6%*	*0.0%*	*10.1%*	*27.5%*	*100.0%*
Expenditures (Ksh Billion)	0.00	4.75	2.21	n/a	8.91	32.65	48.52
	0.0%	3.7%	1.7%	0.0%	7.0%	25.6%	38.1%

Source: JICA Survey Team

Table 10.1-3 Progress of Ongoing Projects (Maintenance) Funded by Fuel Levy

#	Project Name	Scope of Works	Road Length (km)	Commence-ment Date	Contract Period (Months)	Projected Completion Date	Length Completed	Financial Expenditure	Physical Completion
1	Sotik - Keroka (Sotik Town Roads Variation Order)	Repair and Rehabilitation	25.0	11/06/2010	4	12/10/2010	20.0	75%	80%
2	Nyeri – Nyahururu(B5)	Repair and Resurfacing	100.0	18/03/2009	24	08/03/2011	56.0	61%	56%
3	Nyahururu – Gilgil (C77)	Repair and Resurfacing	72.0	2/10/2009	18	31/03/2011	11.8	16%	16%
4	Kisian – Bondo (C27)	Repair and Rehabilitation	45.0	11/09/2009	18	23/03/2011	10.0	12%	22%
5	Chemususu – Kapkong (C55)	Pothole Patching, Drainage works, Bituminous surface treatment	20.0	11/03/2010	8	10/11/2010	11.5	70%	58%
6	Eldama – Ravine – Chemususu (C55)		24.0	11/03/2010	8	10/11/2010	13.0	81%	54%
7	Kapkonga – Nyaru C55		20.0	11/03/2010	8	10/11/2010	12.0	59%	60%
8	Kamandura Bridge A1	Bridge Works, Abutment Reconstruction	Nil	9/03/2010	8	04/11/2010	-	58%	n/a
9	Daraja Moja Bridge on B3		Nil	9/03/2010	8	04/11/2010	-	25%	n/a
10	Wakor Bridge on Kitale Lodwar (A1)		Nil	9/03/2010	8	04/11/2010	-	0%	n/a
11	Kisian - Busia (B1)	Pothole Patching, Drainage works, Bituminous surface treatment	96.0	9/03/2010	12	09/03/2011	-	0%	n/a
12	Oyugis - Junction Asumbi (C18)	Bush Clearing, Culverts and Drainage works, Grading and Gravelling	19.1	24/03/2010	6	20/09/2010	9.0	43%	47%
13	Asumbi - Rangwe - Imbo (C18)	Pothole Patching, Drainage works, Bituminous surface treatment	6.6	24/03/2010	6	20/09/2010	5.0	71%	76%
14	Awasi-DB Nandi South Road C37		11.0	30/07/2010	2	28/09/2010	-	0%	n/a
15	Daraja Mbili - Kiboswa (C86)	Bush Clearing, Culverts and Drainage works, Grading and Gravelling	11.0	5/03/2020	3	03/06/2020	7.0	63%	64%
16	Nanyuki –Lewa(A2)	Pothole Patching, Drainage works, Bituminous surface treatment	50.0	4/05/2010	12	04/05/2011	14.0	27%	28%
17	Kangonde –Mwingi-DB Tana River (A3)		52.0	7/04/2010	6	06/10/2010	33.0	71%	63%
18	Mazeras – Kaloleni		22.0	4/06/2010	12	04/06/2011	8.0	41%	36%
19	Makutano(Kenol) – Sagana (A2)		50.0	10/06/2010	12	09/06/2011	12.0	25%	24%
20	Rodi - Kopany		48.0	24/06/2010	24	23/06/2012	2.0	-	4%
21	Kalobeyei Drift on A1	Construction of Drif, drainage works, grading and gravelling	Nil	20/05/10	6	19/11/2010	-	64%	n/a

#	Project Name	Scope of Works	Road Length (km)	Commence-ment Date	Contract Period (Months)	Projected Completion Date	Length Completed	Financial Expenditure	Physical Completion
22	Eshueshu Bridge C108 Protection	Bridge Works, Abutment Reconstruction		7/06/2010	3	06/09/2010	-	60%	n/a
23	Karatina-Kerugoya-Kutus C74	Pothole Patching, Drainage works, Bituminous surface treatment	28.0	24/05/10	6	23/11/2010	-	0%	n/a
24	Nyeri-Marua Road B5		12.0	20/05/2010	6	16/11/2010	-	0%	n/a
25	Kakamega – Webuye(A1)		41.0	6/07/2010	12	06/05/2011	8.0	17%	20%
26	Kisumu – Kakamega(A1)		52.0	21/06/2010	12	20/06/2011	8.0	43%	15%
27	Thika – Magumo (C66)		68.0	1/08/2010	24	31/07/2012	-	2%	n/a
28	Marere washouts on road (B8)	Construction of Box Culverts	2.0	4/06/2010	8	30/01/2011	-	33%	n/a
29	Nairobi-Magadi Road B8	Pothole Patching, Drainage works, Bituminous surface treatment	4.0	7/07/2010	3	5/10/2010		0%	n/a
30	Katito-Kendu bay		50.0	12/07/2010	3	10/10/2010		0%	n/a
31	Kitui-Kibwezi B7		26.0	12/07/2010	4	09/11/2010		0%	n/a
32	Bondo-Usenge Osieko C27 Road	Bush Clearing, Culverts and Drainage works, Grading and Gravelling	35.0	12/07/2010	3	10/10/2010		0%	n/a
33	Kapenguria – Marich pass A1	Pothole Patching, Drainage works, Bituminous surface treatment	63.0	20/07/2010	12	19/07/2011		0%	n/a
34	Siaya-Rwambwa C29/C30 Road	Bush Clearing, Culverts and Drainage works, Grading and Gravelling	28.5	12/07/2010	3	10/10/2010		0%	n/a
35	Kamunga-Namba Tatu C34	Pothole Patching, Drainage works, Bituminous surface treatment	12.0	12/07/2010	3	10/10/2010		0%	n/a
36	Ndori-Owimbi C28 Road		25.0	7/07/2010	3	05/10/2010		0%	n/a
37	Luanda-Kilo	Bush Clearing, Culverts and Drainage works, Grading and Gravelling	13.6	26/07/2010	3	24/10/2010	6.0	36%	44%
38	Chemilil-Muhoroni C34 Road	Pothole Patching, Drainage works, Bituminous surface treatment	14.5	8/07/2010	3	6/10/2010	9.0	56%	62%
39	Marigat-Loruk B4 Road		34.0	26/07/2010	2	24/09/2010		0%	n/a
40	Nabkoi-Lessos-Chebarbar C36		32.0	12/07/2010	2	10/09/2010		0%	n/a
41	Lodwar-Lokichogio A1	Bush Clearing, Cu;verts and Drainage works,	65.0	15/07/2010	3	13/10/2010		0%	n/a

#	Project Name	Scope of Works	Road Length (km)	Commence-ment Date	Contract Period (Months)	Projected Completion Date	Length Completed	Financial Expenditure	Physical Completion
		Grading and Gravelling							
42	Marigat-Loruk B4 Road Endan Drift	Pothole Patching, Drainage works, Bituminous surface treatment	5.0	15/07/2010	3	13/10/2010		0%	n/a
43	Kisii –Gucha - Keroka (B3)		26.0	28/07/2010	6	27/01/2011	3.0	10%	12%
44	Mwatate-Taveta A23 Road	Bush Clearing, Cu;verts and Drainage works, Grading and Gravelling	89.0	10/08/2010	3	8/11/2010		0%	n/a
45	Nakuru-Subukia-DB Nyandarua Rd B5	Pothole Patching, Drainage works, Bituminous surface treatment	48.0	10/08/2010	2	09/10/2010		0%	n/a
46	Eldoret (Maili Tisa Nangili B2		19.0	6/08/2010	12	07/08/2010		12%	n/a
47	Mamboleo-Miwani C37		15.0	5/08/2010	3	03/11/2010		0%	n/a
48	Alango-Alango ARBA & Dabaab-Liboi	Bush Clearing, Spot Gravelling	46.0	5/08/2010	3	5/11/2010		0%	n/a
49	DB Meru south-DB Meru Central C92	Bush Clearing, Culverts and Drainage works, Grading and Gravelling	25.0	5/08/2010	2	04/10/2010		0%	n/a
50	Nandi Hills - Kimwani (C37)	Pothole Patching, Drainage works, Bituminous surface treatment	17.0	23/07/2010	6	19/01/2011		27%	n/a
51	Consultancy Services Thika-Magumo		Nil	5/07/2010	12	12/07/2011		-	n/a
52	Supervision Services Kisumu-Kakamega		Nil	12/07/2010	12	19/07/2011		0%	n/a
53	Airport Road B10	Pothole Patching, Drainage works, Bituminous surface treatment	2.0	24/08/2010	1	23/09/2010		0%	n/a
54	Management &Operation for Mariakani Weighbridge		-	26/08/2010	24	25/08/2012		0%	n/a
55	Management & Operation for Gilgil Transit Weighbridge		-	26/08/2010	24	25/08/2012		0%	n/a
56	Management &Operation for Athi River Weighbridge		-	3/09/2010	24	2/09/2012		0%	n/a
57	Street Lighting Mombasa Road	Installation of Streetlights	15.0	2/09/2010	3	04/12/2010		15%	n/a
58	Maintenance of Dagoretti Corner – Ngong Town	Pothole Patching, Drainage works, Bituminous surface treatment	15.0	22/09/2010	12	21/09/2011		0%	n/a
59	Maintenance of Museum Hill – Rironi (A104)	Pothole Patching, Drainage works, Bituminous surface	34.0	23/09/2010	12	22/09/2011		0%	n/a

#	Project Name	Scope of Works	Road Length (km)	Commence-ment Date	Contract Period (Months)	Projected Completion Date	Length Completed	Financial Expenditure	Physical Completion
		treatment							
60	Laisamis-Malgis A2 Road	Bush Clearing, Culverts and Drainage works, Grading and Gravelling	30.0	8/09/2010	1	8/10/2010		0%	n/a
61	Rhamu – Mandera Road (B9)		78.0	22/09/2010	12	21/09/2011		0%	n/a
62	Mimijila-Mukowe (C112) Road		115.0	5/10/2010	3	3/01/2011		0%	n/a
63	Machakos-Wote (C99) Road	Pothole Patching, Drainage works, Bituminous surface treatment	35.0	5/10/2010	2	3/01/2011		0%	n/a
64	Merelle-Laisamis A2	Bush Clearing, Culverts and Drainage works, Grading and Gravelling	30.0	5/10/2010	1	04/11/2010		0%	n/a
65	Kwale-Kinango (C106) Road		24.0	5/10/2010	3	03/01/2011		0%	n/a
66	Malindi-Kuhani (B8) Road		66.0	19/10/2010	2	18/12/2010		0%	n/a
67	Kabati-Mbondoni C94 Road		34.0	5/10/2010	2	04/12/2010		0%	n/a
68	Itagani-Wamuyu (C101) Road		23.0	5/10/2010	2	04/12/2010		0%	n/a
69	Kangundo Road C98 Outering Jnc. &DB Machakos	Pothole Patching, Drainage works, Bituminous surface treatment	65.0	26/10/2010	3	24/01/2011		0%	n/a
70	Lodwar - Lokichogio (A1) Road	Bush Clearing, Culverts and Drainage works, Grading and Gravelling	96.0	19/10/2010	1	18/11/2010		0%	n/a
	Total		2,229.3						

Source: Kenya National Highways Authority (June 2011)

Table 10.1-4 Summary of Progress of Ongoing Projects (Maintenance)

Progress Level	0%	Less than 20%	20 - 40%	40 - 60%	60 - 80%	Over 80% or Completed	Total
Road Length (km)	1,396.5	286.0	132.6	127.6	214.6	72	2,229.3
	62.6%	12.8%	5.9%	5.7%	9.6%	3.2%	100.0%
Original Sum (Ksh Million)	1,683.5	3,362.5	1,240.0	962.2	1,986.8	207.1	9,442.1
	17.8%	35.6%	13.1%	10.2%	21.0%	2.2%	100.0%
Paid to Date (Ksh Million)	0.0	349.1	332.2	448.7	1,283.0	293.2	2,706.2
	0.0%	3.7%	3.5%	4.8%	13.6%	3.1%	28.7%

Source: JICA Survey Team

10.2 Financial Capability of the Implementing Agency

10.2.1 Financing of the Road Sector

The Kenya Road Act, 2007 gives overall responsibility for management of the entire road network to the Ministry of Roads (MoR) through five agencies namely: KeNHA; Kenya Rural Roads Authority (KeRRA); Kenya Urban Roads Authority (KURA); Kenya Wildlife Service (KWS) and Kenya Road Board (KRB). The first four agencies are responsible for planning and implementation of road works programs, while the KRB is responsible for management of the Road Maintenance Levy Fund (RMLF). KeNHA is responsible for implementation of Mombasa Southern Bypass and Kipevu Link Road.

Presently, funding for the road sector is obtained from six sources, namely;

- The exchequer or national budget, comprising government revenues
- The road maintenance levy fund (RMLF)
- Transit tolls
- Local government transfer fund (LATF)
- Agricultural cess (vignette) and
- The development partner.

Total funding of the roads sector is shown in the Table 10.2-1.

Table 10.2-1 Funding of Roads Sector

(Unit: Ksh billion)

	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
GOK	19.81	17.09	20.41	25.55	27.86	30.24	32.70	35.05	37.14
RMLF	15.77	18.00	19.00	20.00	21.05	22.16	23.33	24.46	25.75
Development Partners	10.44	23.00	21.94	24.95	25.00	25.00	25.00	25.00	25.00
LATF	0	0	0	0	0	0	0	0	0
Total	46.02	58.09	62.65	70.50	73.91	77.40	81.03	84.51	87.89

Source: Ministry of Road" Road Sector Investment Programme 2010-2014"

The Road Sector Investment Programme has used the existing budget trends based on past allocation of funds to the roads sector and it is projected that future allocations will increase at 5% per annum.

10.2.2 Type of Works

The type of works is classified into the following:

- Routine maintenance

- Periodic maintenance
- Rehabilitation /Reconstruction
- Upgrading to bitumen standard
- Capacity improvement/Expansion
- New road construction
- Proposed Development projects
- Others

Note: The new road construction has already been implemented while the proposed development projects will be implemented when the funds are available.

Table10.2-2 Five Year Investment Program, 2010 – 2014

(Unit: Ksh billion)

Unit: Ksh million		2010	2011	2012	2013	2014	Total
A	**Road Works**						
1	Routine Maintenance	11,897	12,457	12,495	12,571	12,245	61,665
2	Periodic Maintenance	3,630	4,600	6,846	9,283	10,660	35,019
3	Rehabilitation/Reconstruction	12,933	14,134	18,043	21,903	25,772	92,785
4	Upgrade to Bitumen Standard	23,191	24,705	25,359	26,201	27,300	126,756
5	Capacity Improvement	7,247	6,389	4,497	2,130	685	20,948
6	New Roads Construction	4,026	4,026	2,562	1,342	244	12,200
7	Proposed Development Projects	4,500	4,500	4,500	4,500	4,500	22,500
8	Public Transport Facilities	200	200	200	200	200	1,000
9	Trunk Storm Water Drainage	150	150	150	150	150	750
10	Separate NMT Facilities	150	150	150	150	150	750
Total		67,924	71,311	74,802	78,430	81,906	374,373
B	**Road Management Issues**						
1	Capacity Building	300	300	300	300	300	1,500
2	Road Safety	250	250	250	250	250	1,250
3	Axle Load Compliance	400	400	400	400	400	2,000
4	Environmental Sustainability	50	50	50	50	50	250
5	Research and Development	150	150	150	150	150	750
6	Traffic Management	200	200	200	200	200	1,000
7	Cross Cutting Issues	50	50	50	50	50	250
8	Data Collection Monitoring	200	200	200	200	200	1,000
9	Feasibility and Design	1,000	1,000	1,000	1,000	1,000	5,000
Total		2,600	2,600	2,600	2,600	2,600	13,000
Grand Total		70,524	73,911	77,402	81,030	84,506	387,373

Source: Ministry of Road" Road sector Investment Programme (RSIP) 2010-2014"

10.2.3 Road Sector Investment by Agencies

Table 10.2-3 shows Five Year Road Sector Investment by road agencies. According to Table 10.2-3, KeNHA budget is expected to receive Ksh. 151.0 billion during five year period from 2010 to 2014. Among budget to be received, upgrading and capacity improvement budget is Ksh. 69.2 billion and new road construction budget is Ksh. 201 million. According to the interview to KeNHA official, this budget amount is provisional. When the Mombasa Southern Bypass Project realizes, this amount will be delivered from Ministry of Road (MoR). It is noted from the interview of KeNHA official that new road construction costs in KeNHA are expected to obtain from various donors

Table 10.2-3 Five Year Road Sector Investment by Road Agencies, 2010-2014

(Unit: Ksh million)

	Agency	Road Classification	Routine Maintenance	Periodic Maintenance	Rehabilitation	Upgrading	Capacity Improve.	New Road Construction	Total
1	KeNHA	National road	12,112	14,255	55,502	48,248	20,948	201	151,266
2	KeRRA	Rural Road	39,358	6,603	10,784	68,377	0	0	125,102
3	KURA	Urban Roads	8,448	13,265	26,499	10,131	0	12,000	70,343
4	KWS	National and Game Park Roads	1,747	916	0	0	0	0	2,663
All Agencies			61,665	35,019	92,785	126,756	20,948	12,201	349,374

Source: Ministry of Road" Road sector Investment Programme (RSIP) 2010-2014"

Note: Periodic maintenance and rehabilitation/reconstruction cost total are not equal to figures in Table 10.2-2.

10.2.4 Financial Capability of KeNHA

Since KeNHA has been established by the Kenya Roads Act, 2007, only one financial statement of KeNHA was reported for period from April 2009 to June 2010. It is therefore difficult to evaluate the soundness of the financial capability of KeNHA. Tables 10.2-4 to 10.2-7 show the financial statement of KeNHA.

Table 10.2-4 Statement of Financial Position as of 30th June 2010

			Amount (Ksh)
Assets			
	Non-Current Assets		
		Property , Plant & Equipment	15,309,787,456
		Total Non-Current Assets Revenue	15,309,787,456
	Current Assets		
		Inventories	9,146,503
		Trade & Other Receivables	758,504,369
		Cash & Cash Equivalents	2,306,251,072
		Total Current Assets	3,073,901,944
	Current Liabilities		
		Trade Payables & Accruals	7,108,533,047
		Total Current Liabilities	7,108,533,047
	Net Working Capital		-4,034,631,103
	Total Net Assets		11,275,156,353
Financed by			
	GOK Development Grants		10,537,884,782
	Surplus for the Period		737,271,570
Total Reserves			11,275,156,352

Source: Report and Financial Statement ended 30th June 2010, KeNHA

Table 10.2-5 Statement of Income for the 15 Months Period Ended 30th June, 2010

		Amount (Ksh)
Income		
	Exchequer Funds	285,754,413
	Fuel Levy Fund & Transit Tolls	2,910,307,683
	Other Income	49,556,174
	Total Revenue	3,245,618,270
Expenditure		
	Board Expenses	26,028,630
	Staff Expenses	173,699,710
	Administration Expenses	180,783,719
	Road Maintenance Expenses	2,127,834,641
	Total Expenditure	2,508,346,700
Surplus for the Period		737,271,570

Source: Report and Financial Statements ended 30th June 2010, KeNHA

Note: It is excluded development expenditures paid directly by donors to contractors.

Table 10.2-6 Statement of Changes in Reserves for the 15 Months Period Ended 30th June, 2010

	Retained Surplus	GoK Grants	Total Reserves
As at 1st April,.2009			
The GoK Grants		10,537,884,782	10,537,884,782
Surplus of the Period	737,271,570		737,271,570
As at 30th June, 2010	737,271,570	10,537,884,782	11,275,156,352

Source: Report and Financial Statements ended 30th June 2010, KeNHA

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Table 10.2-7 Statement of Cash Flows for the 15 Months Period Ended 30th June, 2010

	Amount (Ksh)
Cash Flows from Operating Activities	
Surplus generated from Operating Activities	737,271,570
Adjustments	
Interest received	-36,010,012
Depreciation	10,154,638
Operating Income before Working Capital Changes	711,416,196
Movements in Working Capital	
Decrease in Debtors, Prepayments & Deposits	-758,504,369
Decrease in Inventories	-9,146,503
Increase in Trade and Other Payables	7,108,533,047
Net Cash from Operating Activates	7,052,298,371
Investment Activities	
Work in Progress	-15,207,905,201
Purchase of Non-Current Assets	-112,036,892
Interest Income	36,010,012
Net Cash from Investing Activities	-15,283,932,081
Financial Activities	
GOK Capital Grants	10,537,884,782
Financial Actives	10,537,884,782
Net Increase in Cash and Cash Equivalent	2,306,251,071
Cash and Cash Equivalents at Start of Period	0
Cash and Cash Equivalents at End of Period	2,306,251,071

Source: Report and Financial Statements ended 30th June 2010, KeNHA

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CHAPTER 11 PROJECT IMPLEMENTING ORGANIZATION

11.1 Organization of the Implementing Agency, KeNHA

KeNHA is the implementing agency of this Project. The organization chart of KeNHA is shown in Figure 11.1-1. Special Project Department of KeNHA, currently responsible for Northern Corridor Transport Improvement Project (NCTIP) together with the Feasibility Study on Mombasa Southern Bypass, is designated to assume this Project.

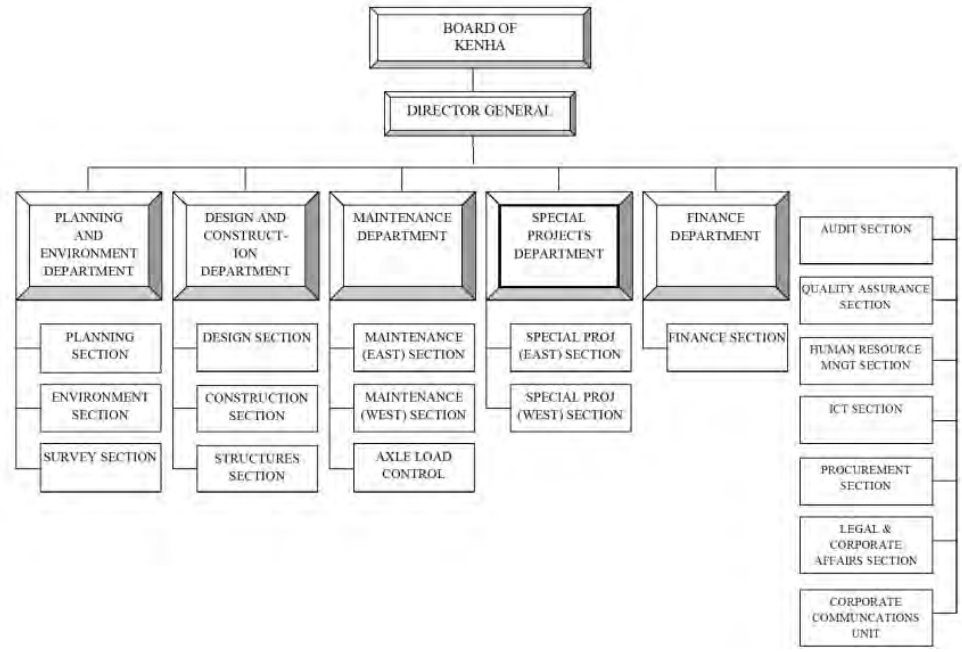


Figure 11.1-1 Organization of KeNHA

Source: KeNHA

Numbers of staff of each department/section of KeNHA is as shown in Table 11.1-1.

Table 11.1-1 Number of Staff of KeNHA

Department / Section	Manager/Engineer/Assist. Eng.	Total Staff
Planning and Environment Department	15	22
Design and Construction Department	33	51
Maintenance Department	15	36
Special Project Department	14	20
Finance Department	3	10
Audit Section	1	6
Quality Assurance Section	5	5
Human Resource Management Section	7	29
Information Communication Tech. Sect.	1	4
Procurement Section	6	21
Legal & Corporate Affair Section	1	4

Source: KeNHA

KeNHA has 10 regional offices headed by regional managers. The regional offices supervise and coordinate construction and maintenance projects of major roads under management of the KeNHA head office. The organization of the regional offices is shown in Figure 11.1-2.

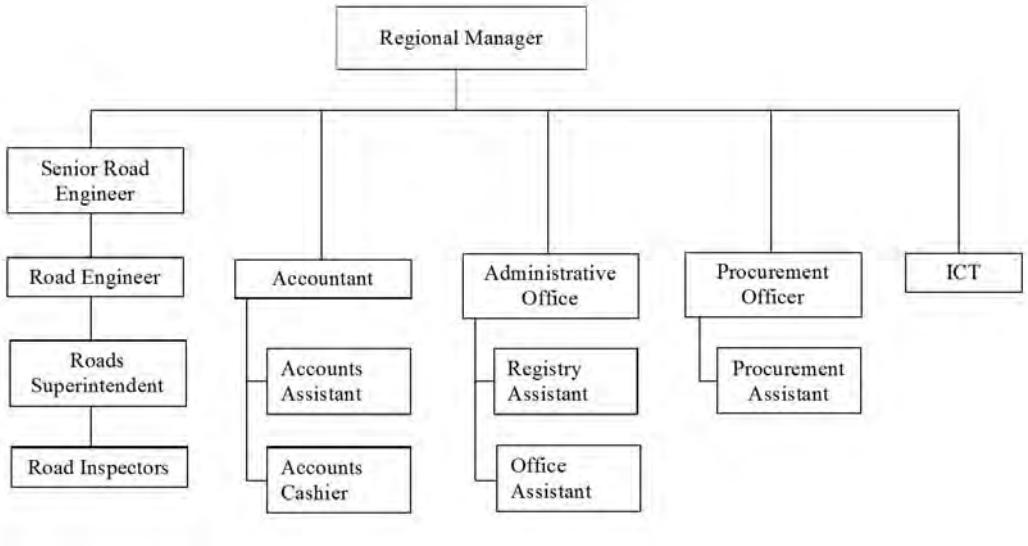


Figure 11.1-2 Organization of Regional Office

11.2 Organization of Special Project Department of KeNHA

The organization of Special Project Department of KeNHA undertaking NCTIP is shown in Figure 11.2-1. The outline of the NCTIP with its implementing status is described in Section 5.2.

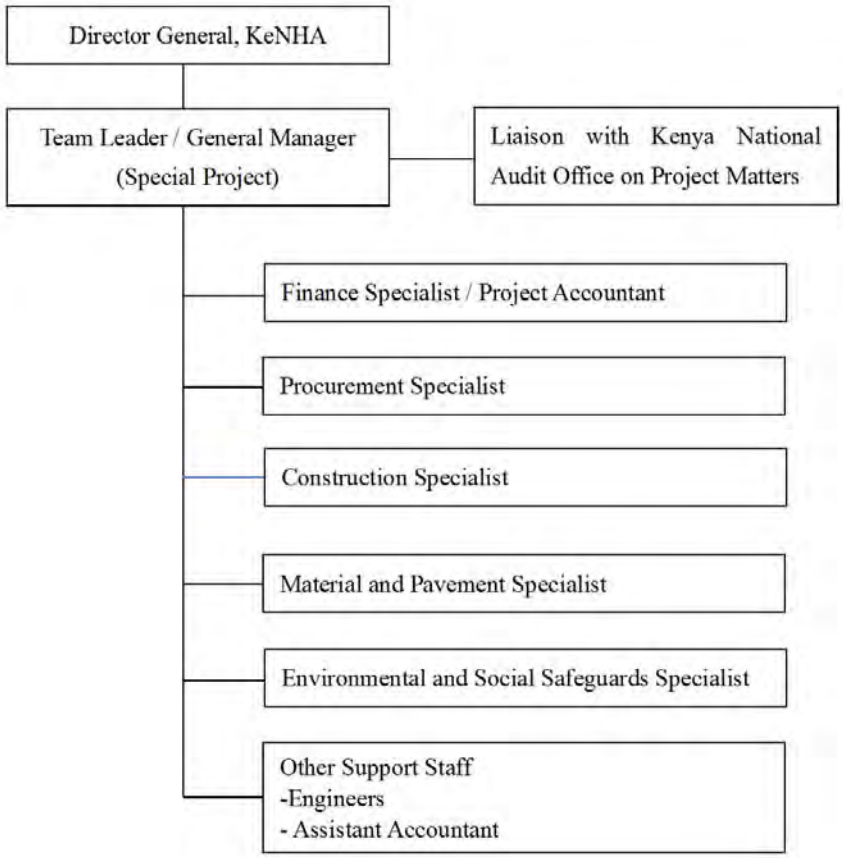


Figure 11.2-1 Organization of Special Project Department

Source: KeNHA

11.3 Project Implementing Organization Proposed for this Project

Based on the review of the present organization for special projects and recommendations to increase its technical capability as described in Chapter 10, the project implementation organization for the Project is proposed as shown in Figure 11.3-1.

