## Republic of Kenya

FY2016 Ex-Post Evaluation of Japanese Grant Aid Project "The Project for the Construction of Nairobi Western Ring Roads" External Evaluators: Yuko Kishino and Yukitoshi Matsumoto, IC Net Limited

#### 0. Summary

This project aimed to reduce travel time and enhance safety and comfort for pedestrians and bicycle users by connecting the roads that had missing links to trunk roads in Nairobi city, thereby contributing to mitigation of traffic congestion in the nearby roads, vitalization of the economy of the areas, and improvement of living conditions of the local residents. The objectives matched the development plan and needs of the government of Kenya and Nairobi County both at the time of planning and the ex-post evaluation, as well as Japan's ODA policy at the time of planning. Therefore, the relevance of the project is high. Construction works at the missing links 3, 6 and 7 were completed mostly as planned. One of the major changes from the original plan is installation of speed bumps and signage for the bumps, which addressed a strong request from the residents in the project areas to ensure safety for pedestrians and road users. Thus, it is fair to say that an appropriate measure was taken. Although the project cost was within the budget, the project period exceeded the plan. Therefore, the efficiency of the project is fair.

This project has mostly achieved its objectives. In the project sites, travel time during off-peak time was reduced almost as expected, whereas travel time in morning and evening peak hours became shorter than the baseline. However, given the recent economic growth near the project sites, traffic volume is increasing and traffic congestion remains problematic during the peak hours. Meanwhile, the roads built by the project are fully used for transport and logistics. A few transport and bus companies claim that they reduced expenses for fuel and maintenance while increasing the number of customers by using the constructed roads. It is also fair to say that the roads helped improve accessibility to such places as workplaces, schools, and hospitals for the residents near the roads. Therefore, the effectiveness and impact of the project are high. No major problems are seen in the institutional, technical, financial aspects and current status of the operation and maintenance system. Therefore, the sustainability of the project effects is high.

In light of the above, this project is evaluated to be highly satisfactory.

#### 1. Project Description





Connected Road Section at the Missing Link 7

#### 1.1 Background

With its port of Mombasa, the largest international port in the East African region, Kenya is one of the hubs of the regional economy in East Africa. Development of the road infrastructure in Kenya is important for economic growth not only for Kenya but also for the neighboring countries. At the time of the planning of this project in 2009, the road network of Nairobi City, the capital of Kenya, was not developed efficiently, and the rapid increase of economic activity and the population were causing serious traffic congestion as well as an increase of transport costs, both of which became obstacles for economic growth. The 2009 census forecasted that, the population would increase from 3 million to over 4 million in 2017<sup>1</sup> and that total vehicle-hours inside Nairobi City would increase more than fivefold from 2013 to 2020 without appropriate remedial measures<sup>2</sup>.

The project's target roads are located near the Westlands area, which is situated in the west of Nairobi City and surrounded by the international trunk roads (Waiyaki Way, Chiromo Road, and Uhuru Highway) in the north and east, the general trunk road (Ngong Road) in the south, and the auxiliary trunk road (James Gichuru Road) in the west (Figure 1). The road network in the area plays an important role in traffic between the Nairobi metropolitan area (within a 20-km radius from Nairobi City) and Nairobi City itself. However, at the time of planning, most of the trunk roads other than those mentioned above were not properly developed; there were many unpaved sections and only a few collector-distributor roads, which caused serious traffic congestion during morning and evening peak times. As the areas were developing from residential into commercial areas, which would further deteriorate traffic congestion.

Given the situation, the government of Kenya requested the government of Japan to carry out a development study ("the Master Plan and Feasibility Study to Alleviate Traffic Congestion and

<sup>&</sup>lt;sup>1</sup> Kenya National Bureau of Statistics

<sup>&</sup>lt;sup>2</sup> Nairobi Integrated Urban Development Master Plan (NIUPLAN) 2012-2014

Improve Traffic Safety in The Nairobi Metropolitan Area"<sup>3</sup>) to improve the road system in the Nairobi metropolitan area. The following pre-feasibility study identified a few urgent projects to be developed Based upon the results of this study, the government of Kenya requested the government of Japan to implement the "Project for the Construction of Nairobi Western Ring Roads."



Source: Documents provided by JICA Note: Names in color were added by the evaluators. Figure 1: Project Sites

## 1.2 Project Outline

The objective of this project is to reduce travel time and enhance safety and comfort for pedestrians and bicycle users by connecting the roads that have missing links to trunk roads in Nairobi City, thereby contributing to the alleviation of traffic congestion in the nearby roads, the vitalization of the economy in these areas, and the improvement of living conditions of the local residents.

<sup>&</sup>lt;sup>3</sup> The study was carried out from 2004 to 2006.

G/A Grant Amount / Actual Grant Amount	Detailed Design: 36 million yen /35 million Construction: 2,507 million yen / 2,284 million yen			
Exchange of Notes Date /Grant Agreement Date	February 2010 (Detailed Design) November 2010/February 2010 (Detailed Design) November 2010 (Construction)			
Executing Agency	Agency in charge: Ministry of Transport, Infrastructure, Housing and Urban Development (Ministry of Roads at the time of planning) Executing Agency: Kenya Urban Roads Authority (KURA)			
Project Completion	December 2013			
Main Contractor	NIPPO Corporation			
Main Consultant	Katahira & Engineering International (Detailed Design and Construction)			
Basic Design	February 2009–November 2009			
Related Projects	<ul> <li>[JICA]</li> <li>Specialized road maintenance management unit in Kenya (2005–2008)</li> <li>Strengthening of capacity on roads maintenance management through contracting (Phase 1: 2010–2013; Phase 2: 2013–2015)</li> <li>The master plan and feasibility study to alleviate traffic congestion and improve traffic safety in the Nairobi metropolitan area (2004–2006)</li> <li>[Other donors/agencies]</li> <li>Government of China</li> <li>African Development Bank</li> <li>European Union</li> </ul>			

# 2. Outline of the Evaluation Study

2.1 External Evaluators

Yuko Kishino, IC Net Limited Yukitoshi Matsumoto, IC Net Limited

2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule. Duration of the Study: October 2016–October 2017 Duration of the Field Study: January 29-March 1, 2017; May 13-26, 2017

#### 2.3 Constraints during the Evaluation Study

The ex-ante evaluation in 2009 specified that the objective of the project was to "alleviate traffic congestion by connecting the roads that have missing links to trunk roads in Nairobi City, thereby contributing to the alleviation of traffic congestion within the Nairobi metropolitan area, which is a logistics center," and direct impact of the project was set be to "alleviate traffic congestion within the Nairobi metropolitan area." However, the target roads are only small parts in the road network of the Nairobi metropolitan area, and traffic congestion is influenced by various factors such as other road construction projects, the population growth, and the economic growth. Thus, it is difficult to evaluate the direct impact of the project on traffic congestion in the Nairobi metropolitan area. Therefore, the ex-post evaluation focused on the project's contribution to alleviating traffic congestion at the nearby roads instead of the entire Nairobi metropolitan area.

Meanwhile, reduction of travel time at the target road sections during off-peak times was designated as one of the quantitative effects of the project to measure. At the time of ex-post evaluation, the executive agency had no quantitative data such as average traffic time, annual average daily traffic volume and demand, and average travel speed, which can help validate the estimated degree of usage of the target sections. As the evaluators were not able to obtain information on how the baseline travel time was measured, travel time at the time of ex-post evaluation was measured by a method designed by the evaluators. Traffic congestion at the nearby roads was evaluated qualitatively through interviews and beneficiary surveys. Therefore, the evaluators may not be able to assess the effects and impact of the project in depth.