KeNHA's Special Project Department which consists of a project manager, engineers, specialists and mangers, will be responsible for the implementation of the Project. A liaison officer will station himself/herself at the Project site to coordinate between the department and the Project consultant and the contractors. Coast Regional Office of KeNHA will assist the department in management and coordination of the Project.

Regarding with environmental and social consideration of the Project, RAP Implementation Committee which consists of representatives from concerned parties will be responsible for the implementation of the EIA management and the resettlement. RAP Implementation Team will be organized by KeNHA to execute the resettlement and management at the Project site with coordination with local government officers and representatives of PAPs.

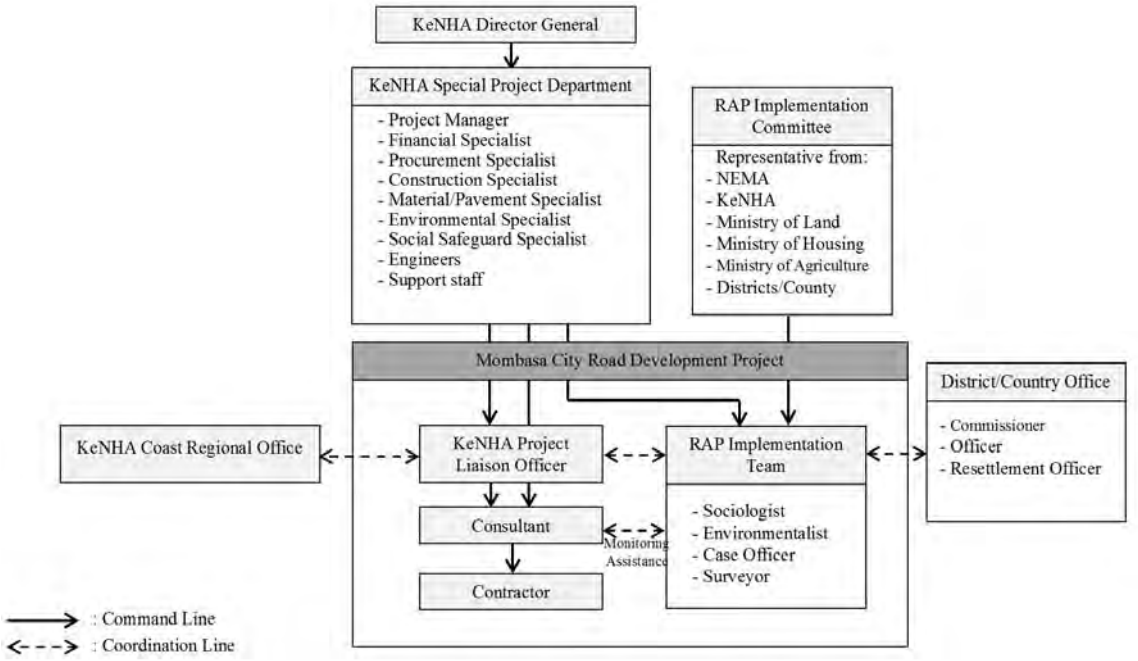


Figure 11.3-1 Project Implementation Organization proposed for the Project

Source: JICA Survey Team

11.4 Maintenance Organization

Ministry of Roads is responsible for the planning, development and maintenance of the public roads in Kenya. This is done through the three road authorities, namely, KeNHA for major roads, KeRRA for rural roads and town roads, KURA for urban roads. Fund for road maintenance is disbursed by the Kenya Road Board (KRB).

Generally, the road maintenance is implemented with the following 3 ways. Most of the maintenance works are undertaken by contractors.

- Routine Maintenance: Road condition inspection, road cleaning and minor repair are executed around once a year.
- Periodic Maintenance: Major repair and rehabilitation of road are executed when the necessity of such maintenances are identified in the routine maintenance.
- Special Maintenance: unscheduled urgent repair and restoration of road are executed in case road collapses are caused by natural disaster, accident or other reasons.

KeNHA is responsible for the maintenance of the Project road. KeNHA will program the maintenance and procure a contractor to undertake routine maintenance of the project road. When the road and/or bridges are damaged, it will be repaired/rehabilitated by procuring a contractor.

The following works are necessary as the routine maintenance of the Project road:

- Inspection: Identifying damages/defects such as pavement crack, bridge structure deformation / collapse, slope failure, scouring protection damage/washout, etc.
- Cleaning: Cleaning of bridge deck, road side ditches and cutting grass on road shoulders and slope.
- Minor Repair: Sealing of pavement cracks, patching on potholes, leveling road shoulders, repairing gabions/riprap. Replacement of broken street lamps.

The following works are necessary as the periodic maintenance of the Project road:

- Road repair/rehabilitation: Repainting of road markings, AC overlay, etc.
- Bridge repair/rehabilitation: Repainting of steel structures, replacement of broken expansion joints, etc.

CHAPTER 12 OPERATION AND EFFECT INDICATORS

12.1 Project Objectives

To analyse logically the project performance and assess the project's operational and effectiveness conditions, appropriate indicators are established based on the goals, objectives and functional characteristics of the Project. Mombasa Southern Bypass and Kipevu Link Road have the overall goals of facilitating transportation of goods and passengers. As a national and regional level goal, the Project will contribute to socio-economic development and promote regional development. Under this concept, goals and objectives of the Project can be stated as follows:

Goals

- To promote trade and increase the volume of transported goods and passengers
- To promote national and regional economy

Objectives

- To facilitate transportation of goods and passengers
- To mitigate road traffic congestion of roads in Port Reitz area, Mombasa Island and Likoni Ferry
- To promote regional development in southern coastal area
- To promote tourism development in southern coastal area
- To maintain environmental conditions

Based on these goals and objectives, performance indicators for operation and effect indicate the performance to be achieved during the project life in specific and measurable terms. In addition, as long as the established indicators can be measured, they may contribute to attaining better performance of the Project.

12.2 Operation Indicators

The operation for Mombasa Southern Bypass and Kipevu Link Road is assessed based on a comparative analysis for indicators of traffic volume in two cases of "without the Project road" and "with the Project road". The indicator of traffic volume refers to average traffic volume of goods vehicles and passenger ones.

- Goods vehicle traffic volume on Mombasa Southern Bypass and Kipevu Link Road
- Passenger vehicle traffic volume on Mombasa Southern Bypass and Kipevu Link Road

12.3 Effect Indicators

Effect indicators are established and shown in Table 12.3-1 in order to monitor the project performance and effectiveness.

Table 12.3-1 Effect Indicators

Objective of the Project	Indicators
To facilitate transportation of goods and passengers	• Good vehicle traffic volumes • Passenger vehicle traffic volumes (Both are operation indicators)
To dissolve road traffic congestion	• Traffic congestion degree (V/C ratio)
To improve transport efficiency	• Travel time and / or • Travel Speed
To promote regional development	• Progress of Dongo Kundu development • Increase in population in Kilindini District • Increase in tourists in Kilindini District

(1) Traffic Congestion along the Road Influenced by the Project

Degree of traffic congestion is expressed by a ratio of traffic volume (V) to capacity (C) (V/C ratio) on the roads influenced by the Project, which are the following roads/sections:

- Port Reitz Road
- Mukupa Causeway
- Changawe Roundabout– Meritini Jct.
- Likoni Ferry

In this calculation, V and C are converted into passenger unit (PCU).

Average Congestion Degree (V/C) = ΣV-Km /ΣC-Km

Where;

V-Km: traffic volume on each link in terms of PCU times length of each link

C-Km: capacity on each link in terms of PCU times length of each link

As for Likoni Ferry, congestion degree or waiting time is expressed by traffic volume in term of PCU.

(2) Average Travel Time

As transport efficiency, the travel speed is appropriate indicator. The travel speed can be measured on the following sections:

- Between Muritini Jct. and Kibundani Jct.
- Between Likoni and Miritini Jct.
- Between Likoni and Moi International Airport

(3) Regional Development

Mombasa Southern Bypass contributes greatly to regional development of southern coastal area. The indicators of regional development can be expressed as progress of Dongo Kundu development and increase in number of population and tourists in Kilindini District.

12.4 Operation and Effect Monitoring Plan

Operation and effect of the Project will be monitored by measuring of the above indicators. The targets of the indicators are estimated as of the planned monitoring timing as shown in Table 12.4-1. Conducting the monitoring by KeNHA in 2019 (as the opening of Mombasa Southern Bypass) and 2025 (as the opening of Dongo Kundu Port Phase 1) is proposed.

Table 12.4-1 Monitoring Plan of Operation and Effect Indicators

Indicators				Unit	Base Year 2011 As the Preparatory Survey	Monitoring Year 2020 After Completion of the Bypass	Monitoring Year 2025 After Opening of Dongo Kundu Port
Vehicle Traffic Volume	Section-1: Meritini Jct. - Mwache Jct.	Goods Vehicle	Planned	veh./day ('000)	-	6.3	10.8
			Actual	veh./day ('000)	-		
		Passenger Vehicle	Planned	veh./day ('000)	-	1.6	2.8
			Actual	veh./day ('000)	-		
		PCU	Planned	pcu/day ('000)	-	22.0	37.6
			Actual	pcu/day ('000)	-		
	Section-2: Mwache Jct. - New Container Terminal	Goods Vehicle	Planned	veh./day ('000)	-	8.1	11.7
			Actual	veh./day ('000)	-		
		Passenger Vehicle	Planned	veh./day ('000)	-	5.2	7.8
			Actual	veh./day ('000)	-		
		PCU	Planned	pcu/day ('000)	-	28.2	40.5
			Actual	pcu/day ('000)	-		
	Section-3: Mwache Jct. - Dongo Kundu	Goods Vehicle	Planned	veh./day ('000)	-	2.4	6.4
			Actual	veh./day ('000)	-		
		Passenger Vehicle	Planned	veh./day ('000)	-	5.5	8.4
			Actual	veh./day ('000)			
		PCU	Planned	pcu/day ('000)	-	9.4	22.6
			Actual	pcu/day ('000)	-		
	Section-4: Dongo Kundu - Kibundani Jct.	Goods Vehicle	Planned	veh./day ('000)	-	2.4	4.0
			Actual	veh./day ('000)	-		
		Passenger Vehicle	Planned	veh./day ('000)	-	5.5	6.6
			Actual	veh./day ('000)	-		
		PCU	Planned	pcu/day ('000)	-	9.4	13.9
			Actual	pcu/day ('000)	-		
Average Congestion Ratio (V/C)	Port Reitz Road	Planned	Traffic Volume	PCU/day ('000)	9.1	27.8	38.1
			Capacity	PCU/day ('000)	11.0	44.0	44.0
			V/C	-	-	0.63	0.87
		Actual	V/C	-	0.83		
	Mukupa Causeway	Planned	Traffic Volume	PCU/day ('000)	41.7	73.4	90.8
			Capacity	PCU/day ('000)	100.0	100.0	100.0
			V/C	-	-		
		Actual	V/C	-	0.42		
	Changamwe Roudabout - Miritini Jct.	Planned	Traffic Volume	PCU/day ('000)	24.8	26.9	32.6
			Capacity	PCU/day ('000)	22.4	76.1	76.1
			V/C	-	-	0.35	0.43
		Actual	V/C	-	1.11		
Likoni Ferry Congestion	Traffic Volume of Likoni Ferry		Planned	PCU/day ('000)	-	1.3	2.9
			Actual	PCU/day ('000)	5.7		
Average Travel Time (during peak hour)	Between Meritini Jct. and Kibundani Jct.		Planned	Minute	-	17.7	22.0
			Actual	Minute	70.5		
	Between Likoni and Miritini Jct.		Planned	Minute	-	25.6	31.5
			Actual	Minute	64.1		
	Between Likoni and Moi International Airport		Planned	Minute	-	33.2	39.6
			Actual	Minute	54.0		
Regional Development	Development of Dongo Kundu Area	Developed Area	Planned	Acre	-	0.0	1,000.0
			Actual	Acre	0.0		
	Industrialization / Urbanization	Population of Kilindini Dist.	Planned	Persons ('000)	-	619.4	776.3
			Actual	Persons ('000)	445.7		
	Development of Tourism	Number of Hotels	Planned	Each	-	78.0	99.0
			Actual	Each	50.0		

Source: JICA Survey Team

CHAPTER 13 QUALITATIVE EFFECT OF THE PROJECT

13.1 Promotion of Poverty Reduction

Poor people's inability to access jobs and services is important element of the social exclusion that defines poverty. Regional and transport development can reduce this poverty, by contributing to economic growth.

In southern coastal area of Mombasa case, poor people may receive the following effect:

- During construction period, poor people can work as unskilled construction workers
- After construction, this Project road will promote regional development along the Project road and enhance industrial and tourism developments. It is expected to increase job opportunities in proportion to economic development.

13.2 Promotion of Dongo Kundu Port and Industrial Development

Kenya Vision 2030 is the country's development blue print from 2008 to 2030. In line with the Vision 2030, the Medium Term Plan was published by the Kenya Government. In this plan, Dongo Kundu free port plan was proposed as Build, Operation and Transfer (BOT) scheme.

When the Project road is constructed, it is expected to promote and accelerate Dongo Kundu port and industrial development.

13.3 Reduction of Freight Transport Related Facilities Congestion

At present, most of the freight transport related facilities such as warehouse, container freight station, are concentrated at Mombasa and Port Reitz areas. Due to the heavy truck movement, these areas are so heavily congested.

When the Project road is constructed, these facilities may be relocated and dispersed to the area along the Project road, which will reduce traffic congestion.

13.4 Promotion of Tourism Development

The southern coastal area of Mombasa has fantastic natural resources and potential to attract foreign tourists like the northern coastal area of Mombasa. However, due to limited capacity of Likoni Ferry, tourism development has been made little.

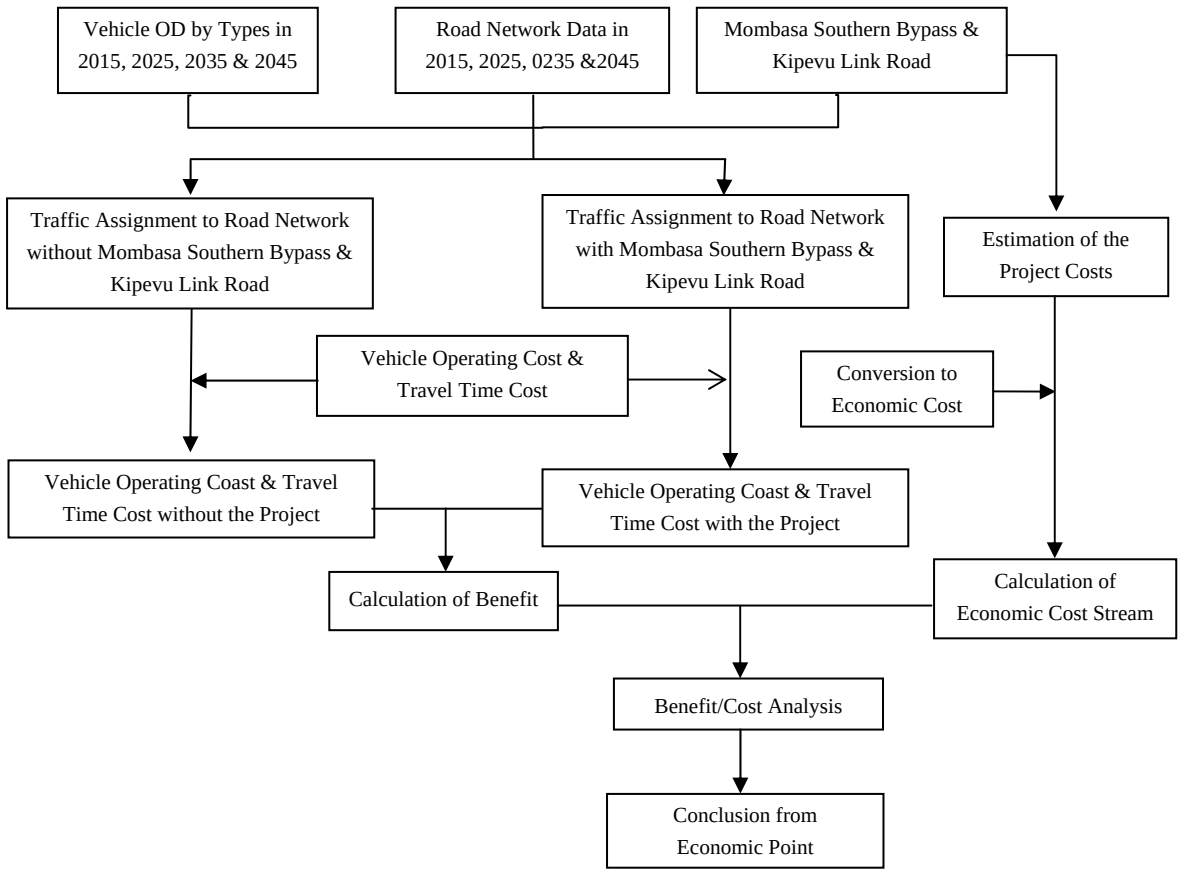
When the Project road is constructed, it is expected that tourism development will be promoted through expanded capacity of transport system.

CHAPTER 14 ECOMOMIC ANALYSIS OF THE PROJECT

14.1 General

14.1.1 General

The economic analysis of the Project is principally made in comparison between benefits and costs which is derived from with and without Mombasa Southern Bypass and Kipevu Link Road. The economic analysis procedure illustrated in Figure 14.1-1 is employed in this study. In order to estimate the benefit, a method of the traffic assignment to the road networks with and without the Project is used.



Source: JICA Study Team

Figure 14.1-1 Procedure for Economic Analysis

14.1.2 Presumption for Economic Evaluation

(1) Type of Benefits

There are various benefits derived from construction of the Bypass and Kipevu Link Road. Among various benefits, the following tangible benefits were considered in the Survey.

- Reduction of vehicle operating cost
- Reduction of travel time cost

(2) Implementation Plan of the Project and Evaluation Period

Based on the Project implementation schedule proposed in Chapter 8, the Project implementation schedule for economic analysis is assumed as shown in Table 14.1-1.

Table 14.1-1 Project Implementation Schedule for Economic Analysis

	2012	2013	2014	2015	2016	2017	2018
Detailed Design							
Tendering							
Construction							
Kipevu Link Road (Section 1 & 2)							
Mombasa Southern Bypass (Section 3 & 4)							

Source: JICA Survey Team

The evaluation period is assumed to be 30 years after opening traffic to public (from 2017 to 2046) taking the service life of the Project road into account.

(3) Evaluation Cases

In order to achieve the purpose for economic analysis, the various cases of construction of the Project road to be evaluated are listed as shown in Table 14.1-2.

Table 14.1-2 Evaluation Cases

	Case	Section 1	Section 2	Section 3	Section 4
Case 0	Do Nothing	-	-	-	-
Case 1	Link Road Only (Section 1+2)	4	4	-	-
Case 2	Link Road (Section 1+2) and Bypass (Section 3+4) (2-lane)	4	4	2	2
Case 3	Link Road (Section 1+2) and Bypass (Section 3+4) (4&2-lane)	4	4	4	2
Case 4	Link Road (Section 1+2) and Bypass (Section 3+4) (4-lane)	4	4	4	4

Source: JICA Survey Team
Note: Figures in the table indicate the number of lanes

(4) Economic Indicators

The economic indicators used in the Survey are as follows:

- Net Present Value (NPV)
- Benefit Cost Ratio, (BCR)
- Economic Internal Rate of Return (EIRR)

14.2 Economic Benefit Calculation

14.2.1 Road Users Cost

By implementing the Project road, a variety of benefits such as improvement of comfort and safety, reduction of commodity damages, promotion of international and inter-regional trade in short and long term and promotion of regional development in long term is expected. Among these benefits, ones in relation to vehicle operating cost are: saving in Vehicle Operating Cost (VOC) and travel saving in time cost.

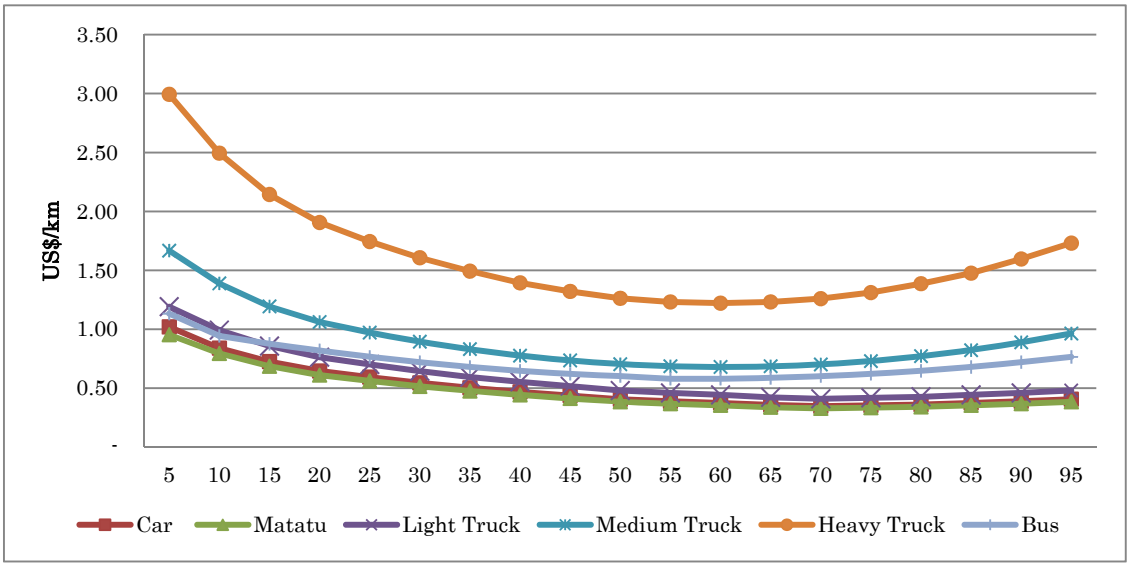
(1) Vehicle Operating Cost (VOC)

Based on VOC estimated in the northern corridor transport project implemented by World Bank, the VOC in the Survey was estimated using consumer price index between 2008 and 2011. Table 14.2-1 shows the unit VOC.

Table 14.2-1 Unit Vehicle Operating Cost (US $ / Vehicle-km, 2011)

VOC Component	Car	Matatu	Light Truck	Medium Truck	Heavy Truck	Bus
Fuel & Oil	0.097	0.129	0.140	0.209	0.404	0.256
Tires	0.004	0.004	0.027	0.027	0.004	0.027
Parts and Labor	0.057	0.126	0.148	0.286	0.455	0.184
Depreciation	0.189	0.050	0.075	0.117	0.314	0.091
Crew Cost	0.000	0.020	0.020	0.041	0.044	0.022
Total	0.347	0.328	0.410	0.680	1.222	0.580

Source: JICA Survey Team estimates based on Northern Corridor Transport Study



Source: JICA Survey Team estimates

Figure 14.2-1 Unit VOC by Vehicle Speed (US $ / Vehicle –km) (2011)

Table 14.2-2 Passenger Time Cost by Vehicle Type

	Cars	Matatu	LGV	MGV	HGV	Bus
Hourly Income in 2011	185	13	93	70	70	13
Average Occupancy	3	13	3	2	2	48
Share of Work Trip	69 %	95 %	96 %	96 %	100 %	84 %
Share of Shopping Leisure Trip	29 %	4 %	3 %	3 %	-	16 %
Time Vale per Vehicle (Ksh)	427	164	303	-	-	574
Time Vale per Vehicle (US$)	4.80	1.84	3.40	-	-	6.45

Sources: 1) Hourly income is estimated using wages from KNBS
2) Average occupancy from feasibility study
3) Share of work trip and shopping trip is obtained from feasibility study
4) Time value per vehicle is estimated by JICA Survey Team
5) Exchange rate from Ksh to US$ is applied for 89 Ksh/US$

Table 14.2-3 Cargo Time Cost by Vehicle Type

VOC Component	Light Truck	Medium Truck	Heavy Truck
Cargo Cost (US$ / km)	0.000	0.043	0.043
Vehicle Km	60,000	80,000	60,000
Yearly Cargo Cost (US$-Vehicle-km)	0	3,460.2	2,595.1
Yearly Running Hours (hrs)	1,300	2,500	3,500
Hours (US$)	-	1.384	0.741
Average Load Factor (Ton/Veh.)	-	2.000	10.000
Cargo Time Value (US$)	-	2.768	7.410

Sources: 1) Cargo time cost and vehicle km are northern corridor transport study
2) Average load factor from feasibility study
3) Time value per vehicle is estimated by JICA Survey Team

14.2.2 Benefit Calculation

On the basis of unit VOC as well as traffic demand forecast, benefits in terms of saving in travel time cost and saving in vehicle operating cost are calculated as shown in Table 14.2-4.

Table 14.2-4 Economic Benefit of the Project

Case		Item	Unit	2011	2015	2025	2035	2045
1	Link Road Only	Travel Time Cost	USD/year	0	3,080	30,771	85,817	103,877
		Vehicle Operating Cost	USD/year	0	3,502	16,367	80,262	98,692
		Total	USD/year	0	6,582	47,138	166,079	202,569
2	Link Road w/ Bypass (2--Lane)	Travel Time Cost	USD/year	0	9,361	93,110	389,555	415,901
		Vehicle Operating Cost	USD/year	0	-6,621	38,177	131,024	213,382
		Total	USD/year	0	2,741	131,287	520,579	629,283
3	Link Road w/ Bypass (4&2--Lane)	Travel Time Cost	USD/year	0	9,600	95,971	415,022	415,022
		Vehicle Operating Cost	USD/year	0	-7,120	38,016	133,883	133,883
		Total	USD/year	0	2,480	133,986	548,906	548,906
4	Link Road w/ Bypass (4--Lane)	Travel Time Cost	USD/year	0	9,772	96,608	416,599	416,599
		Vehicle Operating Cost	USD/year	0	-7,518	37,197	130,205	130,205
		Total	USD/year	0	2,255	133,805	546,804	546,804

Source: JICA Survey Team

14.3 Economic Cost Estimates

14.3.1 Construction Cost, Land Acquisition Cost and Maintenance Cost

The cost of construction, land acquisition, and maintenance presented in Chapter 7 are used for economic evaluation. Some basic presumptions assumed in economic analysis are as follows:

- Escalation factor: Price escalation is not taken into account for construction cost, land acquisition cost and maintenance cost.
- Tax and import duty: Value added tax and import duty are excluded from cost.

- Standard conversion factor: Standard conversion factor of 0.85 is applied to the price of non- tradable goods and services
- Land acquisition cost: Land acquisition cost is included in cost.

14.3.2 Economic Cost

The Project cost calculated in the previous section is expressed as the economic cost.

It is noted that if Mombasa Southern Bypass is constructed in 4-lanes, its construction cost will require US$ 143.7 million more compared with the construction in 2-lanes.