#### **3.** Results of the Evaluation (Overall Rating: A<sup>4</sup>)

## 3.1 Relevance (Rating: $3^5$ )

3.1.1 Consistency with the Development Plan of Kenya

The Investment Program for Economic Recovery Strategy for Wealth and Employment Creation (IP-ERS, 2008–2012), which was the national development plan at the time of planning, recognized the development of basic infrastructure as one of the prerequisites for economic growth; in particular, it acknowledged that one of the development outcomes should be the improvement of efficiency and safety of urban traffic.

*Vision 2030*, the long-term development plan published in 2008, also recognized infrastructure development as one of the foundations for supporting the "three pillars," namely, economic, social, and political; and the development of the overall traffic infrastructure,

<sup>&</sup>lt;sup>4</sup> A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

<sup>&</sup>lt;sup>5</sup> ③: High, ②: Fair, ①: Low

including road construction and alleviation of traffic congestion in urban areas, was addressed as an important issue.

The second medium-term plan (2013–2017) of *Vision 2030*, which was the national development plan at the time of ex-post evaluation, pointed out the importance of infrastructure development, including road construction, in accelerating advanced, inclusive and sustainable economic growth, and acknowledged the necessity for development of a high-quality road network in terms of efficiency (including alleviation of traffic congestion), safety, and comfort.

The Integrated Urban Development Master Plan for the City of Nairobi, which was formulated in 2014 with support from the Japan International Cooperation Agency (JICA), for sustainable urban development and improvement of living conditions within the Nairobi metropolitan area, recognized improvement of the road network in Nairobi City, which included safety measures for pedestrians, as one of the priorities.

Development of a high-quality road network that ensures economic efficiency and safety has been one of the priorities both at the national level and Nairobi City. Therefore, the consistency of the project to development policies is highly maintained.

## 3.1.2 Consistency with the Development Needs of Kenya

In Nairobi City at the time of planning, increasing traffic volume due to population growth, and inefficient road design caused serious traffic congestion, and transportation within the city during peak times took more than twice as long as during non-peak time. Moreover, safety for pedestrians and bicycle users became one of the concerns.

Some sections of the road network were disconnected by several valleys, and there were many dead ends in the target areas of the project, which caused serious traffic congestion during morning and evening peak times.

There were many other problems such as underdeveloped sidewalks, lack of traffic safety facilities and lighting equipment, and sections of heavily undulating terrain. JICA carried out the "Master Plan and Feasibility Study to Alleviate Traffic Congestion and Improve Traffic Safety in the Nairobi Metropolitan Area" to analyze the road network in the Nairobi metropolitan area and identified the target roads of the project as one of the priorities for urgent development, given the serious traffic congestion.

At the time of ex-post evaluation in 2017, the population of Nairobi City was estimated to have increased by nearly one million since the time of planning in 2009; the population of the Westlands area, which is close to the target roads, was estimated to have increased by approximately 600,000.<sup>6</sup>

This increase in the population of Nairobi City caused serious traffic congestion, which led to economic loss by increasing the time for driving from one place to another in the city, fuel cost,

<sup>&</sup>lt;sup>6</sup> Kenya National Bureau of Statistics

and vehicle maintenance costs, as well as air and noise pollution. Additionally, although many people move on foot in Kenya, sidewalks are not well developed and the increase in traffic volume further raises the risks for pedestrians.

As described above, the development of roads in Nairobi City has consistently been one of the important issues, and the need for road development remains high.

## 3.1.3 Consistency with Japan's ODA Policy

The Yokohama Action Plan, formulated in the 4<sup>th</sup> Tokyo International Conference on African Development (TICAD IV) in 2008, recognized the importance of development of the infrastructure network to support the promotion of agriculture and industry and the expansion of trade and investments. According to the ODA Data by Country issued by the Ministry of Foreign Affairs of Japan (2009), Japan's ODA policy for Kenya aimed to complete the Yokohama Action Plan. This plan also acknowledged the fact that the development of economic infrastructure, which included alleviation of traffic congestion in the Nairobi metropolitan area, was one of the priority areas according to the Country Assistance Policy for Kenya formulated in 2000.

This project was part of the program for improvement of the transportation network in the Nairobi metropolitan area. The program was also part of a development agenda of infrastructural development for transport within the "development of economic infrastructure" sector.

As described above, this project has been highly consistent to the country's development plan and needs, as well as Japan's ODA policy.

## 3.2 Efficiency (Rating: 2)

## 3.2.1 Project Outputs

Construction of the target road sections (missing links 3, 6, and 7) was completed mostly as planned. Major modifications included the reduction of the scope of construction near the Lenana intersection at missing link 7, and installation of speed bumps (18 locations) as well as signage for the bumps (35 signs). The reduction was due to a collapse of some areas of the project's construction site, caused by a landslide at the other project's construction site near the Lenana intersection, which postponed the continuation of the planned construction work in both areas. The installation of speed bumps, which was carried out urgently upon the instructions of the Kenya Urban Roads Authority (KURA), was based on the residents' firm request to the KURA, as a minor collision between a car and a pedestrian occurred when some sections of the road were opened before the completion of the project; furthermore, several schools are located around the project areas. While cost of installation of speed bumps and signage were covered by

the project, the Japanese side of the project did not cover its defect liability. Both modifications were properly managed, and they did not stall the project implementation; their negative impact on the project was limited. Undertakings of the Kenyan government side, such as approval of environmental impact assessment and relocation of poles, communication lines, and underground pipes which hindered the implementation of the project, have been completed but with some delays.

Item	Planned (2009)	Actual (2017)			
Design Conditions					
Design Speed	50 km/h				
Lane Width	3.30 m	Mostly as planned except reduction in construction near the Lenana intersection at the missing link 7			
Median Width	1.50 m (0.60 m)				
Shoulder Width	0.60 m				
Sidewalk Width	2.50 m				
Cycle Lane Width	2.00 m				
Initial-service life	Design load for up to 15 years				
Maximum Grade	8.0% *only for newly constructed areas				
Outlines					
Road Length	<ul> <li>Missing link 3 (ML3): Mandera road-Westlands roundabout (1.76 km)</li> <li>Missing link 6 (ML6): Ole Dume road–Mandera road (2.85 km)</li> <li>Missing link 7 (ML7): James Gichuru Rd–Ngong road (3.75 km)</li> <li>Total 8.36 km</li> </ul>	As planned			
Pavement Repair	<ul> <li>Asphalt surface: 113,710 m<sup>2</sup></li> <li>Asphalt base: 113,719 m<sup>2</sup></li> <li>Upper subbase: 194,249 m<sup>2</sup></li> <li>Lower subbase: 109,234 m<sup>2</sup></li> </ul>				
Sidewalk Pavement	<ul> <li>Interlocking block: 18,781 m<sup>2</sup></li> <li>Roadbed: 18,311 m<sup>2</sup></li> </ul>	Mostly as planned			
Cycle Lane Pavement	<ul> <li>Asphalt surface: 26,167 m<sup>2</sup></li> <li>Roadbed: 26,167 m<sup>2</sup></li> </ul>	Mostly as planned			
Drainage	<ul> <li>U type concrete gutter: 5,408 m</li> <li>V type concrete gutter: 4,420 m</li> <li>Catchment basins: 487</li> <li>Drainage RC pipe: 6,179 m</li> </ul>	Mostly as planned			
Drainage Facility	<ul><li>Portal culvert:2</li><li>Box culvert:1</li><li>Pipe culvert:1</li></ul>	Mostly as planned			
Signage	Warning signs, regulatory signs (excluding informatory sign) 431	Mostly as planned			
Lane Marking	55,500 m	Mostly as planned			
Others		Installation of bump (18 locations) and signage for bump (35)			