Table 14.3-1 Economic Cost Estimates

(Unit: US$'000)

Case		Consulting Services US$'000	Land Acquisition US$'000	Local Portion US$'000	Foreign Portion US$'000	Economic Construction Cost US$'000	Total Economic Cost US$'000
1	Link Road Only	10,637	5,978	85,788	4,180	89,968	106,583
2	Link Road w/ Bypass B Route 2-Lane	33,432	16,110	166,805	115,964	282,769	332,311
3	Link Road w/ Bypass B Route 4 & 2-Lane	33,432	16,110	204,160	195,618	399,778	449,320
4	Link Road w/ Bypass B Route 4-Lane	33,432	16,110	219,351	197,602	416,953	466,495

Source: JICA Survey Team

14.3.3 Maintenance Cost

The maintenance cost is assumed to be 3 % of the construction cost.

14.4 Economic Analysis

14.4.1 Cost Benefit Analysis

(1) Mombasa Southern Bypass and Kipevu Link Road

The economic analysis of Mombasa Southern Bypass (Mwache Jct. – Kibundani Jct.) and Kipevu Link Road (Miritini Jct. – Mwache Jct. –New Container Terminal) is made as shown in Table 14.4-1. Based on the annual user's benefit and cost estimate shown in Table 14.4-2, construction of Mombasa Southern Bypass (2-lane) and Kipevu Link Road (4-lane) is evaluated in terms of EIRR, CBR and NPV with assumed operation period of 30 years. Evaluation of the economic viability is done through three approaches and using social discount rate of 12.0%. Comparing with such discount rate, it can be said that economic viability is secured to a feasible level.

Table 14.4-1 Result of Economic Analysis of Mombasa Southern Bypass (2-Lane) and Kipevu Link Road (4-Lane)

Economic Indicators	
EIRR (%)	20.21%
BCR	2.84
NPV (US$ '000)	419,371

Notes: 1) Project life is assumed to be 30 years after opening traffic to public
2) Adopted discount rate is 12.0 %

Table 14.4-2 Cost Benefit Stream of Mombasa Southern Bypass (2-lane) and Kipevu Link Road (4-lane)

Year	CS+LA +Construction US$'000	O&M Cost US$'000	Cost US$'000	Benefit US$'000	Net Revenue US$'000
2012			0		0
2013	24,771	0	24,771		-24,771
2014	24,771	0	24,771		-24,771
2015	82,762	0	82,762	0	-82,762
2016	82,762	0	82,762	0	-82,762
2017	82,762	2,699	85,461	9,648	-75,813
2018	34,484	2,699	37,183	11,705	-25,478
2019	0	8,483	8,483	9,845	1,362
2020	0	8,483	8,483	11,888	3,405
2021	0	8,483	8,483	27,112	18,629
2022	0	8,483	8,483	45,187	36,704
2023	0	8,483	8,483	67,315	58,832
2024		8,483	8,483	95,205	86,722
2025		8,483	8,483	131,287	122,804
2026		8,483	8,483	150,624	142,141
2027		8,483	8,483	172,824	164,341
2028		8,483	8,483	198,311	189,828
2029		8,483	8,483	227,574	219,091
2030		8,483	8,483	261,176	252,693
2031		8,483	8,483	299,763	291,280
2032		8,483	8,483	344,077	335,594
2033		8,483	8,483	394,973	386,489
2034		8,483	8,483	453,430	444,947
2035		8,483	8,483	520,579	512,096
2036		8,483	8,483	529,685	521,202
2037		8,483	8,483	532,260	523,776
2038		8,483	8,483	541,727	533,244
2039		8,483	8,483	551,555	543,071
2040		8,483	8,483	561,760	553,277
2041		8,483	8,483	572,362	563,879
2042		8,483	8,483	583,379	574,896
2043		8,483	8,483	594,831	586,348
2044		8,483	8,483	606,739	598,256
2045		8,483	8,483	629,283	620,800
2046		8,483	8,483	629,283	620,800
Total	332,311	242,924	575,234	9,765,386	9,190,151

0

Year	Discounted Rate	Discounted Cost US$'000	Discounted Benefit US$'000	Net Benefit US$'000
2012	0.89	0	0	0
2013	0.80	19,747	0	-19,747
2014	0.71	17,632	0	-17,632
2015	0.64	52,596	1,742	-50,855
2016	0.57	46,961	2,495	-44,467
2017	0.51	43,297	3,101	-40,196
2018	0.45	16,820	3,587	-13,233
2019	0.40	3,426	3,976	550
2020	0.36	3,059	4,287	1,228
2021	0.32	2,731	8,729	5,998
2022	0.29	2,439	12,990	10,551
2023	0.26	2,177	17,278	15,101
2024	0.23	1,944	21,819	19,874
2025	0.20	1,736	26,864	25,128
2026	0.18	1,550	27,519	25,969
2027	0.16	1,384	28,191	26,808
2028	0.15	1,236	28,883	27,647
2029	0.13	1,103	29,594	28,491
2030	0.12	985	30,324	29,339
2031	0.10	879	31,075	30,196
2032	0.09	785	31,848	31,062
2033	0.08	701	32,642	31,940
2034	0.07	626	33,458	32,832
2035	0.07	559	34,297	33,738
2036	0.06	499	31,158	30,659
2037	0.05	446	27,955	27,509
2038	0.05	398	25,404	25,006
2039	0.04	355	23,093	22,738
2040	0.04	317	21,000	20,683
2041	0.03	283	19,104	18,821
2042	0.03	253	17,386	17,133
2043	0.03	226	15,828	15,602
2044	0.02	202	14,415	14,213
2045	0.02	180	13,349	13,169
2046	0.02	321	23,837	23,515
Total		227,852	647,224	419,371

Source: JICA Survey Team

(2) Kipevu Link Road Only Construction Case

The economic analysis of Kipevu Link Road only construction case is shown in Table 14.4-3 and indicates that construction case of Kipevu Link Road is economically feasible.

Table 14.4-3 Result of Economic Analysis of Kipevu Link Road Only (4-Lane)

Economic Indicators	
EIRR (%)	21.29%
BCR	3.41
NPV (US$'000)	167,646

Notes: 1) Project life is assumed to be 30 years after opening traffic to public
2) Adopted discount rate is 12.0 %

(3) Mombasa Southern Bypass (Mwache Jct. – Kibundani Jct.)

The economic analysis of Mombasa Southern Bypass is shown in Table 14.4-4. The table indicates that Mombasa Southern Bypass with 2-lane is economically feasible.

Table 14.4-4 Result of Economic Analysis of Mombasa Southern Bypass

Economic Indicators	2-lane Case	4 & 2-lane Case	4-lane Case
EIRR (%)	13.29%	9.43%	9.27%
BCR	1.14	0.73	0.72
NPV (US$ '000)	24,870	-74,701	-80,200

Notes: 1) Project life is assumed to be 30 years after opening traffic to public
2) Adopted discount rate is 12.0 %

14.4.2 Sensitivity Analysis

The sensitivity analysis of the economic analysis is conducted for the respective fluctuation of benefit and construction cost at 10%. The results of the sensitivity analysis are shown in Table 14.4-3.

Table 14.4-5 Results of the Sensitivity Analysis

	Cost +10%	Base Case	Cost -10%
Benefit +10%	20.21%	21.09%	22.08%
Base Case	19.36%	20.21%	21.18%
Benefit-10%	18.45%	19.28%	20.21%

Source: JICA Survey Team

CHAPTER 15 RISK ANALYSIS

15.1 Method of Risk Analysis

The risk analysis was carried out based on the degree of impact and possibility of each factor set forth hereunder, prior, during, and post construction period respectively.

Basic possible risk factors are categorized as follows, and each risk is sub-categorized under such categories;

1. Cost Escalation
2. Political Instability
3. Negative Impacts on Natural Environment
4. Negative Impacts on Social Environment
5. Delay of Development (Coast Region)
6. Delay of Development (Other Region)
7. Internal Factors
8. External Factors

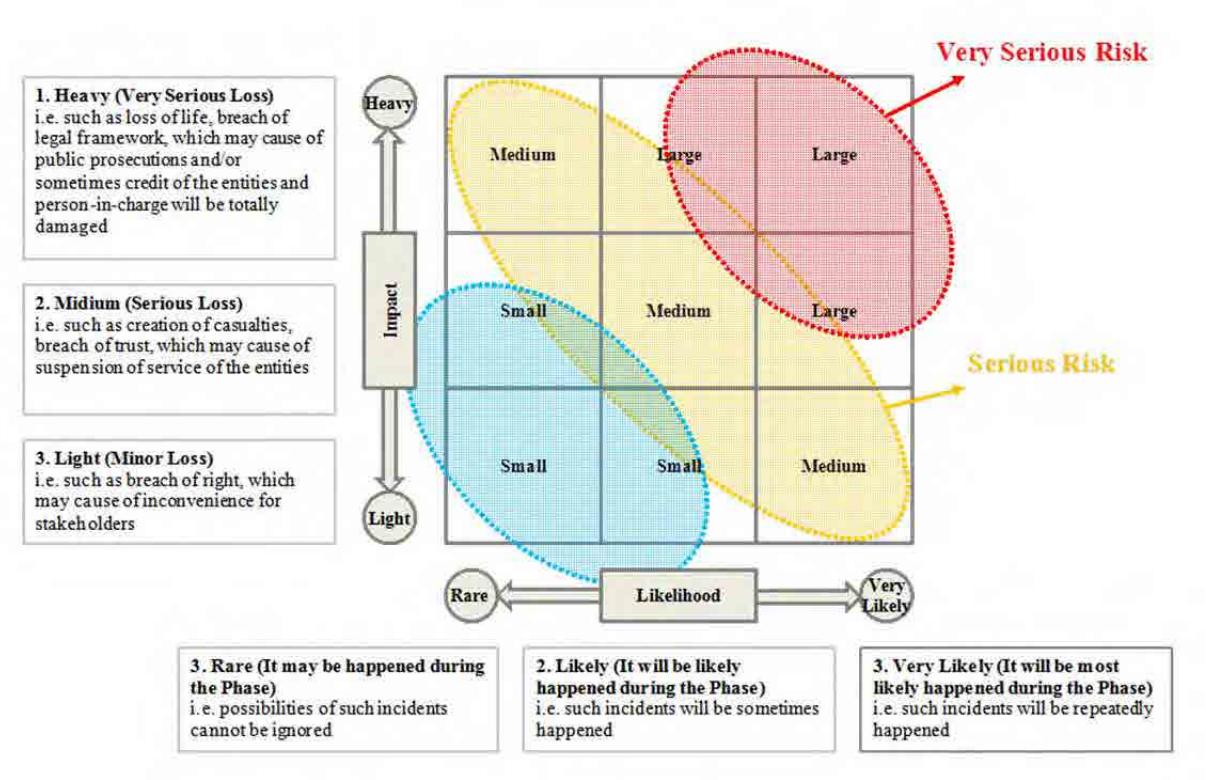


Figure 15.1-1 Risk Analysis Chart

Each sub-categorized factor is assessed for both its impact and likelihood independently, and then each risk is evaluated as either “Minor”, “Serious”, or “Very Serious”, respectively based on Figure 15.1-1.

15.2 Results of Risk Analysis

Results of risk analysis are shown in Table 15.1-1.

Table 15.1-1 Risk Analysis

Risk Factors	Likelihood	Impact / Loss	Risk Valuation	
1. Cost Escalation				
a. Construction Material	Likely	Serious Loss	Serious Risk	II
b. Construction Equipment	Likely	Serious Loss	Serious Risk	II
c. Labour	Likely	Minor Loss	Minor Risk	III
2. Political Instability				
a. Kenya	Rare	Very Serious Loss	Serious Risk	II
b. Uganda & Tanzania	Rare	Serious Loss	Minor Risk	III
c. Other Landlocked Countries	Likely	Minor Loss	Minor Risk	III
3. Negative Impacts on Natural Environment				
a. Water Pollution / Noise during Construction	Likely	Minor Loss	Minor Risk	III
b. Water Pollution / Noise after Opening	Likely	Minor Loss	Minor Risk	III
c. Extinction of Valuable Species	Rare	Serious Loss	Minor Risk	III
4. Negative Impacts on Social Environment				
a. Occurrence of Land Acquisitions	Likely	Serious Loss	Serious Risk	II
b. Occurrence of Labour Strikes	Likely	Serious Loss	Serious Risk	II
c. Spread of HIV/AIDS	Likely	Serious Loss	Serious Risk	II
5. Delay of Development -1 (Coast Region)				
a. New Container Terminal	Likely	Very Serious Loss	Very Serious Risk	I
b. Dongo Kundu	Very Likely	Serious Loss	Very Serious Risk	I
c. Lamu Port	Very Likely	Minor Loss	Serious Risk	II
6. Delay of Development -2 (Other Region)				
a. Northern Corridor	Likely	Very Serious Loss	Very Serious Risk	I
b. Lamu Corridor	Very Likely	Minor Loss	Serious Risk	II
c. Central Corridor	Likely	Minor Loss	Minor Risk	III
7. Internal Factors				
a. Negative Campaign (Natural Environment)	Likely	Serious Loss	Serious Risk	II
b. Negative Campaign (Project Itself)	Likely	Serious Loss	Serious Risk	II
c. Negative Campaign (Compensation Contents)	Likely	Serious Loss	Serious Risk	II
d. Construction Accidents (Delay of Completion & Extra Cost for Restoration)	Likely	Serious Loss	Serious Risk	II
e. Corruption	Likely	Serious Loss	Serious Risk	II

Risk Factors	Likelihood	Impact / Loss	Risk Valuation	
8. External Factors				
a. Overrun with Pirates	Likely	Serious Loss	Serious Risk	II
b. International Terrorism	Likely	Serious Loss	Serious Risk	II
c. Traffic Demand Change (Change of Socio-Economic Conditions of Kenya)	Likely	Serious Loss	Serious Risk	II
d. Shortage of Fund (Change of Socio-Economic Conditions of the World)	Likely	Serious Loss	Serious Risk	II
e. Natural Disaster (Delay of Completion & Extra Cost for Restoration)	Likely	Serious Loss	Serious Risk	II
f. Change of Natural Conditions due to Global Warming (Rise of Sea Level)	Rare	Serious Loss	Minor Risk	III

CHAPTER 16 COMPARISON OF BYPASS ROUTE ALTERNATIVES

16.1 Bypass Route Alternatives

There are 3 alternative Bypass route as shown in Figure 16.1-1. The alternative routes have been compared and the Bypass Route-B was selected in the F/S with its preliminary design. Based on this, the view of the study and design in the Survey were reported in the previous chapters. The justification of the selection of the Bypass Route-B is reviewed in the Survey.

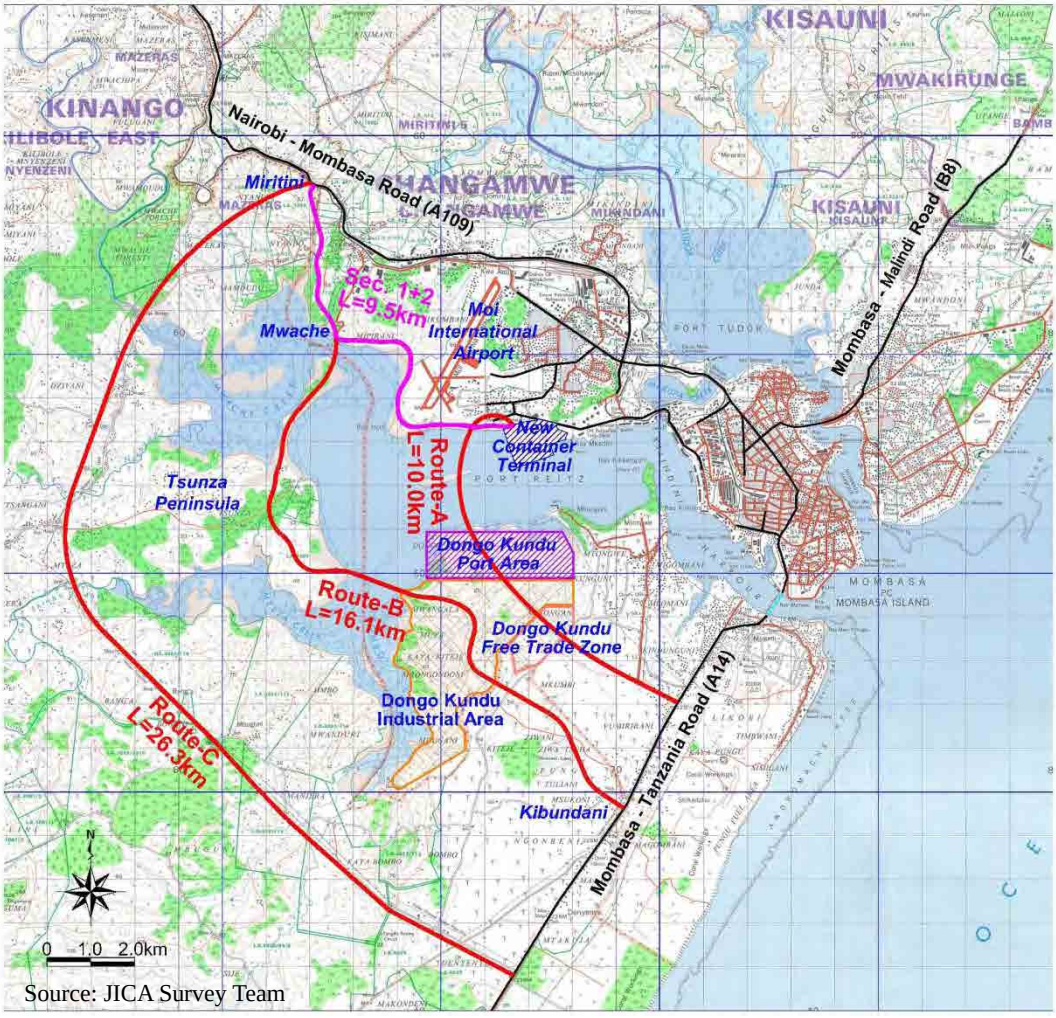


Figure 16.1-1 Bypass Route Alternatives

16.2 Bypass Route-A

The Bypass Route-A requires a high and long span bridge to cross the navigation area. This is most costly. According to the F/S report, KPA strongly objected to this route as it precludes port development to the west. Therefore, the Bypass Route-A is no longer considered.

16.3 Bypass Route-C

The Bypass Route-C is the longest route. However it does not require long bridges except one bridge which is approximately 500m in length at the upstream of Mwache Creek. The topography along the Bypass Route-C is generally hilly. Small hills and creeks cross the route one after another. Reserved forests, Kaya (holly forests) and Mwaluganje Elephant Sanctuary exist along the roadside.

	
Kaya Gandini (UNESCO World Heritage Site)	A View of the Bypass Route-C

Source: JICA Survey Team

Figure 16.3-1 Roadside of the Bypass Route-C

16.4 Comparison of the Bypass Route-B and C

A comparison between the Bypass Route-B and C is shown in Table 16.4-1. As a result, the selection of the Bypass Route-B is justified.

The reasons why the economic evaluation indicators of Route-C are less than that of Route-B are as follows:

- Route-C is longer than Route-B. As a result, vehicle operating cost of Route-C is greater than Route-B.
- Although construction cost of Route-C is smaller than that of Route-B, benefit of Route-C is less than that of Route-B.

Table 16.4-1 Comparison of the Bypass Route-B and Route-C

View Point	Bypass Route-B		Bypass Route-C	
Impact on Natural Environment	It is feasible if appropriate mitigation measures are implemented despite the Bypass Route-B passes through mangroves and tidal flats.	○	It is feasible if appropriate mitigation measures are implemented despite the Bypass Route-C passes near Kaya Forests and Mwaluganje Elephant Sanctuary.	○
Impact on Social Environment	Number of PAPs is not many since the Bypass Route-B avoids highly populated area.	○	Number of PAPs is many since the Bypass Route-C is long and passes near existing roads.	△
Construction Cost	Approx. ¥ 33 Billion	△	Approx. ¥ 24 Billion	◎
Constructability	Construction of 2 long bridges (900m and 1500m) over the sea is required.	△	Construction of one long bridge (500m) over river is required.	◎
Economic Evaluation	EIRR=20.2%, B/C=3.32, NPV=US$493B.	◎	EIRR=13.9%, B/C=1.38, NPV=US$91B.	△
Traffic Benefit	US$131M./year (2025)	◎	US$72M./year (2025)	△
Contribution to Southern Coast Area Development	Construction the Bypass Route-B will trigger the development of Dongo Kundu industrial area including Mombasa South Port and Free Trade Zone.	◎	Contribution to the development of Dongo Kundu area is not significant because the Bypass Route-C does not pass through the	△
Others	Contribution to mitigate traffic congestion at Likoni Ferry and Mombasa City roads is significant.	◎	It will contribute to develop the roadside areas of the Bypass Route-C.	○
Overall Evaluation	The Bypass Route-B is superior to the Bypass Route-C since the economic and traffic benefit and the contributions to the area development of the Bypass Route-B is more than the Bypass Route-C despite construction cost of the Bypass Route-B is higher than the Bypass Route-C.			

Note: ◎= Good, ○= Fair, △= Bad

CHAPTER 17 COUNTERMEASURE AGAINST INCREASE OF HIV/AIDS RISK

17.1 Current HIV/AIDS Condition

The estimated population of adult aged 15-64 years in 2007 was 20 million, according to the Government's projections in 2006. By a national HIV prevalence rate at 7.1%, it is estimated in Kenya that 1.4 million adults suffer from HIV/AIDS in 2007. Looking at the estimated prevalence rate by province, Nyanza makes up the highest 14.9%, Nairobi is the second 8.8%, and Coast is 8.1% (Female: 9.5%, Male: 6.3%)[1].

17.2 Countermeasures against Increase of HIV/AIDS Risk

17.2.1 Kenya National AIDS Strategic Plan

The Kenya National AIDS Strategic Plan 2009/10-2012/13 (KNASP III) was announced in 2009. The emphasis of the Plan was placed on providing people with coordinated and comprehensive high quality of prevention, treatment, and care services. In order to allow universal access to essential services, strategic decisions are required to prioritize countermeasures that realize gains at maximum efficiency and optimal progress achieving expected results. Under KNASP III, the following four reductions are expected to be achieved by 2013:

- The number of new infections by at least 50%
- AIDS-related mortality by 25%
- HIV-related morbidity
- Socio-economic impact of HIV/AIDS on household and community level

17.2.2 HIV/AIDS Workplace Policy of KeNHA[2]

KeNHA put an HIV/AIDS policy in place. As part of the initiatives to mitigate the spread of the pandemic, KeNHA has introduced:

- Condom dispensers in all washrooms
- Information, education and Communication materials utilized by the staff
- Plans to establish a resource center.

[1] Kenya AIDS Indicator Survey 2007, Final Report 2009
[2] HIGHWAY insight, KeNHA, April 2011

17.2.3 Recommended Countermeasures against Increase in HIV/AIDS Risk

During the implementation of the Project, many workers flow into the site where some of them may be affected with HIV/AIDS. In order to prevent them from being infected with HIV/AIDS, provision of safety devices as short-term measures and awareness-raising through education/seminar for the workers and residents as long-term measures are recommended to be undertaken in cooperation with National AIDS Control Council (NACC).

CHAPTER 18 CONSULTING SERVICES

18.1 Roles for Consultant

Consulting services are required to support the implementing agency in such stages as the detailed design, pre-construction and construction. It is herewith recommended that the consulting services in all phases of the project be carried out by a competent Consultant.

18.2 Major Tasks to be undertaken by the Consultant

(1) Detail Engineering Stage

Conduct field survey and investigation on

- Topographic survey
- Geotechnical survey
- Hydrological survey
- Material test and survey

Assist KeNHA with conducting construction preparatory work of

- Collecting data for undertaking land acquisition and resettlement
- Monitoring land acquisition and resettlement in accordance with the action plan
- Assisting the staff who participate in public consultation
- Assisting the relocation or protection of utilities
- Preparing traffic management plan

Prepare documents such as

- Detailed design for Project facilities
- Tender documents including for pre-qualification
- Cost estimates

(2) Selection of Contractors in Construction Stage

Assist KeNHA with selecting contractors in

- Pre-qualification of applicants
- Tender call and pre-tender conference
- Tender evaluation and clarification.
- Contracting

Construction supervision to

- Review documents submitted by contractors
- Inspect and approve drawings, working methods and schedule, quality control system, safety plan, traffic management plan and mitigation measures of environmental impact
- Inspect and approve work quality and quantity
- Monitor environmental management plan
- Issue payment certificates
- Review and report of alteration, variation and solution to disputes
- Initiate meetings and reports
- Inspect as-built drawings
- Inspect and report during defects liability period
- Training on operation and maintenance of roads

18.3 Proposed Consultant Assignment Schedule

List of consultant staff and their assignment schedule required to undertake above tasks are proposed as shown in Appendix 6.

18.4 Draft TOR of Consulting Services

The draft Terms of Reference (TOR) of the consulting services are shown in Appendix 7.

CHAPTER 19 ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

19.1 EIA procedure and EIA related Laws and Regulations

19.1.1 EIA Procedure

(1) Relevant EIA Act and Regulations in Kenya

Environmental Management and Coordination Act, 1999

Under Part VI Section 58 of EMCA 1999, any person, being a proponent of a project is required to apply for and obtain an EIA license from the National Environmental Management Authority (NEMA) before a proponent can commence, proceed with or conduct any undertaking specified in the Second Schedule of EMCA 1999.

The Environmental (Impact assessment and Audit) Regulations, 2003

The Environmental (Impact assessment and Audit) Regulations, 2003 (EIA/EA 2003) stipulates an application procedure of EIA license including a Project Report which requires prior to carrying out EIA study.

The EIA/EA 2003 stipulates the ways in which environmental experts should conduct the EIA study reports and content reporting in conformity to the requirement stated. The EIA/EA 2003 also stipulates the items and contents should be included in the Project Report.

Environment Impact Assessment Guidelines and Administrative Procedures, 2002 (draft)

Environment Impact Assessment Guidelines and Administrative Procedures, 2002 (draft) (EIA/EA Guidelines) describes procedural steps in EIA studies and Environmental Audits as well as the contents and format of the study reports to be submitted to NEMA. The EIA study review process and decision-making are also described.

(2) EIA Authority

Competent agency to evaluate, review the Project Report and the EIA Study Report and issue EIA license is National Environment Management Authority (NEMA). It was established under the EMCA 1999 as the principal agency of government in all matters of environmental management.

Furthermore NEMA functions include the coordination and regulation of various environmental management activities, initiation of legislative proposals and submission of such proposals to the Attorney General, research, investigations and surveys in the field of environment. They also undertake to enhance environmental education and awareness on the

need of sound environmental management. In addition, NEMA will advise the Government on regional and international agreements to which Kenya should be a party.

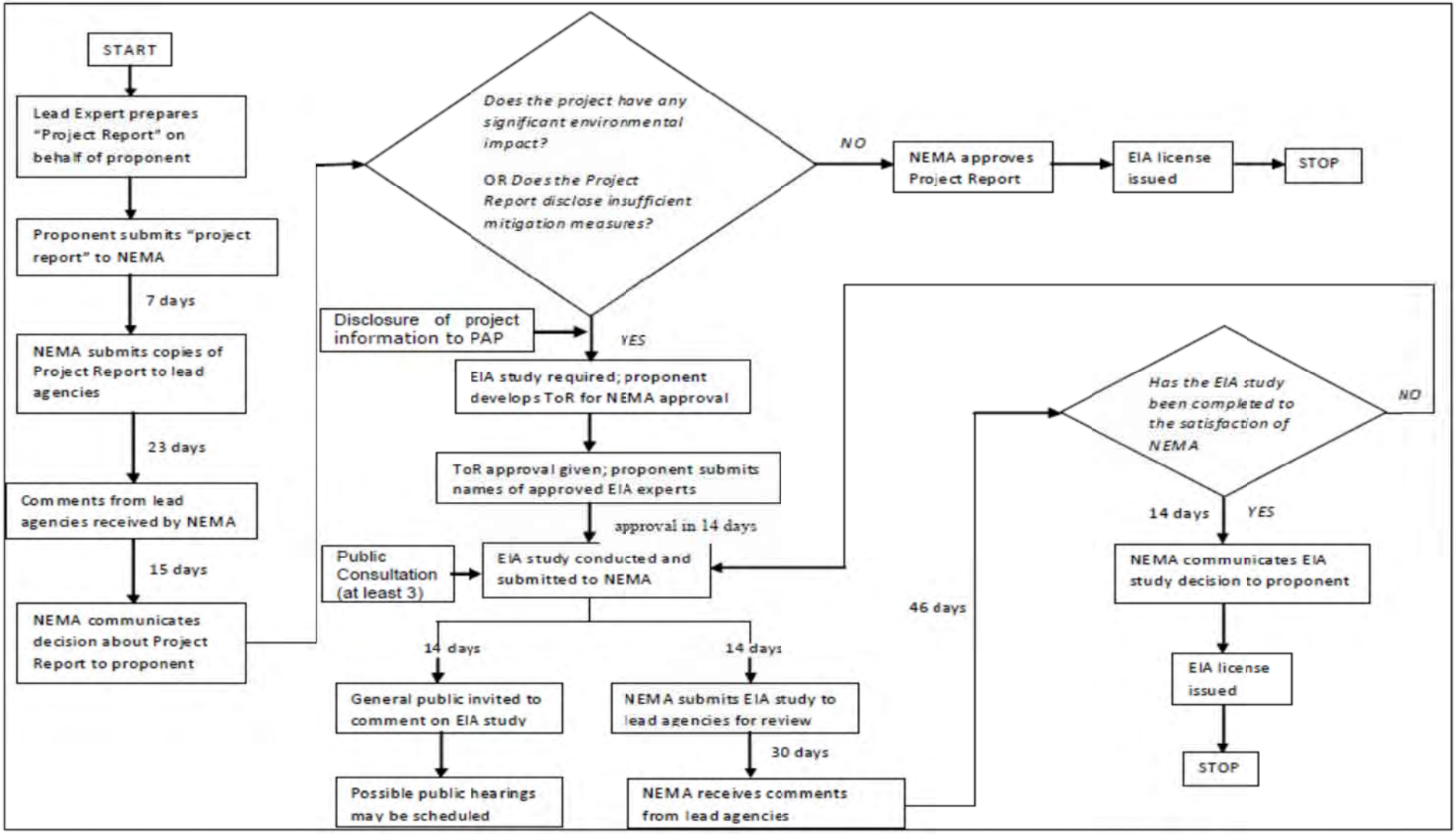
(3) Projects which Require the EIA Study

Thresholds and criteria which determine the necessity of EIA for the proposed projects have not been clearly defined in Kenyan EIA regulations. Projects listed in the Second Schedule of the EMCA 1999 are also required to submit the Project Report and reviewed by NEMA whether the EIA study is necessary or not. According to the screening process explained in the EIA/EA Guidelines, this necessity depends on the degree of significance of the project's environmental impacts. The significance itself depends on such factors as: the sensitivity of the area likely to be affected; public health and safety; the possibility of uncertain, unique or unknown risks; the possibility of having individually insignificant but cumulatively significant impacts; whether the proposed activity affects protected areas, endangered or threatened species and habitats; size, working methods, project activities including their duration and proposals for waste disposal etc.

(4) EIA License Procedure

The EIA license procedure is outlined below and depicted as a flow chart in Figure 19.1-1.

1) All of the environmental impact assessment activities in Kenya should be carried out by "Lead Expert" registered with NEMA.
2) An EIA expert entrusted by project proponents should elaborate a "Project Report" as a project proposal containing the outline of the project and identifying the potential environmental impacts and submit it to NEMA.
3) NEMA examines the "Project Report" and it is required to comment on the report within 45 days.
4) Based on NEMA's comments on the "Project Report", the proponent is to implement the project.
5) If EIA study was requested to carry out, "Terms of Reference" which contains basic requirement of the EIA guidelines should be prepared by the project proponent and submitted to NEMA for approval. There is no fixed period for comment by NEMA but might take for 45 - 60 days in general.
6) EIA report, which usually runs for 3 - 6 months depending on the covering area and intensity of study. the following should be covered by the registered lead experts of EIA.
7) Upon receipt of EIA report, NEMA assesses it within 60 days for further comments unless otherwise EIA license issued.



Source: Information provided by JICA

Figure 19.1-1 The EIA License Process in Kenya

(5) Scope of Items to be Examined and Contents to be Assessed in the EIA Study

The scope of items to be examined in the EIA study is listed in the Second Schedule of the EIA/EA 2003 as shown in Table 19.1-1. The contents to be addressed in the EIA study report stipulated in the EIA/EA 2003 are listed in Table 19.1.-2.

Table 19.1-1 Scope of Items to Be Examined in the EIA Study

Ecological Considerations	(a) Biological diversity	(i) effect of proposal on number, diversity, breeding habits, etc. of wild animals and vegetation (ii) gene pool of domesticated plants and animals e.g. monoculture as opposed to wild types
	(b) Sustainable use	(i) effect of proposal on soil fertility (ii) breeding populations of fish, game or wild animals (iii) natural regeneration of woodland and sustainable yield (iv) wetland resource degrading or wise use of wetlands
	(c) Ecosystem maintenance	(i) effect of proposal on food chains (ii) nutrient cycles (iii) aquifer recharge, water run-off rates etc (iv) a real extent of habitants (v) fragile ecosystems
Social Considerations	(a) economic impacts (b) social cohesion or disruption (c) effect on human health (d) immigration or emigration (e) communication - roads opened up, closed, rerouted (f) effects on culture and objects of culture value	
Landscape	(a) views opened up or closed (b) visual impacts (features, removal of vegetation, etc) (c) compatibility with surrounding area (d) amenity opened up or closed, e.g., recreation possibilities	
Land Uses	(a) effects of proposal on current land uses and land use potentials in the project area (b) possibility of multiple use (c) effects of proposal on surrounding land uses and land use potentials	
Water	(a) water sources (quantity and quality)	(i) rivers (ii) springs (iii) lakes (natural and man-made) (iv) underground water (v) oceans
	(b) drainage patterns / drainage systems;	

Source: the EIA/EA 2003, Second Schedule

Table 19.1-2 Contents to Be Addressed in the EIA Study Report

(a)	A proposed location of the project
(b)	A concise description of the national environmental legislative and regulatory framework, baseline information, and any other relevant information related to the project
(c)	The objectives of the project
(d)	The technology and processes to be used, in the implementation of the project
(e)	The materials to be used in the construction and implementation of the project
(f)	The products, by products and waste generated by the project
(g)	A description of the potentially affected environment
(h)	The environmental effects of the project including the social and cultural effects and the direct, indirect, cumulative irreversible, short-term and long-term effects anticipated
(i)	Alternative technologies and processes available and reasons for preferring the chosen technology and processes
(j)	Analysis of alternatives including project site, design and technologies and reasons for preferring the proposed site, design and technologies
(k)	An environmental management plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment; including the cost, time frame and responsibility to implement the measures
(l)	Provision of an action plan for the prevention and management of foreseeable accidents and hazardous activities in the cause of carrying out activities or major industrial and other development projects
(m)	The measures to prevent health hazards and to ensure security in the working environment for the employees and for the management of emergencies
(n)	An identification of gaps in knowledge and uncertainties which were encountered in compiling the information
(o)	An economic analysis of the project
(p)	An indication of whether the environment of any other state is likely to be affected and the available alternatives and mitigating measures
(q)	Other matters as the Authority may require

Source: the EIA/EA 2003, Section 18(1)

(6) Consultation and Public Participation (CPP)

According to the EIA/EA Guidelines, the EIA process is largely determined by effective CPP which basically provides a cornerstone for project planning and successful implementation. CPP helps to:

1) Facilitate involvement and participation of affected persons throughout the project cycle.
2) Ensures a sense of responsibility and commitment towards implementing the proposed EMP.
3) Table 19.1-3 summarizes CPP stipulated in the EMCA 1999 and the EIA/EA 2003

Table 19.1-3 Consultation and Public Participation Stipulated in the EMCA 1999 and the EIA/EA 2003

	Phase	Target Group	Consultation	Media/ Method	Responsibility	Regulations
Information disclosure on the project	During the process of conducting EIA study (after the approval of the project report by the Authority)	Project affected parties and communities	the project and its anticipated effects and benefits	(i) posting posters in strategic public places in the vicinity of the site of the proposed project informing the affected parties and communities of the proposed project; (ii) publishing a notice on the proposed project for two successive weeks in a newspaper that has a nation-wide circulation; and (iii) making an announcement of the notice in both official and local languages in a radio with a nation-wide coverage for at least once a week for two consecutive weeks;	Proponent	EIA/EA 2003, Article 17 (2) (a)
Public meeting	During the process of conducting EIA study (at least three public meetings)	Project affected parties and communities	the project and its anticipated effects and benefits	(i) appropriate notices are sent out at least one week prior to the meetings and that the venue and times of the meetings are convenient for the affected communities and the other concerned parties (ii) posting posters in strategic public places in the vicinity of the site of the proposed project informing the affected parties and communities of the proposed project; (iii) publishing a notice on the proposed project for two successive weeks in a newspaper that has a nation-wide circulation; and (iv) making an announcement of the notice in both official and local languages in a radio with a nation-wide coverage for at least once a week for two consecutive weeks;	Proponent	EIA/EA 2003, Article 17 (2) (a)(b)(c)

Public comments	Within fourteen days of receiving the EIA study report	Public	(a) the nature of the project; (b) the location of the project; (c) the anticipated impacts of the project and the proposed mitigation measures to respond to the impacts; (d) the times and place where the full report can be inspected; and (e) the period within which the Authority shall receive comments	(a) publish for two successive weeks in the Gazette and in a newspaper with a nation-wide circulation and in particular with a wide circulation in the area of the proposed project, a public notice once a week inviting the public to submit oral or written comments on the environmental impact assessment study report; and (b) make an announcement of the notice in both official and local languages at least once a week for two consecutive weeks in a radio with a nation-wide coverage .	NEMA (at the expense of the proponent)	EMCA 1999, 59 (1) EIA/EA 2003, Article 21(2)
Public hearing (NEMA may hold)	Upon receipt of both oral and written comments as specified Public Hearing	Project affected parties and communities	A proponent shall be given an opportunity to make a presentation and to respond to presentations made at the public hearing	The date and venue of the public hearing shall be publicized at least one week prior to the meeting - (a) by notice in at least one daily newspaper of national circulation and one newspaper of local circulation; (b) by at least two announcements in the local language of the community and the national language through radio with a nationwide coverage. The public hearing shall be conducted at a venue convenient and accessible to people who are likely to be affected by the project.	NEMA	EIA/EA 2003, Article 22

Source: Information provided by JICA

(7) Information Disclosure

Regarding the public access to information, the EIA/EA 2003 stipulates that information or documents submitted to NEMA in connection with EIA as well as NEMA's decision and the reasons shall be made available to the public on such terms and conditions as NEMA may prescribe.

However NEMA may exclude the information which is requested to be not opened by a person submitting information on the basis of commercial confidentiality or national security.

(8) Monitoring and Environmental Audit

Environmental audits are used a tool for compliance monitoring and evaluation to determine how on-going projects conform to environmental protection and conservation measures. The EIA/EA 2003 requires that on-going projects with a potential to impact negatively on the environment to undertake an initial environmental audit and thereafter annual self-audits for the lifetime of the project.

An environmental audit shall be conducted by a qualified and authorized environmental auditor or environmental inspector who shall be an expert or a firm of experts registered as an EIA expert (the EIA/EA 2003 Article 31(2)).

A proponent of a project that has undergone an EIA study shall within a period of twelve months of the commencement of the operations, and not more than twenty four months after the completion of a project whichever is earlier, undertake an environmental audit of the project (the EIA/EA 2003 Article 31 (4)(b)).

In carrying out an environmental audit study, environmental auditor shall comply with any existing national environmental regulations and standards prescribed by NEMA, and in the absence of such national environmental regulations and standards shall use such other international standards as shall be prescribed by NEMA (the EIA/EA 2003 Article 32).

The proponent shall take all practical measures to ensure the implementation of the environmental management plan by carrying out a self-auditing study on a regular basis; preparing an environmental audit report after each audit and submitting the report to NEMA annually or as may be prescribed by NEMA; and ensuring that the criteria used for the audit is based on the environmental management plan (EMP) developed during the EIA process or after the initial audit (the EIA/EA 2003 Article 34).

A control audit shall be carried out by NEMA, whenever the Authority deems it necessary to check compliance with the environmental parameters set for the project or to verify self-auditing reports (the EIA/EA 2003 Article 33).

According to the EIA/EA 2003 Article 36(2), the contents which shall be contained in the environmental audit report are listed in Table 19.1-4.

Table 19.1-4 Contents Required in the Environmental Audit Report

(a)	A presentation of the type of activity being audited
(b)	An indication of the various materials, including non-manufactured materials, the final products, and by products, and waste generated
(c)	A description of the different technical activities, processes and operations of the project
(d)	A description of the national environmental legislative and regulatory frameworks on ecological and socio-economic matters
(e)	A description of the potentially affected environment on ecological and socio- economic matters
(f)	A prioritization of all past and on-going concerns of the project
(g)	An identification of all environmental and occupational health and safety concerns of the project
(h)	An opinion on the efficacy and adequacy of the environmental management plan of the project
(i)	Detailed recommendations for corrective activities, their cost, timetable and mechanism for implementation
(j)	An indication of the measures taken under the environmental management plan to ensure implementation is of acceptable environmental standards
(k)	A non-technical summary outlining the key findings, conclusions and recommendations of the auditor

Source: the EIA/EA 2003, Section 36 (2)

(9) Comparison of Kenyan EIA regulations and JBIC Guidelines/World Bank Safeguard Policies

Comparison of Kenyan EIA regulations and "JBIC Guidelines for Confirmation of Environmental and Social Considerations (2002 April)" (hereafter referred to as the JBIC Guidelines) are summarized in Table 19.1-5. The principle of JBIC Guidelines is fundamentally harmonized with World Bank Safeguard Policies.

Table 19.1-5 Comparison of Kenyan EIA Regulations and JBIC Guidelines/World Bank Safeguard Policies

JBIC Guidelines/ Comprehensive World Bank Safeguard Policies	Relevant Kenyan laws and regulations	Comparison/Gaps
Confirm that project proponents are undertaking appropriate environmental and social considerations, through various measures, so as to prevent or minimize the impact on the environment and local communities which may be caused by the projects, and not to bring about unacceptable effects.	No proponent shall implement a project - (a) likely to have a negative environmental impact; or (b) for which an environmental impact assessment is required under the Act or these Regulations; unless an environmental impact assessment has been concluded and approved in accordance with these Regulations (EIA/EA 2003, 4(1)). The State shall - (a) ensure sustainable exploitation, utilisation, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits; (g) eliminate processes and activities that are likely to endanger the environment. (The Constitution of Kenya, 2010, 69(1) (a)(g))	Because the project which is likely to have a significant negative impact is required to conduct the EIA study and approved, there is no gap between Kenyan laws and JBIC Guidelines.
Projects must comply with laws, ordinances and standards relating to environmental and social considerations established by the governments. They are also to conform to environmental and social consideration policies and plans of the governments that have jurisdiction over the project site.	An environmental impact assessment study shall be conducted in accordance with the general environmental impact assessment guidelines and administrative procedures issued by the Authority. An environmental impact assessment study shall include Environmental Guidelines and Standards (National Legislation, International guidelines. International Conventions and Treaties). (EIA/EA 2003, Third Schedule)	There is no gap between Kenyan laws and JBIC Guidelines in terms of compliance of Laws and Standards. However, Kenyan laws do not clearly stipulate the considerations on involuntary resettlement and indigenous peoples.

JBIC Guidelines/ Comprehensive World Bank Safeguard Policies	Relevant Kenyan laws and regulations	Comparison/Gaps
Environmental impact to be investigated and examined includes factors that impact human health and safety as well as the natural environment, such as: air, water, soil, waste, accidents, water usage, ecosystems, and biota. Social concerns include: involuntary resettlement of the population, the indigenous people, cultural heritage, landscape, gender, children's rights and communicable diseases such as HIV/AIDS and impact that may lead to trans-boundary and global environmental problems	The following issues may, among others, be considered in the making of environmental impact assessments. 1. Ecological considerations 2. Social considerations 3. Landscape 4. Land uses 5. Water (EIA/EA 2003, Second Schedule)	There is no gap between Kenyan laws and JBIC Guidelines in terms of environmental considerations.
During the screening process, each project is classified in terms of its potential environmental impact. The subsequent environmental review will then be conducted in accordance with the procedures for that category. Category A: Borrowers and related parties must submit Environmental Impact Assessment (EIA) reports. For projects that will result in large-scale involuntary resettlement, basic resettlement plans must be submitted. Category B: Where an EIA procedure has been conducted, the EIA report may be referred to.	Any person, being a proponent of a project, shall submit a project report to the Authority. (EMCA 1999, 58 (1)) Where the Authority is satisfied that the project will have no significant impact on the environment or that the project report discloses sufficient mitigation measures, the Authority may issue a licence. If the Authority finds that the project will have a significant impact on the environment, and the project report discloses no sufficient mitigation measures, the Authority shall require that the proponent undertake an environmental impact assessment study. (EIA/EA 2003, 10 (2)(3))	A project which is likely to have a significant negative impact is required to conduct the EIA study and approved by NEMA. However project categorization is not stipulated in Kenya EIA regulations. The criteria which determine the necessity of the EIA study based on the Project Report have not been clearly defined. In addition, Kenyan laws do not stipulate the requirement of Resettlement Action Plan and Indigenous People Plan.
For projects with a potentially large environmental impact, sufficient consultations with stakeholders, such as local	During the process of conducting an environmental impact assessment study, the proponent shall seek the views of	There is no gap between Kenyan laws and JBIC Guidelines in terms of

JBIC Guidelines/ Comprehensive World Bank Safeguard Policies	Relevant Kenyan laws and regulations	Comparison/Gaps
residents, must be conducted via disclosure of information from an early stage where alternative proposals for the project plans may be examined. The outcome of such consultations must be incorporated into the contents of the project plan. Consultations with relevant stakeholders, such as local residents, should take place if necessary throughout the preparation and implementation stages of a project. Having consultations is highly desirable, especially when the items to be considered in the EIA are being selected, and when the draft report is being prepared.	persons who may be affected by the project. In seeking the views of the public, after the approval of the project report by the Authority, the proponent shall publicize the project and its anticipated effects and benefits. The proponent shall hold at least three public meetings with the affected parties and communities to explain the project and its effects, and to receive their oral or written comments. (EIA/EA 2003, 17 (1)(2)) CPP should be undertaken mainly during project planning, in implementation and decommissioning phases. (EIA/EA Guidelines 2002)	Consultation and Public Participation.
EIA reports are required to be made available in the country and to the local residents where the project is to be implemented. The EIA reports are required to be available at all times for perusal by project stakeholders such as local residents and that copying be permitted.	The Authority shall, at the expense of the proponent, publish a public notice inviting the public to submit oral or written comments on the environmental impact assessment study report. The invitation for public comments under this regulation shall state: (a) the nature of the project; (b) the location of the project; (c) the anticipated impacts of the project and the proposed mitigation measures to respond to the impacts; (d) the times and place where the full report can be inspected; and	The EIA study report is disclosed by NEMA according Kenyan EIA regulations. On the other hand, information disclosure by the proponent is not stipulated in the regulations. However the proponent shall hold at least three public meetings with the affected parties and communities to explain the project and its effects and benefits.

JBIC Guidelines/ Comprehensive World Bank Safeguard Policies	Relevant Kenyan laws and regulations	Comparison/Gaps
	(e) the period within which the Authority shall receive comments. (EIA/EA 2003, 21 (2)(3))	
Confirms that the results of monitoring the items which have a significant environmental impact by the project proponents. This is in order to confirm the project proponents' undertaking of environmental and social considerations for category A and B projects. The information necessary for monitoring needs to be supplied by the borrowers and related parties by appropriate means. When necessary, JBIC may also conduct its own investigations. The results of its environmental reviews of project in Categories A, B and FI are provided for public perusal on the website.	In executing a project, after the environmental impact assessment study report has been approved by the Authority, or after the initial audit of an ongoing project, the proponent shall take all practical measures to ensure the implementation of the environmental management plan by: (a) carrying out a self-auditing study on a regular basis; (b) preparing an environmental audit report after each audit and submitting the report to the Authority annually or as may be prescribed by the Authority; and (c) ensuring that the criteria used for the audit is based on the environmental management plan developed during the environmental impact assessment process or after the initial audit. (EIA/EA 2003, 34)	There is no gap between Kenyan laws and JBIC Guidelines in terms of monitoring implementation. However the monitoring for the project which was screened out and prepared only Project Report is not stipulated in the EIA regulations.

Source: The Survey Team based on the information provided by JICA

19.1.2 Environmental Legislation

(1) Environmental Laws and Regulations on Environmental Considerations

Environmental Management and Coordination Act, 1999 (EMCA 1999) is the Kenyan basic environmental law. The Act is administered by the National Environmental Council and implemented by the National Environmental Management Authority (NEMA).

Part II of the EMCA 1999 states that every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment. In order to partly ensure this is achieved, Part VI of the EMCA 1999 directs that any new programme, activity or operation should undergo environmental impact assessment and a report prepared for submission to NEMA, who in turn may issue a license as appropriate.

Part VIII of the EMCA 1999 deals with environmental quality standards. It establishes a Standards and Enforcement Review Committee (SERC) whose functions include the establishment of standards for all environmental media. SERC has committees that have drawn up or are finalizing standards for water quality, waste, chemicals, land use, biodiversity and economic instruments.

Relevant environmental acts and regulations are listed in Table 19.1-6. Since the Constitution of Kenya (Amendment) was promulgated on 27 August 2010, several acts and regulations are now amending. Table 19.1-6 includes amendment information as of May 2011.

Table 19.1-6 Relevant Environmental Acts and Regulations

Acts and regulations	Outline	Administrative authority
1. Basic environmental law		
The Environmental Management and Co-ordination Act, 1999 * being amended	Pollution abatement and control, Environmental conservation	MEMR, NEC, NEMA
1-1. Environmental Impact Assessment/ Strategic Environmental Assessment		
The Environmental (Impact Assessment and Audit) Regulations, 2003 * being amended as “The Environmental (Impact, Audit and Strategic Assessment) Regulations”	process and Procedures for the EIA and Environmental Audit and requirement of EIA licensing	NEMA
1-2. Pollution abatement and control		
(Draft) The Environmental Management and Coordination (Air Quality) Regulations, 2008 * waiting for a notice through the gazette	Air pollution abatement and control	NEMA
The Environmental Management and Coordination, (Water Quality) Regulations 2006	Environmental water quality criteria for water usage and wastewater discharge limits	NEMA
The Environmental Management and Coordination, (Waste Management)	Waste management and control	NEMA

Regulations 2006		
The Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009	Noise and vibration control	NEMA
The Environmental Management and Co-Ordination (Controlled Substances) Regulations, 2007	Protection of the Ozone layer	NEMA
The Environmental Management and Co-Ordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, 2006	Conservation of biological diversity and resources Access to genetic resources and benefit sharing	NEMA
The Environmental Management and Co-Ordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, 2009	Wetlands, River banks, Lake shores and Sea shore management	NEMA
The Environmental (Prevention of Pollution in Coastal and Other Segments of the Environment) Regulation, 2003	Prevention of pollution from discharge of vessels in port and coast	NEMA
2. Natural environment, cultural heritage		
The Wildlife (Conservation and Management) Act (Cap 376) (1985) Revised Edition 2009	Wildlife conservation and management	Ministry of Forestry and Wildlife, KWS
The Forests Act, 2005	Forest conservation and management	Ministry of Forestry and Wildlife, KFS
The Water Act, 2002	Water resources conservation and management	Ministry of Water and Irrigation, WRMA
The Water Resources Management Rules, 2007	Management of water resources including groundwater and water pollution abatement	WRMA
The National Museums and Heritage Act (Cap 216) (2006) Revised Edition 2009	Foundation of National Museums and conservation of cultural heritage	Ministry of State for National Heritage and Culture, NMK
3. Relevant laws applicable for project implementation (construction)		
The Occupational Safety and Health Act, 2007	Management of occupational health and safety	Ministry of Labour
The Public Health Act (Cap. 242)	Maintain safe and healthy environment against land development	Ministry of Public Health and Sanitation
The Physical Planning Act (Cap. 286) Revised Edition 2010 (1996)	Development permits from local authorities	Ministry of State for Planning, National Development and Vision 2030
The Energy Act, 2006	Permits for construction of facilities of energy development projects	Ministry of Energy
The Wayleaves Act (Cap. 292) Revised Edition 2010 (1989)	Procedures for installing utilities on private property	Government of Kenya

Source: Information provided by JICA

(2) Environmental Standards

Environmental standards which are necessary to refer to for the road development project are tabulated below.

Air Pollution Abatement and Control

(Draft) The Environmental Management and Coordination (Air Quality) Regulations, 2008

Table 19.1-7 Comparison of Ambient Air Quality Standards

Pollutant	Time Weighted Average	Kenya (Residential Area) *1	Kenya (Controlled Areas) *1	WHO (2005)*2	USEPA*3
SPM	24 hours	200 μg/m^3	100 μg/m^3	-	-
	1 year	140 μg/m^3	70 μg/m^3	-	-
RPM (<10μm)	24 hours	100 μg/m^3	75 μg/m^3	50 μg/m^3 (PM10)	150 μg/m^3 (PM10)
	1 year	50 μg/m^3	50 μg/m^3	20 μg/m^3 (PM10)	-
PM 2.5	24 hours	-	-	25 μg/m^3	15 μg/m^3
	1 year	-	-	10 μg/m^3	35 μg/m^3
SOx (SO_2)	10 mins	0.191 ppm	-	500 μg/m^3	-
	1 hour	-	-	-	75 ppb
	24 hours	80 μg/m^3	30 μg/m^3	20 μg/m^3	365 (0.14 ppm)
	1 year	60 μg/m^3	15 μg/m^3	-	78 (0.03 ppm)
NOx	24 hours	80 μg/m^3	30 μg/m^3	-	-
	1 year	60 μg/m^3	15 μg/m^3	-	-
NO_2	1 hour	0.2 ppm	-	200 μg/m^3	-
	24 hours	0.1 ppm	-	-	-
	1 month	0.08 ppm	-	-	-
	1 year	0.05 ppm	-	40 μg/m^3	0.053 ppm
Ozone	1 hours	0.12 ppm	-	-	0.12 ppm
	8 hours	1.25 ppm	-	100 μg/m^3	0.075 ppm (2008)
CO/CO_2	1 hour	4.0 mg/m^3	2.0 mg/m^3	-	40 mg/m^3 (CO)
	8 hours	2.0 mg/m^3	1.0 mg/m^3	-	CO: 10 mg/m^3
Pb	24 hours	1.00 μg/m^3	0.75 μg/m^3	-	-
	3 months	-	-	-	0.15 μg/m^3
	1 year	0.75 μg/m^3	0.50 μg/m^3	-	-

Source: Information provided by JICA

Note: 1) (Draft) The Environmental Management and Coordination (Air Quality) Regulations, 2008

2) WHO Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide, Global Update 2005

3) National Ambient Air Quality Standards (NAAQS), USEPA, 19 April 2011 updated

Water Pollution Abatement and Control

The Environmental Management and Coordination, (Water Quality) Regulations 2006

Table 19.1-8 Comparison of Standards for the Effluent Water Quality to Public Water Body

Items	Unit	Kenya[*1]	EHS Guidelines[*2]
pH	-	6.5-8.5	6-9
BOD	mg/L	30	30
COD	mg/L	50	125
Total Nitrogen	mg/L	2 (Guideline)	10
Total Phosphorous	mg/L	2 (Guideline)	2
Oil and Grease	mg/L	Nil.	10
Total Suspended Solids	mg/L	30	50
Total Coliform Bacteria	MPN/100mL	30	400

Source; Information provided by JICA

Note: 1) The Environmental Management and Coordination, (Water Quality) Regulations 2006

2) General EHS Guidelines, Wastewater and Ambient Water Quality, International Finance Corporation: IFC 2007

Noise and Vibration Control

The Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009

Table 19.1-9 Maximum Permissible Noise Level

Zone		Sound Level Limits dB(A)	
		Day (Leq,14 h)	Night (Leq,10 h)
A	Silent Zone	40	35
B	Places of worship	40	35
C	Residential: Indoor : Outdoor	45 50	35 35
D	Mixed residential (with some commercial and places of entertainment)	55	35
E	Commercial	60	35

Time Frame: Day: 6.01 a.m. – 8.00 p.m. (Leq, 14 h); Night: 8.01 p.m. – 6.00 a.m. (Leq, 10 h)

Source: The Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009, First Schedule

Table 19.1-10 Maximum Permissible Noise Levels for Constructions Sites

(Measurement taken within the facility)

Facility		Maximum Noise Level Permitted (Leq) in dB(A)	
		Day	Night
(i)	Health facilities, educational institutions, homes for disabled etc.	60	35
(ii)	Residential	60	35
(iii)	Areas other than those prescribed in (i) and (ii)	75	65

Time Frame: Day: 6.01 a.m. – 6.00 p.m. (Leq, 12 h); Night: 6.01 p.m. – 6.00 a.m. (Leq, 12 h)

Source: The Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009, Second Schedule

19.1.3 Laws and Regulations on Social Consideration

The Constitution of Kenya, 2010 stipulates "Guarantee of the rights to marginalized group" in Chapter 4 and "Land tenure by communities" in Chapter 6 as a principal of relevant acts and regulations in terms of social considerations. Relevant social acts and regulations are listed in Table 19.1-11.