Table 1: Planned and Actual Outputs

Source: Documents provided by JICA, KURA

## 3.2.2 Project Inputs

3.2.2.1 Project Cost

At the time of planning, the estimated total project cost was 2,743 million Japanese Yen (JPY) (JPY 2,543 million on the Japan side, including JPY 36 million for the Detailed Design, and JPY 200 million on the Kenya side).<sup>7</sup> The actual project cost of JPY 2,640 million (JPY 2,284 million on the Japan side including JPY 35 million for the Detailed Design, JPY 356 million on the Kenya side<sup>8</sup>) is 96% of the estimated cost, and the actual cost of the Japan side is 90% of its estimated value. The reasons for the actual project cost on the Japan side being below the planned amount were reduction in construction near the Lenana intersection; the modification of road elevation (planned height) near the intersection of missing links 6 and 7, as well as two sections at missing link 3; the reduction of pavement and earth work due to the modification of pavement structure at some sections. The cost for the undertakings of the Kenya side was 178% of its estimated value because of a significant increase in the costs for relocating poles and underground pipes. As no accurate information was available on the exact locations of underground pipes, the pipes were damaged during relocation and these had to be replaced, and unexpected installed facilities were discovered, all of which increased the cost significantly.

## 3.2.2.2 Project Period

The project period was defined as 23.5 months (25 months if counting both start and end months).<sup>9</sup> The actual project period was 45 months (from March 2010 to November 2013), which is 180 % of its planned value and significantly longer than planned. The reason for this increase in project duration was a significant delay of removal and relocation of poles and underground pipes undertaken by the Kenya side, and a delay in pavement work due to heavy rainfall between October and December 2012. Special care was needed for the relocation of electric cables that would cause power cuts, as the project sites are residential areas, and there was no accurate information on the location of underground pipes, as mentioned above. Hence, a delay due to the removal and relocation of facilities was inevitable.

Although the project cost was within the budget, the actual project duration exceeded the time frame planned. Therefore, overall, the efficiency in the execution of the project is fair.

<sup>&</sup>lt;sup>7</sup> Exchange rate in April 2009: KES 1.00=JPY 1.22 Source: documents provided by JICA

<sup>&</sup>lt;sup>8</sup> KES 358 million, exchange rate as of January 1, 2013, KES 1.00= JPY 1.0069 Source: Exchange-rate.org

<sup>&</sup>lt;sup>9</sup> The planned project period was from February 2010 (G/A for Detailed Design) to April 2012 (a total of 27 months). However, it was not clear whether the duration from exchange of G/A to Detailed Design was included. Therefore, the external evaluators used the work plan attached in the report for the Basic Design and defined the planned project period as 23.5 months, which started from the date that the contract for detailed design was signed by the consultant. Subsequently, the project period was redefined as 25 months if counting both start and end months.

## 3.3 Effectiveness<sup>10</sup> (Rating: ③)

The effects intended by the project were to reduce travel time during off-peak time (outcome 1) and to improve the safety and comfort for pedestrians and bicyclists (outcome 2) by connecting the missing links in three road sections (output). As mentioned in Section 2.3, outcome 1 was evaluated through a travel time survey and interviews with transport companies<sup>11</sup> (a sample of 10) as well as a beneficiary survey<sup>12</sup> (a sample of 120 by nonrandom sampling) because no other data on travel times were available. At the time of planning, no operation indicator was set. The ex-post evaluation tried to evaluate the extent to which the road sections are used by reviewing annual average traffic volume per day, annual average Passenger Car Unit (PCU) per day, and average speed at the target road sections. However, these statistical data were not available at the KURA and neither at the Ministry of Transport, Infrastructure, Housing and Urban Development. Therefore, utilization of the target roads was confirmed by the site visit and interview.

## 3.3.1 Quantitative Effect (Operation and Effect Indicator)

## 3.3.1.1. Utilization of the target roads (Operation Indicator)

At the time of planning, no operation indicator was set. Nevertheless, the traffic congestion during peak times, confirmed by the travel time survey, showed good usage of the newly constructed road sections, whereas interviews with transport companies confirmed that the number of bus routes that use the new road sections increased. Therefore, it can be inferred that the target road sections are being fully used.