Table 19.1-11 Relevant Social Acts and Regulations

Acts and regulations	Outline	Administrative Authority
1. Constitution		
The Constitution of Kenya, 2010	Chapter 4 provides "Guarantee of the rights to marginalized group" and Chapter 6 provides "Land tenure by communities".	All Ministries and Agencies
2. Land		
Land Acquisition Act (Cap. 295) Revised Edition	Acquisition procedure of public interest lands	Ministry of Lands
Government Lands Act (Cap. 280) Revised Edition 2010 (1984)	Acquisition procedure of governmental lands	Ministry of Lands, Commissioner of Land
Trust Land Act (Cap. 288) Revised Edition 2010 (1970)	Procedure of Trust Land owned by government	Ministry of Lands, Council, Division Land Board
Registration of Titles Act (Cap. 281) Revised Edition 2010 (1982)	Procedure of land registration and ownership transfer	Ministry of Lands, Commissioner of Land
Registered Land Act (Cap. 300)	Record of registered land	Ministry of Lands

Revised Edition 2010 (1989)		
Land (Group Representatives) Act (Cap 287) Revised Edition 2010 (1970)	Procedure to regard representative of group as land owner	Ministry of Lands, Council
Land Adjudication Act (Cap. 284) Revised Edition 2010 (1977)	Adjudication procedure to determine owner of trust land	Council
Land Consolidation Act (Cap.283) Revised Edition 2009 (1977)	Ownership confirmation procedure regarding consolidation of land in special area such as trust land out of control of Land Adjudication Act.	Council
Land Titles Act (Cap. 282) Revised Edition 2010 (1982)	Establishment of Land Registration Court and its authority	Ministry of Lands, Recorder of Titles
Land Disputes Tribunals Act (Cap. 303A) Revised Edition 2010 (1990)	Establishment of Land Disputes Tribunals and its authority	Ministry of Lands
Landlord and Tenant (Shops, Hotels and Catering Establishments) Act (Cap. 301) Revised Edition 2010 (1984)	Right of Tenants	Ministry of Lands
Land Control Act (Cap. 302) Revised Edition 2010 (1989)	Procedure of agricultural land transactions	Ministry of Lands
Valuers Act (Cap. 532) Revised Edition 2010 (1985)	Registration procedure of valuer and its requirements	Ministry of Lands
3. Protection of Human Rights		
The Kenya National Commission on Human Rights Act, 2002	Protection and improvement of human rights and	Kenya National Commission on Human Rights
4. Protection of Labors		
The Employment Act, 2007	Protection of Labor's right, prohibition of child labor	Ministry of Labor
The Labor Relations Act, 2007	Right to organization of labor union	Ministry of Labor
The Work Injury Benefits Act, 2007	Compensation for work injuries and disease	Ministry of Labor

Source: Information provided by JICA

19.2 Review of the Revised EIA Report

19.2.1 Review Results

KeNHA submitted “The Environmental and Social Impact Assessment for Mombasa Bypass Road Study (2010)” (hereafter referred to as the EIA report) with the project report to NEMA in October 2010. After the NMEA’s screening, the same contents of the EIA report had been submitted to NEMA as for the full EIA report in March 2011. NEMA noticed to the public to submit comments on the EIA report for thirty days at the end of May 2011. After obtaining the comments from the public and relevant agencies, NEMA has been reviewing the EIA report according the EIA procedure explained in Section 19.1.1.

The JICA Survey Team received a copy of the EIA report in June. The JICA survey Team has closely examined the EIA report with respect to the following items in accordance with the JBIC Guidelines. However, the review by the JICA Survey Team excluded the assessment study for the roads on the north main land and Mombasa Island that are proposed for widening and improvement.

The review results and items to be improved of the EIA report are summarized Table 19.2-1.

Table 19.2-1 Review Results and Items to be Improved of the EIA Report

	Check Items	Review	Items to be Improved
1	Understanding of baseline conditions of environmental and social considerations	• Social environment (land use, socio-economic conditions, social infrastructures) were compiled in the EIA report. • Natural environment (topography, climate, marine waters) and biological environment (mangroves and marine fauna) was investigated. However, the protected and endangered species were not mentioned. Terrestrial fauna including avian species should be reported. • The present marine water quality and sediment quality of the creeks were examined based on the measurements.	➢ Air quality and noise level were not investigated. Because of the potential impacts associated with the road development project, the present status should be examined. ➢ Terrestrial fauna including avian species were not investigated based on the field surveyed. There exist water birds in mangrove and tidal flat area in the creeks. Although there are no protected areas in and around the project area of the proposed road alignments, any existence of protected species should be confirmed by the field survey. ➢ Hazardous chemicals and heavy metals in sediment of the creeks were not investigated. To evaluate the pollution level of sediment, the present concentrations should be investigated.
2	Confirmation of legal and institutional framework and authorities with a statutory responsibility for environmental and social considerations	• The EIA report has been submitted to NEMA in accordance with the EIA regulations in Kenya, following the procedures summarized in Section 19.1 • The legislations and regulations applicable to the proposed project were addressed in the EIA report. • Legal and institutional framework and authorities responsible for environmental and social considerations were described in the EIA report.	-

	Check Items	Review	Items to be Improved
3	Scoping	• Potential impacts due to the activities of the road development during the construction and operation phase were addressed in terms of the physical and physicochemical environment, biological environment and social environment in the EIA report. • The analysis was made to categorize the potential impacts as positive and negative, significance, duration (short, medium and long term) and affected area. Although indirect and cumulative impacts are not clearly identified, those impacts were also analyzed in the EIA report.	- ➢ The result of scoping should be summarized in a matrix form so as to clearly understand the potential positive and negative impacts of the proposed project.
4	Prediction and assessment of the impacts on the environmental and social conditions	• The following impacts were predicted and evaluated due to the activities at the phased of construction and operation based on the baseline conditions of natural and social environment. <u>Social Environment</u> • The impacts evaluated for social environment in the EIA report were land acquisition and resettlement, communities as socio-economic entities, mode of transport, fishing, traditionally valued vegetation, traditional identity, social amenities and utilities, community health and safety, religion, communication, gas pipelines and disease prevention. • These impacts were evaluated based on the literature review and filed survey, stakeholder consultation and meetings, focus group discussions, public meetings and questionnaire surveys.	-

	Check Items	Review	Items to be Improved
		Natural Environment • The impacts evaluated for natural environment in the EIA report were soils/land degradation, water resources (groundwater/ surface water), flora and fauna, marine ecology, marine water and sediment quality, aesthetics and landscape. • The potential impacts on marine flora (mangroves) and fauna (fish and macro benthos) were evaluated based on the results of filed surveys. In addition, terrestrial flora, vegetation and crops were also surveyed to examine the impacts. Pollution related to Human Health • The impacts evaluated for pollution related to human health were air quality, noise environment, water quality and availability, road and traffic safety.	➢ The potential impacts on terrestrial fauna including avian species should be evaluated based on the results of the field surveyed. ➢ Although there are no protected areas in and around the project area of the proposed road alignments, the potential impacts on the protected species should be assessed based on the results of the field survey, if necessary. ➢ The impacts on ambient air quality and noise level were only qualitatively examined in the EIA report. Because of the potential impacts associated with the road development project, these pollution levels should be estimated from the predicted emissions of future traffic based on the present baselines. The predicted levels should be evaluated with the environmental standards as described in Section 19.1.2 should be evaluated based on the results of the field survey. ➢ The pollution level of hazardous chemicals and heavy metals in sediment of the creeks, where piers and abatement of the bridges will be installed, should be evaluated based on the results of the field survey.
5	Analysis of alternatives and assessment of environmental and social impacts	• Three alternatives road routes, suspension bridge railway link and no action alternative were analyzed in the EIA report. • Route-B was concluded the preferred option since it would; ✓ Provide a north-south coastal route avoiding Mombasa island; ✓ Significantly reduce journey times by avoiding the Likoni Ferry; ✓ Provide access to and from the proposed new port facility at Dongo Kundu and possible passenger terminal at Tsunza;	➢ These alternatives should also be compared from the viewpoint of environmental and social impacts. ➢ Furthermore, at least, three alternatives, i.e., Routes-A, B and C should be compared from the various view points as discussed in Table 16.1-1.

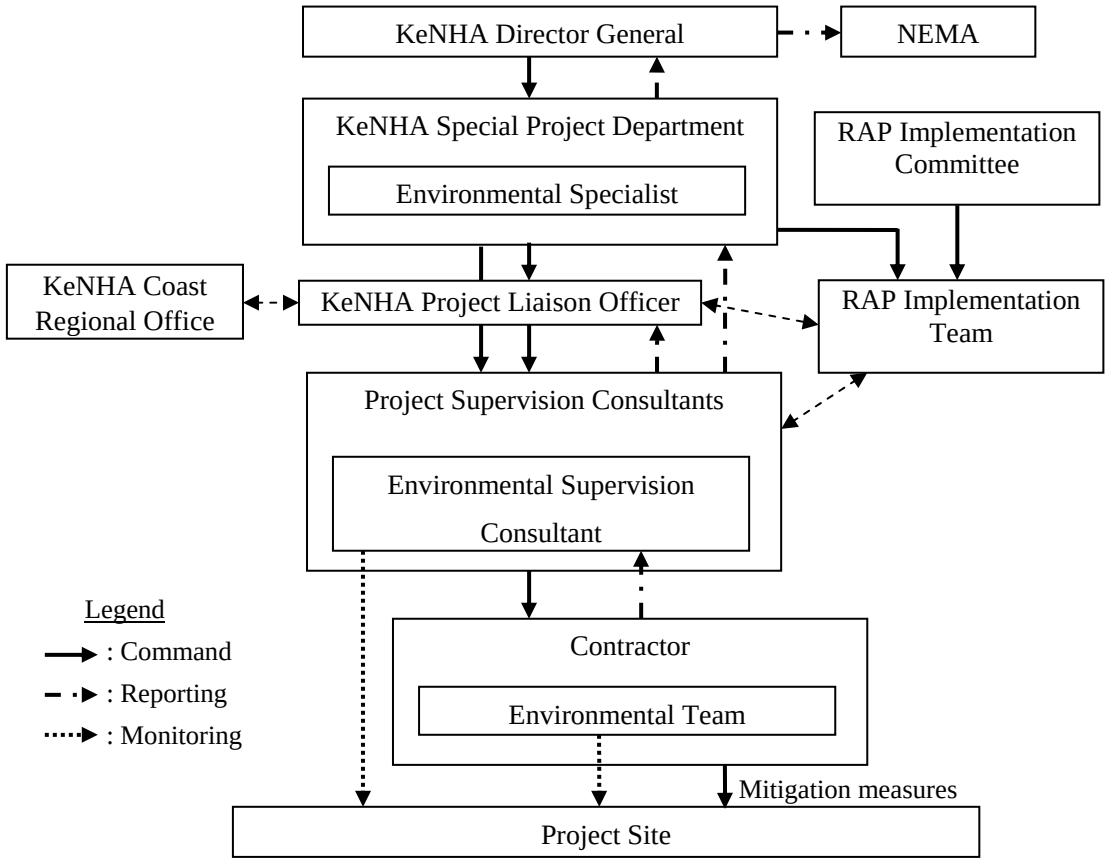
	Check Items	Review	Items to be Improved
		✓ Form part of the access to and from the proposed new container terminal; and ✓ Lead to economic and real estate development of the south coast.	
6	Mitigation measures	• Mitigation measures were proposed for each potential adverse impact during the construction and operation phases. • According to JBIC Guidelines, in examination of mitigation measures, priority is to be given to the prevention of environmental impact, and when this is not possible, minimization and reduction of impact must be considered next. Compensation measures must be examined only when impact cannot be prevented by any of the aforementioned measures.	➢ In addition to the proposed mitigation measures; the JICA Survey Team recommends that; ✓ The road alignment should be proposed to minimize the number of PAPs and avoid destroying cultivated areas and locally significant cultural heritage such as “Kaya”. ✓ The oil separator should be installed to avoid the spillage of oil/petrol and hazardous substances which may lead to damage of mangroves, marine fauna and degradation of water quality. ✓ On the basis of the predicted ambient air quality, mitigation measures such as forbidding the over emission trucks from using the roads should be elaborated, if necessary. ✓ On the basis of the predicted noise level, mitigation measures such as installation of noise barrier and noise absorption plate should be considered, where required. ✓ According to the pollution level of hazardous chemicals and heavy metals in sediment, treatment of contaminated dredged spoil should be considered, if necessary.
7	Environmental Monitoring Plan (EMP)	• The environmental and social monitoring plan linked to the mitigation measures were proposed in the EIA report. Environmental and social monitoring is required to check that planned mitigation measures have been implemented and to provide early warning of environmental change. • Monitoring items, methods and frequencies were included in the monitoring program.	➢ Although the monitoring framework (responsible organization, personnel) was addressed in the EIA report, the EMP organization chart including KeNHA and NEMA should be depicted not only for the construction phase but also for the operation phase. ➢ The monitoring program for ambient air quality and noise level should be included.

	Check Items	Review	Items to be Improved
			➢ During the construction phase, turbidity in creeks should be monitored when the abutment of the bridges are installed.
8	Stakeholder Consultation Meeting	• According to the EIA report, after the reconnaissance visit, a number of stakeholders were consulted to inform them about the project and an opportunity was provided to hear their views on potential environmental and social impacts associated with the proposed project. • In addition to the public consultation meetings, focus group discussions through interactive forums, key informant interviews and face to face meetings with organizations were also conducted. • Views of the stakeholder and focus groups consultations and meetings were summarized in the EIA report. Positive and negative impacts raised by the stakeholders were reflected in the scoping.	➢ The Survey Team also assisted KeNHA to hold the stakeholder consultation meetings at Changamwe and Likoni. Details are shown in Chapter 21. The results of these meetings should be also reflected in the EIA report.
9	Cost and Budget	• The cost associated with the environmental and social monitoring pan was estimated in the EIA report.	➢ The budget to sustain the monitoring framework should be summarized based on the cost estimated for the environmental and social monitoring plan during the operation phase. ➢ The cost associated with the monitoring of ambient air quality and noise level should be included. ➢ Budgetary estimates for implementation of resettlement will be shown in RAP which is under survey. Supplemental RAP will be prepared based on a new alignment proposed by the JICA Survey team.

Source: JICA Survey Team

19.2.2 Diagram for Environmental Management and Monitoring Plan

The overall Project Implementation Organization for the Project is explained in Figure 11.3-1. In particular, the organization chart of the environmental management and monitoring is depicted in Figure 19.2-1.



Source: JICA Survey Team

Figure 19.2-1 Organization Chart for Environmental Management and Monitoring Plan

(1) KeNHA

Construction Phase:

KeNHA is Project owner, responsible for project management including overall environmental management. To carry out overall environment management, in KeNHA Special Project Department, an Environment Specialist and Social Safeguard Specialist shall be assigned. The Environmental Specialist is in charge of guiding and supervising implementation of the EMP for the Project.

- Ensure that sufficient funds are available to properly implement the EMP;
- Ensure that EMP provisions are implemented for the entire Project regardless of financing source;

- Ensure that Project implementation complies with the Kenyan and JICA environmental policy, principles and requirements;
- Submit quarterly environmental monitoring reports to JICA during the construction phase.

Operation Phase:

- Set up an operation and Maintenance Unit to control the Link and Bypass Roads operation;
- Hire Environmental Monitoring Consultants to carry out environmental monitoring in operational phase;
- Implementing the EMP in the first three year of operation;
- Investigating and monitoring of environmental matters in the first three year of operation. For the mangrove monitoring: four year of operation;
- Submit biannual environmental monitoring reports to JICA in the first three operation years;
- Submit the environmental audit report to NEMA within a period of twelve months of the commencement of the operations.

(2) KeNHA Special Project Department

KeNHA Special Project Department is responsible for implementation of the Project. Its responsibilities include:

- Overall planning, management and monitoring of the environmental management;
- Ensuring that all environmental protection and mitigation measures of environmental impacts are carried out in accordance with policies regulations on environment and other relevant laws;
- Organizing training courses for local staff and contractor's teams on mitigation measures and safety methods;
- Carrying out internal monitoring and supervising independent monitoring, which will be contracted with other consulting services of the project;
- Supervising and providing budget for monitoring activities;
- Ensure that environmental protection and mitigation measures proposed in the EMP are incorporated in the detailed design and that the Project is implemented following the JICA Guidelines;
- Ensure that tender documents and civil works contracts include the EMP and specify requirement for preparation and implement of Constructor's EMP;
- Review and approve the Constructor's EMP with assistance from the Construction Supervision Consultant;

- Recruit an external monitoring consultant(s) to monitor EMP implementation and to verify monitoring information submitted by KeNHA to JICA;
- Recruit an environmental supervision consultant to undertake ambient baseline data collection and monitoring during various project phases;
- Based on the results of EMP monitoring, identify environmental corrective actions and prepare a corrective action plan, as necessary, for submission to JICA;
- Establish an environmental grievance redress mechanism to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the Project's environmental performance.

Environmental Specialist:

- Together with the supervising consultants, monitoring of construction sites and preparing monitoring methods;
- Monitoring of construction activities in combination with obtaining community opinions to ensure the fulfillment of requirements in the EMP;
- Suspending any activity that triggers a serious negative environmental impact; suspending construction if contractors fail to observe requirements in the EMP or take any mitigation measures.

(3) Supervision Consultants

- Prepare and submit to KeNHA and JICA technical and financial proposals in their bids for environmental monitoring and other services.
- Engage Environmental Supervision Consultants to undertake regular project monitoring and reporting based on EMP provisions
- Prior to implementation of civil works, assist KeNHA Special Project Department in reviewing the Constructor’s EMP to ensure that these are consistent with the provisions of the EMP
- Assist KeNHA Special Project Department in monitoring the implementation of mitigation measures during preconstruction phase and the environmental performance of contractors based on the EMP and the EMPs prepared by contractors.
- Providing technical supports for KeNHA Special Project Department; preparing periodical reports on environmental management and compliance monitoring.
- Incorporate in the environmental monitoring reports the results of environmental effects monitoring and undertake data analysis.
- Making recommendations and strengthening environmental management and monitoring capability of contractors
- Assist KeNHA Special Project Department in preparing monitoring reports for submission to JICA on a quarterly basis.

- Assist KeNHA Special Project Department to ensure that the EMP provisions are included in the tender documents and civil works contracts

(4) Contractors and their Environmental Team

The Construction Contractors (Contractors) will be selected by KeNHA. Their responsibility includes construction works and following contractor specifications outlined in the EIA and EMP. This includes:

- Recruit a qualified Environmental Officer on a fulltime basis to ensure compliance to environmental contractual obligations and proper implementation of the Contactor's EMP;
- Prepare and submit to KeNHA Special Project Department the Contactor's EMP prior to commencement of civil works;
- Ensure proper implementation of the Contactor's EMP;
- Carrying out contractor's environmental monitoring monthly and submit monthly reports to KeNHA Special Project Department/ Supervision Consultants on the monitoring results and implementation of environmental mitigation measures;
- Implement additional environmental mitigation measures, as necessary;
- Applying all mitigation measures suggested in EMP/Contactor's EMP during construction of road and bridges;
- Ensuring safety of construction workers and local people during construction.

(5) NEMA

- Monitoring the implementation of mitigation measures suggested in the EIA report approved by NEMA to minimize the project impacts in the construction and operation phases (compliance monitoring).
- Checking the environmental audit report.
- Conducting the control audit, whenever NEMA deems it necessary to check compliance with the environmental parameters set for the Project or to verify self-auditing reports

The institutional framework for the RAP implementation is proposed and explained in Chapter 20.

(6) RAP Implementation Committee

The RAP Implementation Committee will set out the frame work for policies, principles, institutional arrangements, schedule and other indicative budgets to facilitate the project resettlement process. It shall;

- Verify land tenure and owner ship for compensation purpose.
- Link the PAPs to the other stakeholders.
- Create awareness on land alternative and resettlement options and identify alternative land for relocation.
- Ensure displaced persons are informed about their options and rights pertaining to resettlement, offered choices and provided with alternatives.
- Provide development assistance in addition to compensation measures
- Conduct resettlement and monitor progress of resettled persons.
- Manage impediments to the implementation of RAP.
- Address grievances following the approved grievance mechanism.
- Cooperate with the external auditor in the development of the semi-annual audit report.
- Review and comment on monitoring reports.

(7) RAP Implementation Team

The roles and responsibilities for this team will include but not limited to the following;

- Payment of cash compensations to PAPs
- Check on the compliance of the procurement procedures in relation with Kenyan Laws
- Coordination of stakeholder meeting and public hearing
- Management and monitoring of RAP implementation
- Internal monitoring and evaluation of the RAP process
- Coordination with the field team
- Preparation of internal monthly environmental and social audit reports

19.2.3 Report Submission

KeNHA has the responsibility to prepare the reports of environmental monitoring results in accordance with the Environmental Management and Monitoring Plans and submit them to JICA in the form as shown in Appendix 9. The monitoring reports shall be submitted to JICA quarterly during the construction phase. During the operation phase after opening the roads, the report shall be submitted to JICA biannually for three years.

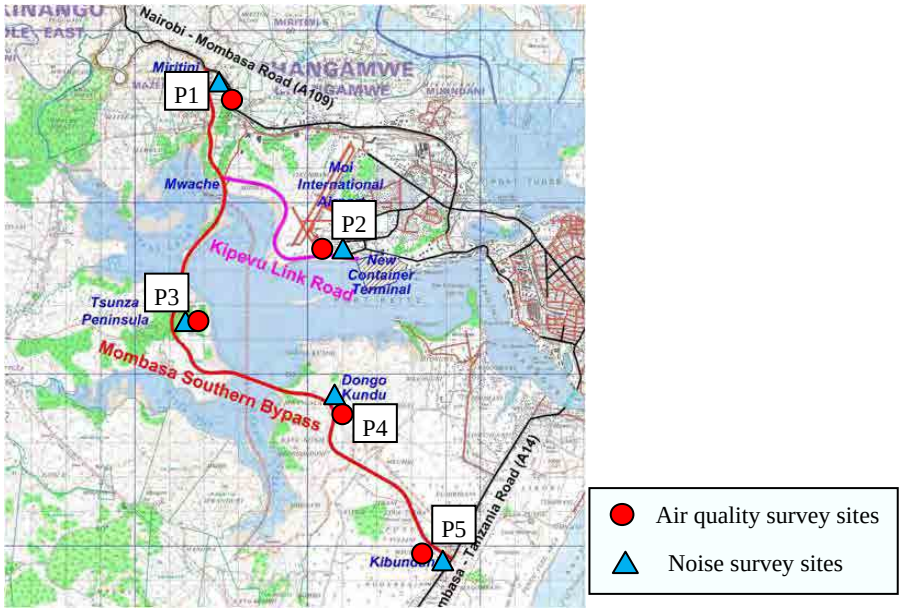
KeNHA has also the responsibility to submit the environmental audit report to NEMA within a period of twelve months of the commencement of the operations.

19.3 Supplemental EIA Survey

19.3.1 Ambient Air Quality

(1) Survey Method

The ambient air quality survey was conducted in the middle of July 2011 to understand the present air quality conditions in the vicinity of the road development areas shown in Figure 19.3-1. Table 19.3-2 summarized measurement parameters, survey method, sampling period and prediction method.



Source: JICA Survey Team

Figure 19.3-1 Location of Ambient Air Quality and Noise Surveys

Table 19.3-1 Ambient Air Quality Survey Specification

Parameters	Particulates (PM_{10}), Nitrogen Oxides (NO_X), Sulphur Oxides (SO_X), Carbon Monoxide (CO), Ozone (O_3), Lead (Pb) and wind direction and wind speed				
Survey Location	5 sites (Figure 19.3-1)				
	P1	P2	P3	P4	P5
	Miritini	Port Reitz	Tsunza	Mwangala	Kibundani
	S 4º 00’ 00’’ E 39º 34’ 29’’	S 4º 02’ 05’’ E 39º 36’ 10’’	S 4º 03’ 20’’ E 39º 33’ 47’’	S 4º 04’ 47’’ E 39º 35’ 44’’	S 4º 07’ 00’’ E 39º 38’ 02’’
Survey Method	Continuous measurement with air sampler				
Period/Schedule	24 hours x 1day (July 2011)				
Prediction Method	Air pollutant levels are predicted by the plume model based on the increased emissions from the road traffic.				

Source: JICA Survey Team

(2) Measurement Result

The measurement result of the ambient quality survey is summarized in Table 19.3-2.

Table 19.3-2 Result of Ambient Air Quality Survey

Pollutant	Unit	Location					Kenya *1	WHO *2	Time Weighted Average
		P1 Miritini	**P2** Port Reitz	**P3** Tsunza	**P4** Mwangala	**P5** Kibundani			
PM_{10}	$\mu g/m^3$	11	12	17	15	14	100 50	50 20	24 hours 1year
SO_x (SO_2)	$\mu g/m^3$	ND	18	ND	ND	ND	80 60	20 -	24 hours 1year
NO_x (NO_2)	$\mu g/m^3$	ND	26	18	ND	8	80 60	40 (NO_2)	24 hours 1year
CO	$\mu g/m^3$	379	510	427	381	404	4,000 2,000	- -	1 hour 8 hours
O_3	ppm	ND	ND	ND	ND	ND	0.12 1.25	- 100	1 hour 8 hours
Lead	$\mu g/m^3$	ND	ND	4.4	ND	3.8	1 0.75	-	24 hours 1year
Wind Speed	m/s	3.8	3.5	3.5	4	4	-	-	-
Wind Direction	-	SW	SW	S	SW	SE	-	-	-

Source: The Survey Team

Note: ND: Not detected (less than the quantification limits).

*1: (Draft) The Environmental Management and Coordination (Air Quality) Regulations, 2008.

*2: WHO Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide, Global Update 2005

The observed pollutant concentrations were compared with the tolerance limits of the draft Kenya air quality regulations shown in Table 19.3-2. The pollutant concentrations were well below the tolerance limits of the draft Kenyan regulations and also satisfied the WHO air quality standards.

The wind survey conducted with the ambient air quality survey showed that the wind blew from the south or the southwest and southeast where there are currently no anthropogenic emission sources of air pollutants. Since the project area along the road alignments is located south and west of the industrial areas in Changamwe and Mombasa Island, the background air quality in the project area might not be deteriorated.

Airborne Lead was detected at Points 3 and 5 and exceeded the tolerance limits of the draft Kenyan regulations. These concentrations were however much lower than those that were previously reported in Nairobi, Kenya[1]. Since leaded gasoline has been phased out in Kenya

[1] Mulaku, *et.al*., "Mapping and Analysis of Air Pollution in Nairobi, Kenya," *International Conference on Spatial Information for Sustainable Development*, Nairobi, Kenya, October 2001.

since 2006[2] and there are no other emission sources around the survey sites, the airborne lead might not increase over the present level due to the road traffic.

(3) Impact on Ambient Air Quality

The future pollutant levels in ambient air based on the projected traffic volume were predicted by the Plume Model[3] (refer to Appendix 10 for more detail).

The pollutant emissions were calculated based on the projected traffic volume of Case 2 following the recommendations of Chapter 22. According to this scenario, during the Phase-1 until 2025, Sections 1 and 2 of the Kipevu Link Road is 4-lane, and Sections 3 and 4 of the Mombasa Southern Bypass Road is 2-lane.

The prediction point was set at the edge of ROW. The horizontal distance from the centre of the road to the prediction point is 55 meters since ROW is 110 meters wide.

The pollution levels of ambient air were estimated by adding the computed increments (Tables A9-10 to A9-13 in Appendix 10) to the background pollutant concentrations shown in Table 19.3-2. The predicted pollutant levels in 2025 (at the end of Phase 1) were summarised in Table 19.3-3.

Table 19.3-3 Predicted Pollutant Levels in 2025 [μg/m^3]

Pollutants	Section 1	Section 2	Section 3	Section 4	Kenya Regulations[*1] (Residential area)
NOx	8	34	18	12	80 (24 hours) 60 (1year)
PM_{10}	12	12	17	15	100 (24 hours) 50 (1year)
CO	384	510	427	408	4,000 (1 hour) 2,000 (8 hours)
SO_2	20	18	1	1	80 (24 hours) 60 (1year)

Source: The Survey Team

Note 1: (Draft) The Environmental Management and Coordination (Air Quality) Regulations, 2008

Because the present background pollutant levels are well below the tolerance limits for a residential area stipulated in the draft Kenya air quality regulations, the predicted pollutant concentrations of NOx, PM_{10}, CO and SO_2 at the edge of ROW along the Kipevu Link Road will not exceed the tolerance limits in 2025.

Also the predicted pollutant concentrations of NOx, PM_{10}, CO and SO_2 along the Mombasa

[2] UNEP website: http://www.unep.org/Documents.Multilingual/Default.Print.asp?DocumentID=392&ArticleID=4476&l=en

[3] Japan Highway Environment Research Institute (HERI), "Technical Handbook for Environmental Impact Assessment of Roads, 2007 edition".

Southern Bypass Road will be still lower than the tolerance limits of the draft Kenya air quality regulations in 2025.

Furthermore the predicted concentrations of these pollutants in 2025 might not largely exceed the WHO guidelines which are stricter than Kenya air quality regulations.

However, it should be noted that there are some constraints in this prediction. Due to the lack of the pollutant emission factors from vehicles in Kenya, the emission factors were referred to the values used in Japan according to the "Technical Handbook for Environmental Impact Assessment of Roads (2007)". Therefore in order to obtain more accurate concentrations, the emission factors measures in Kenya should be adopted.

The ambient air quality survey was conducted in just one day in the middle of July. In order to grasp background pollutant levels and determine the baseline conditions for the Environmental Monitoring Plan, the monitoring campaign should be carried out before construction.

19.3.2 Noise Survey

(1) Survey Method

The noise survey was conducted in the middle of July 2011 to grasp the present noise levels of areas along the proposed road alignments shown in Figure 19.3-1. Table 19.3-4 summarized measurement parameters, survey method, sampling period and prediction method.

Table 19.3-4 Noise Survey Specification

Parameters	Equivalent sound level: L_{Aeq}, L_{Amax} and L_{Amin}				
Survey Location	5 sites (Figure 19.3-1)				
	P1	P2	P3	P4	P5
	Miritini	Port Reitz	Tsunza	Mwangala	Kibundani
	S 4º 00' 00'' E 39º 34' 29''	S 4º 02' 05'' E 39º 36' 10''	S 4º 03' 20'' E 39º 33' 47''	S 4º 04' 47'' E 39º 35' 44''	S 4º 07' 00'' E 39º 38' 02''
Survey Method	Noise level will be measured by the installation of noise level meter at survey sites during day and night time				
Period/Schedule	24 hours x 1day (July 2011)				
Prediction Method	Road traffic noise is predicted by the model of Acoustical Society of Japan based on the traffic increase.				

Source: JICA Survey Team

(2) Measurement Result

The measurement result of the noise survey is summarized in Table 19.3-5.

Table 19.3-5 Result of Noise Survey

dB(A)		Day (6.01 a.m. - 8.00 p.m.)	Night (8.01 p.m. – 6.00 a.m.)
Location		L_{Aeq} (Min.-Max.)	L_{Aeq} (Min.-Max.)
P1	Miritini	61 (49 – 75)	47 (44 – 51)
P2	Port Reitz	49 (45 – 60)	47 (45 – 60)
P3	Tsunza	45 (43 – 58)	43 (40 – 51)
P4	Mwangala	57 (49 – 64)	45 (42 – 51)
P5	Kibundani	56 (49 – 75)	46 (44- 54)
Kenyan[*1] Regulations		50 (residential) 60 (commercial)	35 (residential) 35 (commercial)
IFC Guidelines[*2]		55 (residential) 70 (industrial)	45 (residential) 70 (industrial)

Source: The Survey Team

Note: 1) The Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009. Time Frame: Day: 6.01 a.m. – 8.00 p.m.; Night: 8.01 p.m. – 6.00 a.m.

Note: 2) General EHS Guidelines; Environmental Noise Management, International Finance Corporation: IFC 2007.

Time Frame: Day: 7.00 a.m. – 10.00 p.m.; Night: 10.00 p.m. – 7.00 a.m.

According to the Kenyan noise regulations, the noise levels during the day at three sites exceeded the maximum permissible noise level of 50 dB(A) for a residential zone. The noise levels at all five sites during the night exceeded the maximum permissible noise level of 35 dB(A) for a residence zone.

However, it is said that the maximum permissible noise levels of Kenyan regulations are extremely stricter than the international standards. Therefore, the present noise levels should be evaluated by the international standards, such as the guidelines of International Finance Corporation (2007), although the definition of the time frame of the day and night is different from the Kenyan regulations.

Compared with the IFC's EHS guidelines, except at P1, the noise levels observed during the day were almost at the same level as the IFC guideline values. At P1, the noise level largely exceeded the guideline value of 55 dB(A) for a residential area during the day. Because the sampling site at P1 (Miritini) was close to the Nairobi-Mombasa Road (A109), the road traffic noise of A109 might result in the loudest sound levels.

On the other hand, the noise levels observed during the night at all sites were almost the same level of the IFC guideline value of 45 dB(A) for a residential area.

(3) Noise Impacts

The future noise levels based on the projected traffic volume were predicted by the

mathematical model[4] developed by the Acoustical Society of Japan (refer to Appendix 10 for more detail).

The future noise levels were calculated based on the projected traffic volume of Case 2 following the recommendation of Chapter 22. In this scenario, Sections 1 and 2 of the Kipevu Link Road is 4-lane, and Sections 3 and 4 of the Mombasa Southern Bypass Road is 2-lane.

The prediction point was set at the edge of ROW. The horizontal distance from the centre of the road to the prediction point is 55 meters since ROW is 110 meters wide.

The predicted noise levels at the edge of ROW based on the projected traffic volume are shown in Table 19.3-6 for four sections.

Table 19.3-6 Predicted Noise Levels: L_{Aeq} [dB]

Year		2015		2020		2025		2035	
Road Section		Day	Night	Day	Night	Day	Night	Day	Night
Section 1		65	59	68	62	69	63	71	65
Section 2		65	59	67	61	69	63	71	66
Section 3		-	-	61	55	61	55	60	54
Section 4		-	-	61	55	62	56	61	55
Kenyan[*1] Regulations	Residence	50	35	50	35	50	35	50	35
	Commercial	60	35	60	35	60	35	60	35
IFC Guidelines[*2]	Residence	55	45	55	45	55	45	55	45
	Industrial	70	70	70	70	70	70	70	70

Source: The Survey Team

Note: 1) The Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009. Time Frame: Day: 6.01 a.m. – 8.00 p.m.; Night: 8.01 p.m. – 6.00 a.m.

Note: 2) General EHS Guidelines; Environmental Noise Management, International Finance Corporation: IFC 2007. Time Frame: Day: 7.00 a.m. – 10.00 p.m.; Night: 10.00 p.m. – 7.00 a.m.

The predicted noise levels at the edge of ROW along the Kipevu Link Road, in 2015, might exceed the maximum permissible noise levels for a residential zone (outdoor) and even for a commercial zone, set in the Kenyan noise regulations both during the day and the night.

Also the predicted noise levels along the Mombasa Southern Bypass Road, in 2020, might exceed the maximum permissible noise levels of Kenyan regulations both during the day and the night.

It is said that the maximum permissible noise levels of Kenyan regulations are extremely stricter than the international standards such as the General EHS Guidelines of International Finance Corporation (2007).

[4] K. Yamamoto, "Road traffic noise prediction model "ASJ RTN-Model 2008": Report of the Research Committee on Road Traffic Noise," Acoust. Sci. & Tech. 31, 1 (2010)

If compared with the IFC noise guidelines shown in Table 19.3-6, the predicted noise levels at the edge of ROW in 2025 might exceed the IFC noise guideline levels by 6 to 18 dB(A) along the Kipevu Link Road, and by 6 to 11 dB(A) along the Mombasa Southern Bypass Road.

Since the present noise levels are consider to be almost at the same levels of IFC guidelines as shown in Table A4-2, the predicted noise levels might increase by about 5 to 20 dB(A) from the present conditions. In particular, the increase of the noise level during the night could be over 10 dB(A).

(4) Abatement Measures

Therefore, the proper and feasible abatement measures should be implemented along the roads close to the residential areas, especially schools, hospitals and religious facilities.

- Install noise barriers and low noise pavement
- Attach noise absorbing panels under elevated road sections
- Set environmental facility zones such as green belt
- Install warning signs on road for horn ban, speed control and lane restriction
- Regular maintenance on road to keep road surface good condition
- Develop a mechanism to record and respond to monitoring results and complaints

Table 19.3-7 shows the examples of noise abatement measures, their functions and effectiveness.

Table 19.3-7 Typical Noise Abatement Measures

Mitigation Measures	Function	Effectiveness
Low noise pavement	Small porous in the asphalt pavement surface absorb the noise generated by friction between the car tires and road surface.	About 3 dB
Noise barriers	Noise barriers reduce noise by diffraction.	About 10 dB
Environmental buffer zone (e.g., vegetation)	Trees are planted to create green spaces and reduce noise by distance from noise sources.	5~10 dB

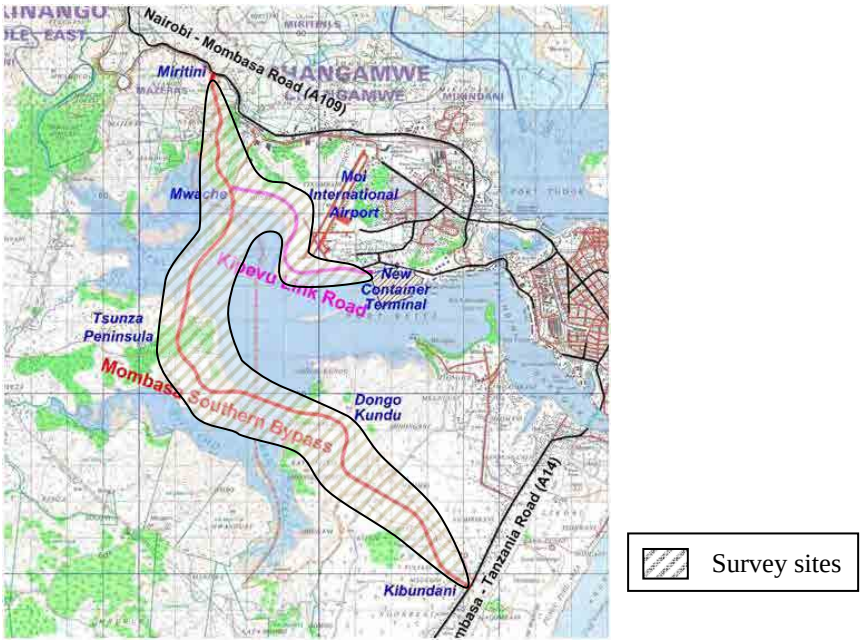
Source: Road Development and Environmental Measures, Ministry of Land, Infrastructure, Transportation, and Tourism (http//www.mlit.go.jp/road/ir/data/souon/souon3.html)

19.3.3 Flora and Fauna Survey

(1) Survey Method

The flora and fauna survey was conducted in July 2011 to investigate the existence of any protected species of flora and fauna in the vicinity of the proposed road alignments, especially

mangrove and tidal flat areas shown in Figure 19.3-2. Table 19.3-8 summarized target species to be surveyed, survey method and survey period.



Source: JICA Survey Team

Figure 19.3-2 Location of Flora and Fauna Survey

Table 19.3-8 Flora and Fauna Survey Specification

Items	• Protected species declared as endangered or threatened species under the relevant Kenyan acts and regulations; • Threatened species (grouped as EN, CR, VU) in the IUCN Red List; • Avian species, which are included in the list of the "Agreement on the Conservation of African-Eurasian Migratory Waterbirds"; and • Locally significant species for the livelihood of local residents		
Survey Location	Mwache Creek, Tsunza Peninsular and Mteza Creek (Figure 19.3-2)		
Survey Method	Mangroves and terrestrial vegetation		Visual observation, transect method
	Marine and terrestrial fauna	Mammals	Tracks and Scats, Traps
		Birds	Visual, call census and transect method
		Amphibian	Active searches
		Reptilian	Active searches
		Insects	Active searches, Traps
Period/Schedule	10 days in July 2011		

Source: JICA Survey Team

(2) Diversity of Flora and Fauna

Major vegetation types within the traverse route along the project road alignments include:

- mangrove wetland forest
- terrestrial high canopy forest area
- secondary thicket, closed and open types
- farmland area with cash and subsistence

Based on observations from remnant patches of natural vegetation, the general vegetation within the terrestrial sections of the route of traverse was high canopy Miombo woodlands dominated by *Brachystegia spp.* which gradually transformed and merged with mangrove formations along the inter-tidal zone. To date, this continuum has been interrupted by anthropogenic activities such as human settlement and cultivation. Natural vegetation only occurs as narrow mangrove belts in the intertidal zone and small clusters of woodland currently preserved as traditional sacred groves Kayas.

Diversity of fauna species is quite low which probably indicative of impact of habitat loss as shown in Table 19.3-9. However, for an area characterized by disturbed habitats, the bird count of 50 observed was high when compared to the 65 reported for the national Arabuko Sokoke Forest Reserve which is a similar dry forest but preserved to near pristine state.

The detail results of the flora and fauna survey are shown in Appendix 10.

Table 19.3-9 Composition of Flora and Fauna in the Project Area

Flora & Fauna	Surveyed Area	Arabuko Sokoke Forest Reserve
Mammals	5	52
Birds	50	65
Butterflies	58	124
Amphibians	32	79
Snakes	12	ND
Plant species	206	600

Source: JICA Survey Team

(3) Protected Species of Flora and Fauna

The status of protection for all species encountered in the traverse area was screened against Kenyan and international legal instruments.

When conservation status for individual species was evaluated using Kenyan criteria, it emerged that only the EMCA (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations 2006 has a provision for inventory of conservation status for individual species but this provision has not yet been implemented. Instead, the Kenya Wildlife Services (KWS) provides a list of endangered and threatened species (Source: http://www.kws.org/research/priority_ecosystems.html). Referring to this list, none of the fauna and flora species encountered within the traverse route was identified as

threatened, endangered or endemic to this area.

According to the International Union for the Conservation of Nature and Natural Resources (IUCN), species are classified into nine groups, set through criteria such as rate of decline, population size, area of geographic distribution, and degree of population and distribution fragmentation. In the IUCN Red List, the official term "threatened" is a grouping of three categories: Critically Endangered, Endangered and Vulnerable. Applying the IUCN Red List criteria to all species of the flora and fauna recorded in the traverse area, none of the species was classified as the threatened status. However, only one species of bird, Plain-backed sunbird (*Anthreptes reichenowi*) is categorized as being Near Threatened, i.e., likely to become endangered in the near future.

Kenya is also a signatory to the Bonn Convention on Conservation of Migratory Species and its daughter Agreement; the African-Eurasian Migratory Waterbird Agreement (AEWA). Four bird species, African Spoonbill (*Platalea alba*), African Sacred Ibis (*Mycteria ibis*), Yellow-billed Stork (*Threskiornis aethiopicus*) and Marabou Stork (*Leptoptilos crumeniferus*) which are listed in Table 1 of Annex 3 of AEWA, were encountered in the tidal flat of Port Reitz area.

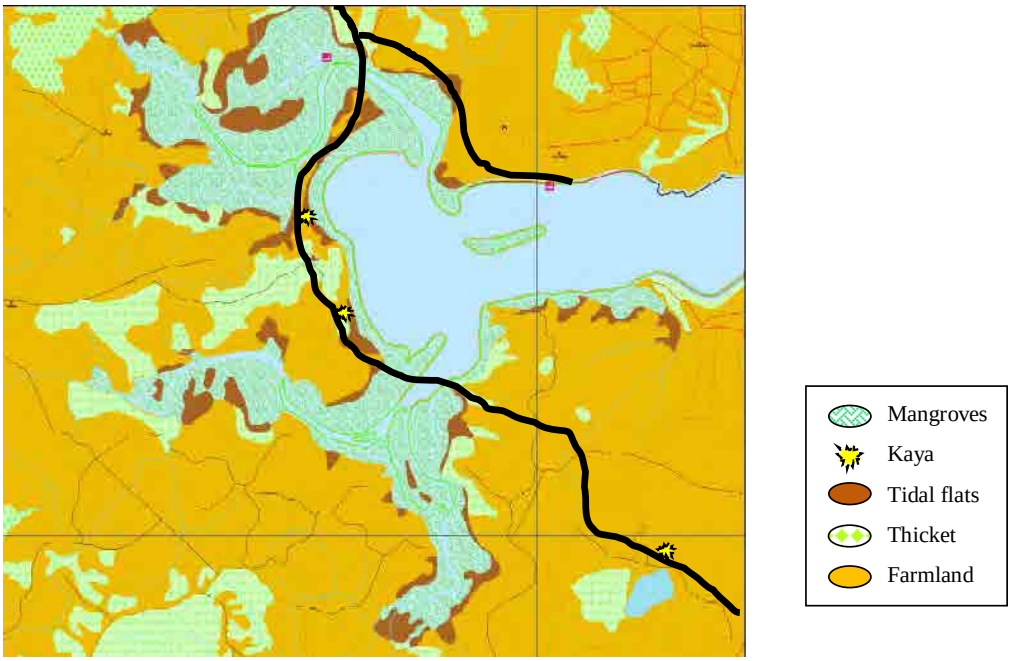
(4) Locally Significant Ecosystem

There are two dominant formations considered important for biodiversity conservation in the project area, namely mangroves and Kaya forests as shown in Figure 19.3-3.

Mangroves

In the route of traverse, mangrove forests dominate the creeks of Mwache and Mteza rivers and the entire shoreline of the Tsunza peninsula covering an estimated 15 square kilometers (1,500 ha) out of the national resources of 540 square kilometers (54,000 ha). Kenya coastline carries nine true mangrove species namely: *Rhizophora mucronata*, *Bruguiera gymnorrhiza*, *Ceriops tagal*, *Avicennia marina, Xylocarpus granatum*, *X. moluccensis*, *Heritiera littoralis*, *Lumnitzera racemosa* and *Sonneratia alba*, all of which were recorded in Mwangal, Tsunza and Mkupe along the proposed road alignments. None of the mangrove species is endemic to Kenya and they occur widely along the tropical reaches of the Indian Ocean coastline.

Within the route of traverse, size distribution of *Rhizophora mucronata*, *Bruguiera gymnorrhiza* and *Ceriops tagal* was noted to be declining especially at Mkupe and Mwangala where large diameter stems were quite rare. These areas were dominated by relatively small diameter tree while deeper into the creeks and away from exploitation reach, the sizes were relatively larger. *Rhizophora mucronata* is the most favored for wood (poles, post and withies) and is therefore most harvested and consequently the most threatened by local utilization (Table 19.3-10).



Source: JICA Survey Team

Figure 19.3-3 Vegetation Map of Locally Significant Ecosystem

Table 19.3-10 Ethnobotanical Information on Mangrove Species

Mangrove Species	Local name (Swahili)	Local Uses	Preference Level	Remarks
Rhizophora mucronata	Mkoko	Timber, fuel wood	Very high	Most threatened
Bruguiera gymnorrhiza	Muia	Timber, fuel wood	High	Threatened, in low population
Ceriops tagal	Mkandaa	Timber, fuel wood	High	Hardly above 3m in height
Sonnerata alba	Mlilana	Timber, fuel wood	High	Low
Avicennia marina	Mchu	Fuel wood	Average	Low threats
Lumnitzera racemosa	Kikandaa	Fuel wood, ribs for boat	Low	Locally rare
Xylocarpus granatum	Mkomafi	Timber, fuel wood and carving	Low	Locally rare
Xylocarpus molucensis	Mkomafi dume	Fuel wood	Low	Locally rare
Heritiera littoralis	Msindukazi	Timber	Low	Locally rare

Source: JICA Survey Team

Kaya Forests

Kayas exist as remnant patches of miniature forest complete with multistoried canopies with full closure. These sacred areas contained a relatively higher tree canopy species in given area space compared to the other terrestrial vegetation dynamics. The main floral components varied from site to site, but with some generalists among the species. Commonly shared were

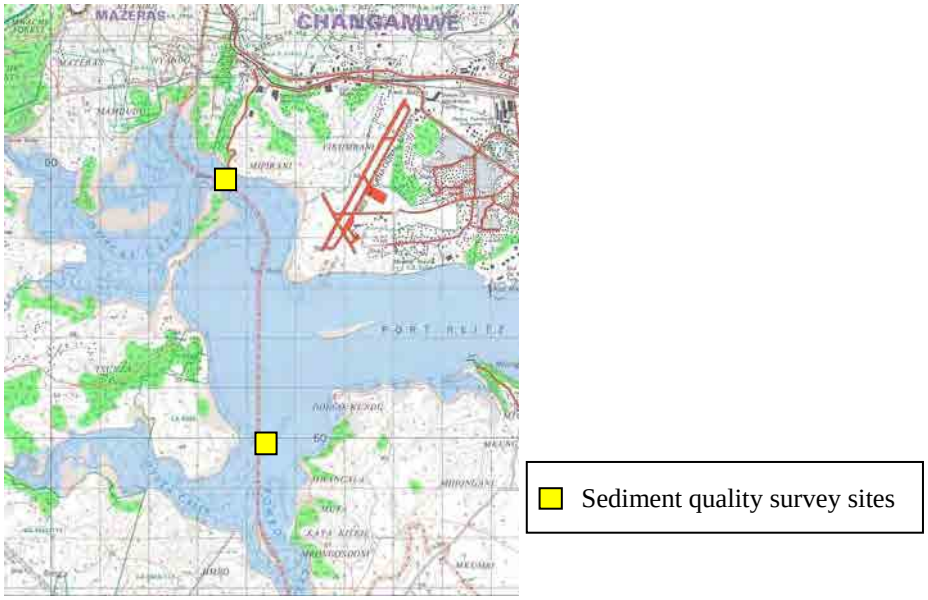
the light loving species in the gaps and the periphery of the tree canopy cover, which are also found in disturbed thickets and farmland. Such floral components include herbaceous species *Asystesia gangetica, Commelina benghalensis, Asparagus fulcatus, Triumffeta rhomboidea*; shrub species: *Uvaria acuminata,* T*hespesia danis, Bridelia cathartica, Lantana camara*; and tree species *Lannea schweinfurthii, Azadirachta indica, Grewia plagiophylla, Diospyros cornii*.

Although none of Kayas in the project area has individually been gazetted under either the Forests Act or the Antiques and Monuments Act, Kayas have enjoyed strong protection under cultural and moral code. However, the diversity of floral species has greatly diminished due to the growing human activities.

19.3.4 Sediment Quality Survey

(1) Survey Method

The sediment quality survey was conducted in September 2011 to investigate the present concentrations of hazardous chemicals and heavy metals in sediment of the creeks, where piers and abatement of the bridges will be installed. The sampling location is shown in Figure 19.3-4. Table 19.3-11 summarized measurement parameters, sampling period and survey method.



Source: JICA Survey Team

Figure 19.3-4 Location of Sediment Quality Survey

Table 19.3-11 Sediment Quality Survey Specification

Parameters	Physical characteristics		Particle Size Distribution, Moisture Content
	Nutrients		Total Organic Carbon (TOC), Total Nitrogen (T-N), Total Phosphorus (T-P)
	Heavy Metals		As, Cd, Cr, Cu, Pb, Hg, Ni, Ag and Zn;
	Persistent Organic Pollutants (POPs)		HCB, DDT, Chlordane, Aldrin, Dieldrin, Endrin and total PCB
	Polycyclic Aromatic Hydrocarbons		Total PAHs
Survey Location	2 sites (Figure 19.3-4)		
	Mwache Creek	Mteza Creek	
	S 4º 01’40’’ S 4º 04’36’’	E 39 º 34’25’’ E 39 º 35’04’’	
Survey Method	Sediment samples were collected and analyzed at the NEMA’s certified laboratories: SGS Kenya Ltd. and National Agricultural Research Laboratories.		
Period/Schedule	Field sampling x 1day (July 2011)		

Source: JICA Survey Team

(2) Measurement Result

The result of the sediment quality survey is summarized in Table 19.3-12.

Table 19.3-12 Result of Sediment Quality Survey

Parameters	Unit	Location		CEFAS Guidelines[*1]		Canada Guidelines[*2]	
		Mwache Creek	**Mteza Creek**	Action Level 1	Action Level 2	ISQG	PEL
Moisture content	%	17.5	30.3	-	-	-	-
Nutirents							
TOC	%	0.24	1.02	-	-	-	-
T-N	%	0.02	0.06	-	-	-	-
T-P	%	<0.02	0.05	-	-	-	-
Metals							
Arsenic (AS)	mg/kg	ND (<0.005)	ND (<0.005)	20	100	7.24	41.6
Cadmium (Cd)	mg/kg	ND (<0.02)	ND (<0.02)	0.4	5	0.7	4.2
Chromium (Cr)	mg/kg	3.9	23.6	40	400	52.3	160
Copper (Cu)	mg/kg	7.0	15.8	40	400	18.7	108
Nickel (Ni)	mg/kg	0.9	16.2	20	200	-	-
Silver (Ag)	mg/kg	ND (<0.02)	168.5	-	-	-	-
Zinc (Zn)	mg/kg	29.1	20	130	800	124	271
Lead (Pb)	mg/kg	ND (<0.02)	13.9	50	500	30.2	112
Mercury (Hg)	mg/kg	ND (<0.005)	ND (<0.005)	0.3	3	0.13	0.7
Hazardous chemicals							
HCB	μg/kg	ND (absent)	ND (absent)			0.32	0.99
DDT	μg/kg	ND (<0.01)	ND (<0.01)	1.0[*1-1]		1.19	4.77
Chlordane	μg/kg	ND (absent)	ND (absent)			2.26	4.79
Aldrin	μg/kg	ND (<0.01)	ND (<0.01)	-	-	-	-
Dieldrin	μg/kg	ND (<0.01)	ND (<0.01)	5.0[*1-1]		0.71	4.3
Endrin	μg/kg	ND (<0.01)	ND (<0.01)			2.67	62.4
Total PCBs	μg/kg	ND (absent)	ND (absent)	20	200	21.5	189
Total PAHs	μg/kg	ND (<0.01)	ND (<0.01)	100[**1-2]		-	-

Source: The Survey Team

Note: ND (<0.01) indicates that the quantification limit (e.g., 0.01) was specified by the lab. On the other hand, ND (absent) means that data were less than the quantification limits but not specified by the lab.

*1 Centre for Environment, Fisheries & Aquaculture Science (CEFAS) Guideline Action Levels (2003)

*1-1: These levels were set in 1994. *1-2: In 2003 a new set of action levels has been presented as revised action levels for England and Wales (DEFRA, 2003). These are still not in use.

*2 Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (2002), Interim marine sediment quality guidelines (ISQGs; dry weight), probable effect levels (PELs; dry weight),

Nutrients

The levels of TOC, Total Kjeldahl Nitrogen and Total Phosphorus recorded at these creeks were relatively low. Therefore it is inferred that the nutrients concentrations in the bottom sediments does not reflect the characteristics of an estuarine environment greatly enriched by organic matter and nutrients. There is no risk of eutrophication due to dredging and disposal of the dredged spoil.

Heavy Metals

The concentrations of heavy metals in the sediments of two creeks are summarized in Table 19.3-12. These concentrations were compared with the British guideline values established by the Centre for Environment, Fisheries & Aquaculture Science (CEFAS).

In general, a case by case decision is made based on the Action Levels:

- Case I: Contaminant concentrations below Action Level are generally considered of no concern with their potential to cause pollution;
- Case II: Material with contaminant concentrations between Action Levels 1 and 2 are likely to require further consideration either by additional sampling and analysis, testing (possibly by bioassay) or a change to the proposed dredge/placement method.
- Case III: Contaminant concentrations above Action Level 2 are considered to be unsuitable for sea disposal and will most likely require additional investigation and consideration, which may include treatment management practices.

The metal levels observed in two sampling points were below the Action Level 1 of CEFAS Guideline values as shown in Table 19.3-12. The concentrations of As, Cd and Hg were below the detection limits.

Hazardous Chemicals

The data of Organochlorine Pesticides, Polychlorinated Biphenyls (PCBs) and Polycyclic Aromatic Hydrocarbons (PAHs) in Table A19.3-12 shows that these concentrations of chemicals in two creeks were consistently below the detection limits of the analytical methods. That is, these chemicals are well below the CEFAS Action Level 1 and also the Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (2002).

(3) Assessment of Impacts

The present levels of heavy metals and hazardous chemicals in the sediment of Mwache Creek and Mteza Creek may not cause any adverse impacts on aquatic biota due to sediment

re-suspension promoted by the dredging and damping operations during the bridge construction. Therefore, any treatment of dredged spoil will not be needed before damping.

19.4 Supplementary EIA Report

The draft supplementary EIA report in Appendix 11 comprises mainly the results of the supplemental EIA surveys as shown in Table 19.4-1. In case of the contents already analysed and/or surveyed in the EIA report, their corresponding chapters and sections are indicated in the supplementary EIA report.

Table 19.4-1 Contents of the Supplementary EIA Report

Draft Table of Contents Supplementary EIA		Existing EIA Report		Supplementary EIA
		Surveyed/ Analysed	Corresponding Chapters	Surveyed/ Analysed
-	Executive Summary	○	Executive Summary	-
1.	Policy and Legal Framework	-	-	-
1-1	Introduction	○	Ch.1	○
1-2	Laws and Policy in Kenya	○	Ch.10	○
1-3	JBIC Guidelines and World Bank's Operational Policy	Δ	Ch.18	○
1-4	Gap Analysis and Project Policy	x	-	○
2.	Project Description	○	Ch.2, 4, 5, 6	○
3.	Baseline Data	-	-	-
3-1	Natural Environment	Δ	Ch.9, 11	○
3-2	Pollution Control	Δ	Ch.9, 11, 12	○
3-3	Social Environment	○	Ch.9	○
4.	Environmental Impact Study	-	-	-
4-1	Natural Environment	Δ	Ch.8, 15	○
4-2	Pollution Control	Δ	Ch.8, 12, 13, 15	○
4-3	Social Environment	○	Ch.8, 13, 16	○
5.	Analysis of Alternatives	Δ	Ch.3	○
6.	Environmental Management Plan	-	-	-
6-1	Mitigation Measures	Δ	Ch.7, 15, 16	○
6-2	Environmental Monitoring Plan	Δ	Ch.17	○
7.	Public Participation and Information Disclosure	○	Ch.14	○
8.	Cost and Budget	Δ	Ch.17	○
-	References	○	References	○
-	Appendix	-	-	-
A1	Principles of the JBIC Guidelines, Comparison of Kenyan and JBIC Guidelines/World Bank Policies	x	-	○
A2	List of Vascular Plants, Birds and Butterflies in the Study Area	x	-	○

A3	Records of Stakeholder Consultation Meetings	x	-	○
A4	Terms of Reference for Mangrove Reforesting Plan	x	-	○
A5	Environmental Management Plan Monitoring Form for Submitting to JICA	x	-	○

Source: JICA Survey Team

Note ○: Surveyed and/or analysed, Δ: Partially surveyed and/or analysed, x: Not surveyed and/or analysed

19.5 JBIC Environmental Checklist

The JICA Survey Team assisted KeNHA with elaborating the JBIC Environment Checklist to comply with the JBIC Guideline.

The draft JBIC Environment Checklist for the Project is shown in Appendix 12.

CHAPTER 20 SUPPLEMENTARY RESETTLEMENT ACTION PLAN

20.1 Projected Affected Persons (PAPs)

The PAPs enumerated through collection of baseline socio-economic data of Project Affected Persons (PAPs) by land-acquisition of the Project are shown in Table 20.1-1.

Table 20.1-1 Distribution of PAPs by Villages

District	Village	PAPs	
		No.	Rate (%)
Kilifi	Mabanda ya Ngombe	19	4.1
Subtotal		19	4.1
Changamwe	Miritini	91	19.8
	Port Reitz	47	10.2
Subtotal		138	30.0
Kinango	Tsunza	97	21.1
	Mwandudu	26	5.7
Subtotal		123	26.8
Likoni	Mtongwe	47	10.3
	Shikadabu	51	11.1
Subtotal		98	21.4
Kwale	Kiteje	37	8.1
	Pungu	44	9.6
Subtotal		81	17.7
Total		459	100.0

Source: Supplementary RAP

20.2 Assistance for Preparation of Supplementary RAP

20.2.1 Analysis of Legal Framework

In Kenya, only 15% of the national lands are titled. There are many other forms of land ownership, lease or use. Due to the inconsistency of provisions in the draft Guidelines on Resettlement and Evictions, May 2010 with those of the World Bank's Operational Policy 4.12 on Involuntary Resettlement (OP 4.12), land and assets are defined in Kenya differently in terms of occupancy rights, anti-eviction rights, adverse possession, unregistered leases and rentals.

OP 4.12 requires that affected communities be consulted regarding project implementation and resettlement. Affected communities should receive the opportunity to participate, implement and monitor resettlement. In Kenya, conventional land registration (or titling) systems tend to be highly centralized and rely heavily on professionals, who are mostly based in the country's

capital city. Poor and illegal occupants of lands do not have access to those professionals and are often left without title.

The differences in approach vary largely in the application of the land tax and land registration (cadastral). Since majority of land occupants are non-titled within a municipality, the land tax system does not work in terms of tax parcels, tax records and procedures which often make the senses-taking of PAPs as defined in the World Bank OP 4.12 more orderly. This becomes problematic in squatter settlements or in protected forests where some evictions of vulnerable/indigenous groups have allegedly taken place.

Finally, there is also no provision in the laws of Kenya that the state should attempt to minimize involuntary resettlement. However in this circumstance the World Bank guidelines on involuntary resettlement will supersede and hence apply in its entirety. Table 20.2-1 summarizes the comparison of Kenyan and World Bank Policies/JBIC Guideline on resettlement and compensation.

Table 20.2-1 Comparison of Kenyan and World Bank Policies/JBIC Guideline on Resettlement and Compensation

Types of Affected Persons/Lost Assets	Kenyan Law	World Bank OP4.12/JBIC Guidelines	Comparison/Gaps	Countermeasure and/or Recommendations to bridge the comparison/Gaps
Section I : Property and Land Rights				
Land Owners	There are two systems of substantive land law, three systems of conveyances, and five systems of registration. The two systems of substantive law are under: (i) the Indian Transfer of Property Act 1882 as amended by 1959 Amendment Act; and (ii) the Registered Land Act. The three systems of conveyances are those applicable to land registered under: (i) Government Land Act Chapter 280, part X Laws of Kenya and Land Titles Act Chapter 282, Part III Laws of Kenya; and (iii) Registered Land Act. The five registration systems are those under the: (i)Government Land Act; (ii) Registration of Titles Act; (iii) Land Titles Act; (iv) Registration of Documents Act Chapter 285 Law of Kenya; and (v) Registered Land Act.	Through census and socio-economic surveys of the affected population, identify, assess, and address the potential economic and social impacts of the project that are caused by involuntary taking of land (e.g., relocation or loss of shelter, loss of assets or access to assets, loss of income sources or means of livelihood, whether or not the affected person must move to another location) or involuntary restriction of access to legally designated parks and protected areas. Land-for-land exchange is the preferred option; compensation is to be based on replacement cost.	Kenya has no specific legislation that explicitly addresses the issues of involuntary resettlement or forced evictions. There are laws and legislations that have provisions referring to resettlement but they vary in substance and process.	From the socio-economic survey, it proved that the project has been supported and hence there is no compulsory acquisition to be invoked. The replacement costs approach will apply in compensation packaging in line with World Bank OP4.12/JBIC guidelines.
Land Tenants/Informal	Rentals and leases are valued separately. Landlord and tenant	For those without formal legal rights to lands or claims to such	Those without formal legal rights or claims to such lands are not	From the socio-economic survey, most tenants were observed to

Types of Affected Persons/Lost Assets	Kenyan Law	World Bank OP4.12/JBIC Guidelines	Comparison/Gaps	Countermeasure and/or Recommendations to bridge the comparison/Gaps
Setters	(shops, hotels catering, small businesses) Cap 301 Section 4 of the Act provides that: (i) notwithstanding the provisions of any other written law or anything contained in the term and conditions of a controlled tenancy, no such tenancy shall terminate or be terminated, and no term or condition in, or right or service enjoyed by the tenant of, any such tenancy shall be altered, otherwise than in accordance with the following provisions of this Act; (ii) a landlord who wished to terminate a controlled tenancy, or to alter, to the detriment of the tenant under, such a tenancy, shall give notice in that behalf to the tenant in the prescribe form.	land that could be recognized under the laws of the country, the government should provide resettlement assistance in lieu of compensation for land, to help improve or at least restore those affected persons' livelihood.	entitled to be resettled or compensated.	have only 2 month-worth of rent as deposit held by the landlord. Therefore they will be given adequate notice to vacate to ensure that such deposits are exhausted. However, in case of commercial leases, the remaining equivalent of the lease will be paid to tenants as compensation.
Land Users	Sections 117 and 118 cover expropriation of unregistered trust lands. Parliament may empower a county council to set apart trust land for: (i) the use and occupation of any public body or authority for public purposes; (ii) prospecting or	Identify and address impacts also if they result from other activities that area: (a) directly and significantly related to the proposed project, (b) necessary to achieve its objectives, and (c) carried out or planned to be carried out contemporaneously	No equivalence between World Bank/JBIC and Kenyan system for identifying and addressing impacts resulting from project related activities.	The Supplementary RAP came across households that were allocated county council land in the Shika- Adabu area. However, since they are all willing to surrender the land for road construction, Compulsory acquisition will not apply.

Types of Affected Persons/Lost Assets	Kenyan Law	World Bank OP4.12/JBIC Guidelines	Comparison/Gaps	Countermeasure and/or Recommendations to bridge the comparison/Gaps
	mining purposes; or (iii) the use and occupation of any person or persons for a purpose which is likely to benefit the residents of the area. Trust lands refer to that land that is still under African customary tenure. The title of this land is said to vest in the Country Council in trust for its inhabitants, hence the term "Trusts"(Land Acquisition Act Chapter 288).	with the project.		Instead, compensation will be paid as per the replacement cost approach.
Owners of Non-permanent Buildings	There are no specific provisions in Kenya law and regulation dealing separately with non-permanent building.	For those without formal legal rights to lands or claims to such land or assets that could be recognized under law of the country, World Bank/JBIC policy provides for resettlement assistance in lieu of compensation for land, to help improve or at least restore their livelihoods.	World Bank OP 4.12 states that if the impacts include physical relocation, the resettlement plan or resettlement policy framework includes measures to ensure that the displaced persons are- (i) provided assistance (such as moving allowances) during relocation; and (ii) provided with residential housing, or housing sites, or, as required, agricultural sites for which a combination of productive potential, locational advantages, and other factors is at least equivalent to the advantages of the old site. The Kenyan system does not allow	Majority of the houses affected by the Project are temporary dwellings. However the Supplementary RAP should not discriminate in compensation between permanent and non-permanent buildings.

Types of Affected Persons/Lost Assets	Kenyan Law	World Bank OP4.12/JBIC Guidelines	Comparison/Gaps	Countermeasure and/or Recommendations to bridge the comparison/Gaps
			for provision of residential housing for project affected people and is only in favor of compensation.	
Owners of Permanent Buildings	There are no specific provisions in Kenya law and regulation dealing separately with permanent buildings.	Entitled to in-kind compensation or cash compensation at full replacement cost including labor and relocation expenses, prior to displacement.	As above	As above
Section II : Resettlement and Compensation Process				
Calculation of Compensation and Valuation	According to the Land Acquisition Act Chapter 295 Section 10, the Collector of Compensation inspects the affected land and values it for compensation. After the inquiry, the Collector will issue an award depending on his own assessment. The award is issued in a prescribed form, together with a statement form. The prescribed form indicates the amount of compensation awarded, while the statement gives the landowners the option of acceptance or rejection of the award. If the land owner accepts the award, the collector will issue a cheque in settlement together	Bank policy requires: (a) prompt compensation at full replacement cost for loss of assets attributable to the project; (b) of there is relocation, assistance during relocation, and residential housing, or housing sites, or agricultural sites of equivalent productive potential, as required; (c) transitional support and development assistance, such as land preparation, credit facilities, training or job opportunities as required, in addition to compensation measures; (d) cash compensation for land when the impact of land acquisition on livelihoods is minor; and (e) provision of civil infrastructure	There are no equivalent provisions on relocation assistance, transitional support, or the provision of civic infrastructure.	World Bank O.P 4.12/JBIC Guidelines should be applied.

Types of Affected Persons/Lost Assets	Kenyan Law	World Bank OP4.12/JBIC Guidelines	Comparison/Gaps	Countermeasure and/or Recommendations to bridge the comparison/Gaps
	with a formal "Notice of Taking Possession and Vesting" (Section 19). Compensation is based on the market value for private land (Section 19).	and community services as required.		
Relocation and Resettlement	The Registration Land Act Chapter 300 provides for the absolution proprietorship over (exclusive rights) by the state, and such land can be acquired by the land under the Land Acquisition Act in the project area. Furthermore, the Land Acquisition Act Chapter 95 provides for ascertainment of interests prior to land registrations under Registered Lands Act.	To avoid or minimize involuntary resettlement and, where this is not feasible, to assist displaced persons in improving or at least restore their livelihoods and standard of living in real terms relative to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.	Kenyan laws do not appear to make provisions for avoidance of minimizing of involuntary resettlement.	The Supplementary RAP came across very few cases where absolute relocation will be required. In most cases, households will be relocated to their properties to another part of the same land away from the designated road reserve hence eliminating the need for resettlement.
Completion of Resettlement and Compensation	According to the new constitution, "every person having an interest or right in or over property which is compulsory taken possession of or whose interest in or right over any property is compulsorily acquired shall have a right of direct access to the High Court for the determination of his interest or right, the legality of	Implement all relevant resettlement plans before project completion and provide resettlement entitlements before displacement or restriction of access. For projects involving restrictions of access, impose the restrictions in accordance with the timetable in the plan of actions.	There is no equivalence between Kenyan law and World Bank policies on implementing relevant resettlement plans before project completion or on providing resettlement entitlements before displacement or restriction of access.	Compensation will be paid before ground breaking in line with the new constitution.

Types of Affected Persons/Lost Assets	Kenyan Law	World Bank OP4.12/JBIC Guidelines	Comparison/Gaps	Countermeasure and/or Recommendations to bridge the comparison/Gaps
	the taking of possession or acquisition of the amount of any compensation to which he is entitled;			
Livelihood Restoration and Assistance	There are no specific provisions for livelihood restoration, but references are made to some for assistance.	Livelihoods and living standards are to be restored in real terms to pre-displacement levels or better.	Kenyan policy and legislation would need to be aligned with Bank policy to effectively guarantee rights of all affected persons of involuntary resettlement.	World Bank OP 4.12/JBIC Guidelines should be applied. Thus, all livelihood affected persons, fishermen and fish traders, boat owners operators, small scale traders, boda-boda operators etc. have been allocated for in the Entitlement Matrix in the RAP.
Consultation and Disclosure	Land Acquisition Act Cap 295, Section 3 also provides that: "Where the Minister is satisfied that the need is likely to arise for the acquisition of some particular land under section 6, the Commissioner may cause notice thereof to be published in the Gazette, and deliver a copy of the notice to every person who appears to him to be interested in the land.	Consult project-affected persons, host communities and local NGOs, as appropriate. Provide them opportunities to participate in the planning, implementation, and monitoring of the resettlement program, especially in the process of developing and implementing the procedure for determining eligibility for compensation benefits and development assistance (as documented in a resettlement plan), and for establishing appropriate and accessible grievance mechanism.	Even though notices are made in the Gazette, the practice has been that where a mitigation plan affects local communities, proceedings are conducted in the local language. This is significant considering the compensation of those most likely to be affected(e.g. squatters).	The entire project was disclosed in local media in line with EMCA 1999. Further, a total of 15 meetings were held to disclose the Project inclusive of the Supplementary RAP in line with World bank OP4.12/JBIC Guidelines.

Types of Affected Persons/Lost Assets	Kenyan Law	World Bank OP4.12/JBIC Guidelines	Comparison/Gaps	Countermeasure and/or Recommendations to bridge the comparison/Gaps
Section III : Dispute Resolution				
Grievance Mechanism and Dispute Resolution	Grievance procedures may be invoked at any time, depending on the complaint. No person or community from whom land or other productive assets are to be taken will be required to surrender those assets until any complaints she/he has about the method or value of the assets or proposed measures are satisfactorily resolved.	Establish appropriate and accessible grievance mechanisms.		A practical grievance redress procedure has been proposed for in this RAP in line with World Bank OP 4.12/JBIC Guidelines.

Source: Safeguards Diagnostic Review for Piloting the Use of Kenyan Systems to Address Environmental Safeguard Issues in the Proposed World Bank-Assisted Kenya Energy Development and Access Project (KEDAP), December 2006

20.2.2 Necessity of Relocation

Based on JBIC Guidelines/World Bank O.P 4.12, the new alignment was proposed in order to minimize the number of PAPs and impact to environment. The number of PAPs and Project Affected Structures of the original alignment and proposed alignment is shown in Table 20.2-2.

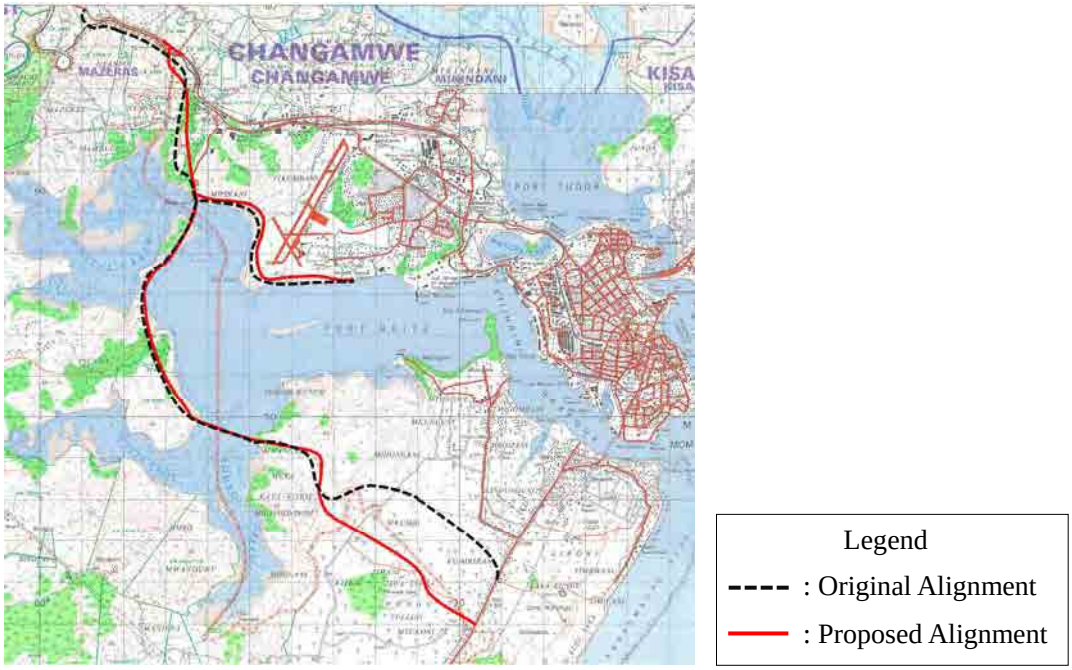


Figure 20-2-1 Original Alignment and Proposed Alignment

Table 20.2-2 Number of PAPs and Project Affected Structures of the Original Alignment and Proposed Alignment

Category	Unit	Original Alignment	Proposed Alignment	Difference
Land Owner	Person	597	459	-138 (23%)
Project Affected Population	Person	3,340	3,067	-273 (-8%)
House, Shed	No.	370	226	-144 (-39%)
School	No.	2	0	-2 (-100%)
Mosque	No.	2	0	-2 (-100%)
Church	No.	1	0	-1 (-100%)
Fisherman	Person	220	250	+30 (+14%)
Fish Farmer	Person	No Data	21	N/A
Famer	Person	No Data	407	N/A
Boat Operator	Person	No Data	6	N/A
Canoe Operator	Person	No Data	11	N/A
Boba-boda Operator	Person	No Data	38	N/A
Conservation Group	No.	No Data	30	N/A
Economic Tree	No.	21,949	14,413	-7,536 (-34%)

Source: Draft RAP Report Mouchelparkman in association with CAS Consultant Ltd and Supplementary RAP

20.2.3 Socio-economic Study

(1) Data Collection Methodologies

The socio-economic study such as Senses Survey, Assets and Land Survey and Livelihood and Living Survey was carried out to ensure that impact and compensation assessments are based on current and verifiable socio-economic and demographic information. Also comprehensive questionnaire was prepared in order to capture information on such as source of income, number of children, adult male and female, type of land tenure, land size, number and type of structure, type of crops and economic trees etc.

The local consultant which subcontracts the Supplementary RAP preparation works used GPS devices to locate the proposed alignment center and ROW to determine the 110m road corridor.

(2) Cut-off Date

The Cut-off Date eligible for compensation was set on 15th July 2011 when the socio-economic survey for the proposed alignment commenced. No structure and field established in the project-affected area after the Cut-off Date shall be eligible for compensation. The Cut-off Date has been explained and declared during the informative meetings to all interested parties in the area.

20.2.4 Valuation of and Compensation for Losses

The valuation was based on detailed field date collected and physical measurements of land, buildings & other structures and economic trees. Also market surveys for land, building materials and economic crops were carried out in order to set the framework for valuation. As a principle, valuation in the Supplementary RAP adopted the replacement cost method with the twin goals of restoration and rehabilitation to standards higher than original.

<u>Value of Land under ROW</u>

Length of land taken by ROW was multiplied by the 110m width to yield area in square meters from which total hectares and acres to be acquired was computed. The latter figure (acres) was multiplied by the market prices for land within the target locality to yield an estimate of total cost of the land to be acquired for Way Leaves. Determination of the land value factored many parameters including the current market prices as obtained from diverse sources land and property agents, local administration, land control boards, property owners, recent research papers and reports, etc.) The final compensation value factored in likely escalation in land prices owing to influx of speculators and the purpose was to ensure that, at

all times, PAPs can afford to buy land in the same villages. All entitlements also factored in a statutory 15% mark-up required for all compulsory acquisition.

Valuation of Buildings and Other Structures

Valuation of buildings and other structures used an estimate of the total effort invested in terms of building materials (floor, wall, roof type, finish and labour input) which was valued at market rates without factoring in depreciation. The outcome was used to adjust the value of target property as previously estimated by the owner during questionnaire surveys so as to arrive at objective costing of the total damage due to the target structure.

Implementation of the replacement cost to arrive at the total cost implication of replacing assets to be relocated faced challenges in that, on account of extreme poverty, some of the PAPs live in sub-standard dwellings (Figure 20.2-2) which were considered unfit for human habitation, and which do not merit replacement. As such, other than the replacement cost, this RAP aspired to provide the next best standard of house for affected households. For such PAPs, a flat rate compensation package has been proposed.

Figure 20.2-2 Sample of Sub-standard Dwelling

Value of Trees within the ROW

The projected income at economic life was applied in valuation of trees falling within the ROW. Valuation of economic trees factored 2 parameters namely;

i) Standing value of the resources either through computation of the total investment so far or, computation of gross income from liquidating the tree (sale of timber, firewood, etc).
ii) Computation of the net discounted income at the end of economic life of the tree

In the case of non-productive trees, valuation ended at the first level while for commercial trees such as coconut, cashew nut etc., gross value was obtained from summation of outcome of computations from (i) and (ii) above.

20.2.5 Income Restoration

One of the objectives of the Supplementary RAP is to ensure that livelihoods are improved or restored to pre-displacement levels. Compensation for affected property will therefore seek to facilitate full and smooth recovery without exposing the PAPs to vulnerability and this applies to people who are not necessarily physically displaced but who are affected by a land loss that affects their sustainability.

The following principles will be followed on effecting payment of compensation for lost assets:

- Compensation shall be paid prior to acquisition or displacement.
- Compensation will be at replacement cost.
- Compensation for structures shall include the full cost of materials and labour required for reconstructing a building of similar and preferably better and standing. In other word, the affected person must be able to have their structure rebuilt in a different location using the compensation paid for the old building. Depreciation will not be taken into account while calculating the cost of affected structures. The compensation package will also include cost of moving such as transport costs as well as any associated land titling or transfer fees.
- To consult stakeholders including communities and ensure their participation in the compensation policy for loss of land.

20.2.6 Grievance Procedure

Grievance procedure may be invoked at any time, depending on the complaint and no person or community from whom land or other productive assets are to be taken will be required to surrender those assets until any complaints he/she has about the method or value of the assets or proposed measures are satisfactorily resolved. In order to deal with the grievance that may rise during the implementation, the Supplementary RAP has identified procedures to allow affected people to lodge a complaint or a claim (including claims that derive from customary law and usage) without cost and with the assurance of a timely and satisfactory resolution of that complaint or claim in which case, dialogue is a vital element. The grievance redress mechanisms is designed with the objective of solving disputes at the earliest possible time which will be in the interest of all parties concerned and therefore implicitly discourages referring such matter to the courts which would otherwise take a considerably longer time. The grievance procedure will be simple, administered as far as possible at the local levels to facilitate access, flexible and open to various proofs. Figure 20.2-1 shows a schematic presentation of the overall grievance procedures recommended.

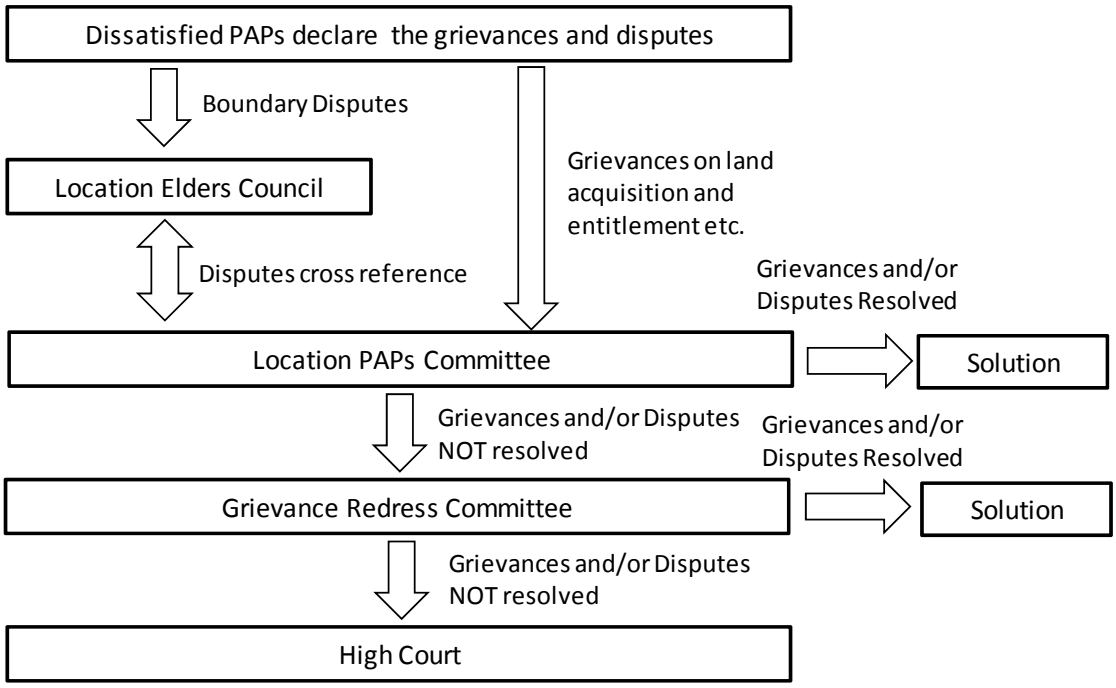


Figure 20.2-3 Recommended Grievance Redress Procedure

20.2.7 Entitlement Matrix

The entitlement matrix shows the full range of affected people, types of loss they will suffer, and the compensatory measures that will be applied in order to meet JBIC Guidelines/World Bank O.P4.12 for resettlement in table 20.2-3.

Table 20.2-3 Type of Loss and Compensatory Measures for Different Categories of PAPs

Type of Loss	Unit of Entitlement	Compensatory Measures
A: Loss of Agricultural Land		
Part of land lost or residual land is viable[1]	A) Title Holders	・ 100% cash compensation as replacement cost for the portion surrendered ・ 15% cash top-up compulsory acquisition
	B) Tenants	・ Cash compensation for standing tree crops ・ Advance notice to vacate
	C) Informal Settlers	・ Cash compensation for standing tree crops ・ Advance notice to vacate
All land lost or residual land is economically non-viable.	A) Title Holders	・ 100% cash compensation at replacement cost for the lost portion ・ 15% cash top-up compulsory acquisition
	B) Tenants	・ Cash compensation for standing tree crops ・ Advance notice to vacate
	C) Informal Settlers	・ Cash compensation for standing tree crops ・ Advance notice to vacate
B: Loss of Residential/Commercial/Industrial Land		

[1] Non arable land either because of rockiness, slope exceeding 55%, water logging, or cannot afford space adequate for housing and economic utilization.

Type of Loss	Unit of Entitlement	Compensatory Measures
Partial loss of land but residual is viable[2]	A) Title Holders	· 100% cash compensation for loss at replacement cost · 15% cash top-up in compulsory acquisition
	B) Tenants/Lease Holders	· Cash compensation for standing tree crops · Advance notice to vacate
	C) Informal Settlers	· Cash compensation for standing tree crops · Advance notice to vacate
Entire loss of land or partial loss where residual is non-viable	A) Owners	· 100% cash compensation for entire land holding at replacement cost · 15% cash top-up in compulsory acquisition · Residual land reverts to community
	B) Tenants/Lease Holders	· Replacement cost for standing assets · Advance notice to vacate
	C) Informal Settlers	· Replacement cost for standing assets · Possibility of land grant where possible[3] · Advance notice to vacate
C: Loss of Structure		
Partial loss but residual viable in owner-built structures	A) All Categories of Occupiers	· Cash compensation at replacement cost for affected portion calculated on market value without depreciation · Repair costs for unaffected structure equivalent to 25% of the compensation · Moving assistance such as house replacement, assistance of rent for some period and moving cost · Right to salvage materials · Advance notice to vacate
Fully affected/partly affected and remaining structure is non-viable in owner-built	A) All categories of Occupiers	· Cash compensation at replacement cost based on market value without depreciation · House building allowance at 25% of compensation · Moving assistance such as house replacement, assistance of rent for some period and moving cost · Right to salvage materials · Advance notice to vacate
Loss of occupied portion	A) Lease Holder	· Re-imbursement of remaining worth of lease or tenancy deposit · Moving assistance such as house replacement, assistance of rent for some period and moving cost · Advance notice to vacate
	B) Informal Settler	· Value and entitlement for structure will be claimed by legal owner · 3 months rent equivalent on compassionate grounds · Moving assistance such as house replacement, assistance of rent for some period and moving cost · Advance notice to vacate
D: Loss of Standing Tree Crops		
	All Cultivators	· Compensation for any non-agricultural trees, shrubs/ permanent grass cover based on economic value for tree and vegetation

[2] Land can still be exploited economically for residential, commercial or industrial uses as per local zoning class.

[3] Some of the informal settlers do not know of any land and are too frail to fend for themselves. Unless resettled, displacement would spell doom for them.

Type of Loss	Unit of Entitlement	Compensatory Measures
		・ Cash compensation based on income for entire life-cycle in case of permanent crops ・ Cash compensation at gross yield value for temporary crops such as cassava
E: Loss of Community Proprietary Resources		
	All Community Proprietary Resources	・ In-kind replacement for affected resources
F: Assistance to Vulnerable Groups		
	All Vulnerable Groups	・ Socio-department of KeNHA to consider other assistance over and above compensation package to cushion them against impact or vulnerable groups
G: Loss of Livelihood		
	Boat Owners	・ 3 months cash handout for income replacement
	Boat Operators	・ 3 months cash handout worth of wages paid
	Canoe Owners	・ 3 months cash handout worth of income paid
	Canoe Operators	・ 3 months cash handout worth of wages paid
	Fishermen	・ Provision with alternative and new fish land beach ・ Capacity building and equipment for deep sea fishing ・ Income replacement for any day of work lost due to construction activity
	Small Scale Traders	・ 3 months cash handout for income replacement computed at the gross average daily income
	Fish Traders	・ Benefit from modern fish market in the new beach area
	Fish Farmers	・ In-kind replacement of loss assets plus 3 months cash handout for loss of income
	Boda-boda Operators	・ 1 month worth of income replaced before identification of other routes
	Conservation groups	・ Capacity building for fish farming ・ Income replacement for lost assets and anticipated income.
	Landlord	・ 3 months cash hand-out worth of gross rent
	Estate Developer	・ Re-imbursement of lost income for entire premises replacement cost rent ・ Right to salvage materials
	Football Club	・ Fund to purchase and equip a football pitch
H: Grave		
	Individual Graves	・ Negotiated re-imbursement for translocation costs including option for physical translocation
	Communal Graveyards	・ Negotiation of available options

Source: Draft RAP Report, October 2011, Repcon Associates

20.2.8 Monitoring and Evaluation

(1) Indicators and Means for Verification

Indicators form the key elements of any monitoring and evaluation system. The advantage of identifying indicators is that it provides management and staff with a clear set of targets at each level of performance and ensures that progress can be measured against the targets.

Indicators also make possible the comparison of inputs with the completion of outputs and achievement of objectives and goals, thus providing the basis for performance evaluation. For purposes of the RAP, four categories of indicators have been formulated to facilitate monitoring of Progress, Outputs, Effects, Impacts and Compliance in implementing the project.

Progress/Output Monitoring

For purposes of the Supplementary RAP, deliverables (outputs) have been clearly outlined in the Entitlement Matrix and the Assets Register which will form the basis for payment of compensation. Progress will be monitored on the basis of basis of periodic outputs as per the Implementation Schedule, Annual Work Plan and Project Implementation Manual while outputs will be monitored on the basis of actual number of PAPs compensated.

Output monitoring will be reported through periodic reports produced by the Project Management Unit (PMU) and backed up by signed consent certificates by PAPs. These reports will form the basis for routine external monitoring by both GoK agencies and JICA.

Effect Monitoring

Effect Monitoring will be used to measure the extent to which the immediate objectives have been achieved and give an idea of the results emanating from implementing the Supplementary RAP e.g., percentage of PAPs now accessing better housing or improved livelihoods on account of being successfully resettled. Effect monitoring especially through end of term project evaluation is also useful in documenting lessons learned from project implementation which can also be replicated elsewhere. Effect monitoring will best be achieved through routine and end term project evaluation conducted by KeNHA.

Impact Monitoring

This is the process through which, assessment of the overall achievement of the project goal will be made. Specifically, this is the system that will generate data to gauge the impact of the resettlement on the PAPs, including the vulnerable groups. The basis for impact monitoring is the baseline social-economic survey data against which all the well-being PAPs will be compared.

(2) Internal Monitoring

Within the internal monitoring framework, subject matter specialists (including the Resettlement Officer) of the PMU will file monitoring reports to the project coordinator who will review, collaborate and submit to the KeNHA. KeNHA will review and synthesize monitoring reports to:

- Provide timely information about all resettlement arising as a result of development of the bypass road project;
- Identify any grievances that have not been resolved at local level and require resolution through the involvement of the PMU;
- Document the timely completion of project resettlement obligations for all permanent and temporary losses;
- Evaluate whether all PAPs have been compensated in accordance with the requirements of the Supplementary RAP and that PAPs have higher living standards in comparison to their living standards before physical or economic displacement.
- Evaluate whether all PAPs have been compensated in accordance with the requirements of the Supplementary RAP and that PAPs have higher living standards in comparison to their living standards before physical or economic displacement.

Upon internal verification of all reports, KeNHA will submit the same to both GoK and JICA for review and advice through a feedback mechanism.

(3) External Monitoring

The Supplementary RAP acknowledges magnitude and strategic importance of the Mombasa Southern Bypass, it will attract huge attention from many stakeholders who will keenly monitor progress. It is thus important for the project to develop their own database that will be readily availed to interested parties.

External monitoring of the Supplementary RAP will be undertaken alongside that of other project components. It is expected that KeNHA will mount routine monitoring in response to PMU reports while other agencies both within and outside government (Efficiency Monitoring Unit, Parliamentary Committees, NEMA etc.) will routinely monitor progress including implementation of both social and environmental mitigation. Other External Monitoring will take place as follows:

Midterm Monitoring

The Project will undergo monitoring after two years to determine status of resettlement process alongside other components.

Monitoring by JICA

In the capacity of strategic partner to the Project, JICA will routinely field monitoring teams who will screen the project for adherence to JBIC Guidelines/World Bank OP 4.12.

Post Project Impact Assessment

In order to ensure that compensation and assistance will enable the affected people to improve or restore their livelihoods, an impact assessment will be undertaken 6 - 12 months after the implementation is completed to evaluate whether the intended objectives were realized. For this, suitable baseline indicators related to income, assets, land ownership, expenditure pattern of key activities, housing conditions, access to basic amenities, demographic characteristics, indebtedness, etc. have been provided in the baseline socio-economic survey.

20.3 Contents of Supplementary RAP

The contents of the supplementary RAP are tabulated in Table 20.3-1. The Supplementary RAP will add some contents missing and revised contents to be improved.

Table 20.3-1 Contents of the Supplementary RAP

Table of Contents Supplementary RAP		Existing RAP Report		Supplementary RAP
		Surveyed/ Analysed	Corresponding Chapters	Surveyed/ Analysed
1	Description of the Project	-	-	-
1-1	The Project Background	-	-	-
1-1-1	Overview	○	Chapter-1,2	○
1-1-2	Objectives of the Project	○	Chapter-1,2	○
1-1-3	Project Justification	x	x	○
1-2	Outline of the Project	-	-	-
1-2-1	Project Location	○	Chapter-2	○
1-2-2	Project design Concept and Objectives	x	x	○
1-2-3	Project Components	○	Chapter-2	○
1-2-4	Project Phasing and Activities	x	x	○
2	Potential Impacts	-	-	-
2-1	Project Component with triggers to Resettlement	Δ	Chapter-6	○
2-2	Zone of Impact by Component	x	x	○
2-3	Alternatives Considered to Avoid or Minimize Resettlement	x	x	○
2-4	The Mechanisms Established to Minimize Resettlement	x	x	○
3	Socio-economic Survey	-	-	-
3-1	Result of Census Survey	-	-	-
3-1-1	Overview of the Survey			
3-1-2	Current Occupants of the Affected Area	○	Chapter-4	○
3-1-3	Standard Characteristics of Displaced Households	○	Chapter-4	○
3-1-4	Magnitude of Expected Loss of Asserts	x	x	○
3-1-5	Information on Vulnerable Group	Δ	Chapter-4	○
3-2	Other Surveys Describing the Followings	-	-	-
3-2-1	Land Tenure and Transfer Systems	Δ	Chapter-4	○
3-2-2	Patterns of Social Interaction	x	x	○
3-2-3	Social Infrastructure and Services	○	Chapter-4	○
3-2-4	Social and Cultural Characteristics of Affected People	○	Chapter-4	○
3-2-5	Attitude to the Project	x	x	○
4	Legal Framework	-	-	-
4-1	Applicable Legal and Administrative Procedures	○	Chapter-3	○
4-2	Laws and Regulations Relating to the Implementing Agencies	-	-	-
4-2-1	Constitutional Rights to Land Ownership	○	Chapter-3	○
4-2-2	Requirements of Kenya Laws	○	Chapter-3	○
4-2-3	Statutory Mechanism for Land Acquisition	○	Chapter-3	○
4-3	JBIC Guidelines and World Bank's Operational Polices	-	-	-
4-3-1	Environmental and Social Consideration of	x	x	○

Table of Contents Supplementary RAP		Existing RAP Report		Supplementary RAP
		Surveyed/ Analysed	Corresponding Chapters	Surveyed/ Analysed
	JBIC			
4-3-2	World Bank Safeguard Policies	Δ	Chapter-3	○
4-3-3	Commonalities between GoK, WB and JBIC Guideline	x	x	○
4-4	Gaps between Local Laws and the JBIC Guidelines and World Bank's Operational Policy	x	x	○
5	Institutional Framework.	-	-	-
5-1	Identification of Agencies Responsible for Resettlement Activities	-	-	-
5-1-1	Overview of the Institutional Framework	Δ	Chapter-7	○
5-1-2	Levels of Project Implementation	Δ	Chapter-7	○
5-2	Role and Responsibilities within the Institutional Framework	-	-	-
5-2-1	National Level Institutions	Δ	Chapter-7	○
5-2-2	Regional Level Institutions	Δ	Chapter-7	○
5-2-3	Project Level Institutions	Δ	Chapter-7	○
5-3	Assessment of the Institutional Capacity of such Agencies	-	-	-
5-3-1	Capacity Building Needs for National Level GoK Agencies	x	x	○
5-3-2	Capacity Building for Project Implementation	x	x	○
6	Eligibility	-	-	-
6-1	Principle Authorities	○	Chapter-6	○
6-2	Eligibility for Compensation	○	Chapter-6	○
6-3	Declaration	x	x	○
7	Valuation of and Compensation for Losses	-	-	-
7-1	Overview	x	x	○
7-2	Safeguards for Transparency	○	Chapter-6	○
7-3	Data Synthesis	x	x	○
7-4	Approach to Valuation	x	x	○
8	Resettlement Measures and Entitlement Matrix	-	-	-
8-1	Principles of this RAP	-	-	-
8-1-1	Minimization of Displacement	x	x	○
8-1-2	Livelihood Restoration	○	Chapter-6	○
8-1-3	The Need to Cushion Vulnerable Groups	○	Chapter-6	○
8-1-4	A Fair and Equitable set of Compensation must be Negotiated	○	Chapter-6	○
8-1-5	Assistance in Relocation must be Made Available	○	Chapter-6	○
8-1-6	Resettlement must be Seen as an Inevitable Upfront Cost	Δ	Chapter-6	○
8-2	The Cut-off Date	○	Chapter-6	○
8-3	The Entitlement Matrix	○	Chapter-6	○
9	Community Participation	-	-	-
9-1	Description of the Strategy for Consultation with and Participation of Resettlers	x	x	○

Table of Contents Supplementary RAP		Existing RAP Report		Supplementary RAP
		Surveyed/ Analysed	Corresponding Chapters	Surveyed/ Analysed
9-2	Summary of the Views Expressed Views	○	Chapter-5	○
9-3	General Participations of the Community and PAPs	○	Chapter-5	○
9-4	Assimilation of Stakeholder Comments into the RAP	x	x	○
10	Grievance Procedures	-	-	-
10-1	Overview	○	Chapter-6	○
10-2	PAP to PAP Counselling	x	x	○
10-3	The Location Elders Council	x	x	○
10-4	Location PAPs Committee	x	x	○
10-5	Grievance Redress Committee	○	Chapter-6	○
10-6	The High Court	○	Chapter-6	○
10-7	Costs in the GRM	x	x	○
11	Organizational Responsibilities	-	-	-
11-1	Overview	Δ	Chapter-7	○
11-2	Levels of Accountability in the Project	x	x	○
11-3	Tools in Project Organization and Management	x	x	○
11-4	Organization Responsibility in the Project	Δ	Chapter-7	○
12	Implementation Schedule	-	-	-
12-1	Loan Effectiveness and Implementation Planning	x	x	○
12-2	Implementation Phase Activities	○	Chapter-7	○
12-3	Compensation Process	x	x	○
12-4	Removal of Assets	x	x	○
13	Costs and Budget	-	-	-
13-1	Costs in the Resettlement Process	x	x	○
13-2	Total Budget for the RAP	○	Chapter-9	○
14	Monitoring and Evaluation	-	-	-
14-1	The Concepts	x	Chapter-8	○
14-2	Indicators and Means for Verification	x	Chapter-8	○
14-3	Procedure for Internal Monitoring under the Project	○	Chapter-8	○
14-4	External Monitoring	○	Chapter-8	○
14-5	Post Project Impact Assessment	x	Chapter-8	○
14-6	Support for External Monitoring	x	Chapter-8	○

Note: ○: Surveyed and/or analysed, Δ: Partially surveyed and/or analysed, x: Not surveyed and/or analysed
Source: JICA Survey Team

CHAPTER 21 ASSISTANCE FOR THE STAKEHOLDER CONSULTATION MEETING

21.1 First Stakeholder Consultation Meetings

21.1.1 Objectives

The objectives of the first stakeholder consultation meetings are to disseminate the outline of the project, and social and environmental considerations.

21.1.2 First Stakeholder Consultation Meeting in Changamwe

550 stakeholders from local residents, government/private sectors, research/educational institutions and media participated in the meeting. Most of the participants expressed favour of the project expecting its promotion of economic activity and tourist industry. In addition, since this area has been under constant strain of heavy traffic jam caused by vehicles related to port activity, the project is highly expected to alleviate the traffic jam.

However, some attendances requested to implement careful social and environmental considerations.

21.1.3 First Stakeholder Consultation Meeting in Likoni

471 stakeholders from local residents, government/private sectors, educational institutions and media participated in the meeting. Most of the participants expressed favour of the project expecting its promotion of economic activity and employment opportunity related to the construction of the proposed roads.

However since a lot of PAPs are located in Likoni area, questions and inquires concerning compensation and the proposed alignment were raised.

21.2 Second Stakeholder Consultation Meetings

21.2.1 Objectives

The objectives of the second stakeholder consultation meetings are to present the result of the supplementary EIA survey such as Ambient Air Quality, Noise Level, Flora & Fauna and Sediment Quality, and draft RAP based on socio-economic survey carried out shortly after the first stakeholder consultation meetings.

21.2.2 Second Stakeholder Meeting in Changamwe

226 stakeholders, mainly PAPs participated in the meeting. The main concern of participants is proper and adequate compensation for PAPs and no adverse claim and view is raised.

21.2.3 Second Stakeholder Meeting in Likoni

238 stakeholders, mainly PAPs participated in the meeting. Most of the participants showed understanding of compensation for PAPs. Meanwhile participants from Pungu village in Kwale District expressed strong opposition to the proposed road alignment which passes through the village.

21.3 Other Stakeholder Consultation Meetings

21.3.1 Objectives

The objectives of the meetings are to ask cooperation for the socio-economic survey from potential PAPs and collect their detail opinions and views toward the Project.

21.3.2 Stakeholder Consultation Meeting in Village Level

The local consultant together with the relevant officials in KeNHA and local provinces organized and facilitated totally 11 times of stakeholder consultation meetings in village level.

Table 21.3-1 Record of Stakeholder Meetings in Village Level

Date	District	Village	No. of Participants
23rd July 2011	Likoni	Pungu, Kwale	45
		Kiteje, Kwale	28
24th July 2011	Changamwe	Miritini	37
26th July 2011	Kinango	Tsunza	36
	Likoni	Mtongwe	68
27th July 2011	Changamwe	Port Reitz	39
29th July 2011	Changamwe	Miritini	45
25th August 2011	Likoni	Mwangala	186
10th September 2011	Kwale	Pungu	132
21st September 2011	Likoni	Shikadabu	129
27th September 2011	Kwale	Pungu	125

21.4 Summary of the Opinions and Views Expressed

21.4.1 Comments from Land/Asset Owners

i. PAPs require adequate and prompt compensation for their land and property in case to be affected.

ii. PAPs need adequate pre-notice to vacate their current residence. Once being compensated, they should be given ample time to vacate since they will need to look for alternative accommodation.
iii. Some PAPs need transport to enable them to carry their goods to the new residences that they will obtain.
iv. All PAPs generally fear whether or not they can get adequate compensation for land and economic tree to be affected.
v. All PAPs need practical and free access grievance redress mechanism.

21.4.2 Comments from Fishermen

i. Fishermen fears that they may be denied access to their fish land and fishing sites where the bridges site is fenced out. They demanded that alternative access to the sea for fishing should be provided.
ii. Fishermen fears that they may not catch fish during the bridges construction. Also during operation, they fear that discharges of runoff from the bridge will pollute the creeks and thus spoil the fishing industry little by little.

21.4.3 Comments from Fish Traders

i. Fish traders fear that they will be unable to catch fish and thus loose the income from fishing trade.
ii. Fish traders feat that they will be unable to travel to other markets to obtain fish for sale.

21.4.4 Comments from Boat Operators

i. Boat operators fear that their transport business will die out once the bridges are constructed and operational.

21.4.5 Comments from Conservation Groups

i. Conservation groups fear that once their area of operation is fenced out for the bridges, they will lose their current income from fish farming and mangrove seeding.

21.5 Reflections of Opinions and Views from Stakeholders

Taken account of opinions and views raised in the stakeholder consultation meetings, countermeasures are elaborated as follows:

- ✓ Alternative road alignment which avoids Pungu village
- ✓ Proper and adequate compensation for PAPs
- ✓ Practical grievance redress mechanism for all PAPs, especially for poor PAPs
- ✓ Employment measures during construction stage
- ✓ Mitigation measures against noise impact and impact on flora & fauna

- ✓ Installation of oil separator tank to avoid water pollution

CHAPTER 22 RECOMMENDATIONS

(1) Staged Construction

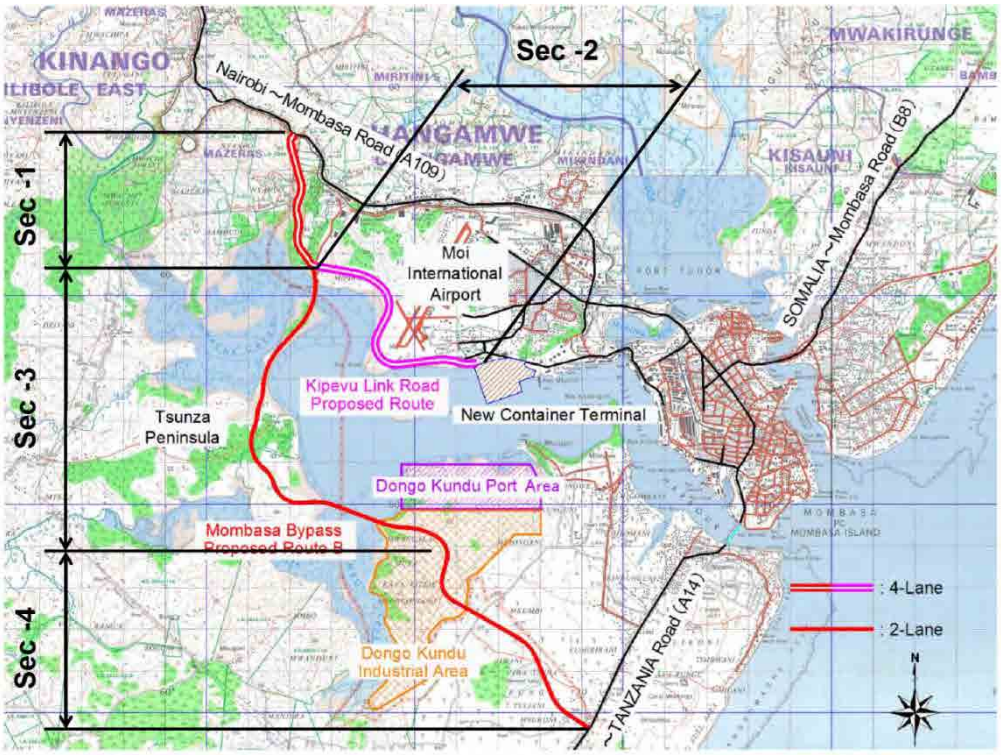
Staged Construction is recommended with the following considerations:

- Initially, 2-lanes are appropriate for Section 3 & 4 from the view point of traffic capacity and economic feasibility.
- The appropriate timing of widening Section 3 & 4 into 4-lanes depends on future development of Dongo Kundu Area which is expected to be promoted around 2025.

Stage Construction:

Phase-1: Construction of Section 1 & 2 with 4-lanes and Section 3 & 4 with 2-lanes

Phase-2: Widening Section 3 & 4 into 4-lanes



Source: JICA Survey Team

Figure 22.1-1 Section for Stage Construction

(2) Timely Implementation of RAP

A large size of resettlement of affected houses and land acquisition are required for the Project. To implement the project without delay, smooth implementation of resettlement and land acquisition is the key for which the following are recommended:

- Establish RAP committee composed of representatives from the related government organizations and local communities to coordinate and implement the resettlement and land acquisition.
- Establish RAP implementing team at the Project site under KeNHA to conduct the negotiation for compensation for resettlement and land acquisition
- Assign a sociologist within consultant team to assist and monitor the resettlement and land acquisition. Periodic report should be prepared by him.
- RAP should be commenced as the start of the detailed design and be completed before the start of the construction.

(3) Preservation of Natural Environment

The Project road runs through mangrove forest and tidal flat lands. Measures should be taken to preserve the natural environment.

- Contractor's registration of ISO14000s (Environmental Management System) should be one of the qualification conditions.
- Contractor's construction plan regarding environmental preservation should be strictly evaluated in the tendering.
- An environmental specialist should be assigned in the consultant team to inspect the work in accordance with the EIA monitoring plan.