## 3.3.1.2. Reduction of travel time (Effect Indicator)

Travel time during off-peak times was set as an effect indicator at the time of planning. As described in Table 2, travel time was expected to be reduced from 14 minutes to 8 minutes at the section between missing links 3 and 6 (Gitanga Road–Westlands roundabout), whereas travel time at missing link 7 (James Gichuru Road–Ngong Road) was expected to be reduced from 13 to 6 minutes.<sup>13</sup> The travel time survey<sup>14</sup> conducted by the evaluator found that travel time

<sup>&</sup>lt;sup>10</sup> Sub-rating for effectiveness is to be assigned considering the impact.

<sup>&</sup>lt;sup>11</sup> Interview was conducted with 10 companies (bus companies and transport companies), which used the road constructed by the Project.

<sup>&</sup>lt;sup>12</sup> "Residents of nearby areas" is defined as the parent population of the survey. Sampling for the beneficiary survey was carried out as follows: A questionnaire survey was conducted for a sample of 120 individuals who were selected from the residents and road users in the Westlands, Kilimani, Riverside, and Kileleshwa areas and the nearby Mandera Road. The sampling error of the 95% confidence interval is approximately average  $\pm 10\%$ . Non-probability sampling was used as the areas are inhabited by relatively affluent families and access of the survey team to households in those areas was limited due to high security. The respondents are naturally supportive to the survey, and sampling selection bias may overestimate the effect of the project as samples may not represent the population. Therefore, the results of the survey are used as a supplementary opinion for evaluating the effect/impact of the project.

<sup>&</sup>lt;sup>13</sup> How to measure a baseline travel time was not explained in the preparatory survey report.

during peak times at the section between missing links 3 and 6 was 7.8 minutes, which is less than the goal set at the time of planning (8 minutes). At missing link 7, travel time was 6.6 minutes, which does not reach the goal (6 minutes), but is considered almost achieved as actual reduction of time was 6.4 minutes, which was 91% of the target for the minutes to be reduced (7 minutes). According to the interviews with road users, travel time between Westlands roundabout and Ngong Road has been greatly reduced because the missing links at roads 3 and 6 were connected by the project, so that vehicles do not need to bypass the sections. Furthermore, during the morning peak time, travel time at the former section was 15.4 minutes (the goal was 12 minutes), and at the latter it was 12.5 minutes (the goal was 9 minutes), whereas during the evening peak time travel time at the former was 15.9 minutes and at the latter 15.7 minutes. Overall, travel time during peak times was reduced, although it does not reach the goal; thus, it can be inferred that traffic congestion has been reduced compared to its state at the time of planning. However, traffic congestion during mornings and evenings remains a problem; this was pointed out in the beneficiary surveys and the interviews with transport companies and community associations (Photo 1). The installation of speed bumps to improve safety of the roads, which was not planned when the target indicator was set, is likely to negatively affect travel time. Vehicles must reduce speed at the bumps at 18 locations, although the extent of speed reduction cannot be objectively assessed, as travel time without the bumps cannot be measured. In addition, as the target road sections are connected to rapidly developing areas, a more-than-anticipated increase in the traffic volume, may have negatively affected the reduction of travel time during peak time.

<sup>&</sup>lt;sup>14</sup> The definitions of off-peak time and peak time at the time of planning were not confirmed. Following the definition adopted by another project, peak time as defined for this ex-post evaluation as follows: from 7 to 8 a.m. in the morning and from 5 to 6 p.m. in the evening. Regarding the travel time survey conducted by the evaluators, local consultants drove along the target road sections 12 times (six round trips) during off-peak times during a week (from 11 a.m. to 4 p.m.), and eight times (four round trips) during morning and evening peak times, and the average travel time was calculated.

	Baseline	Target	Actual		
	2009	2012	2013	2014	2017
	Planned Year	Completion Year	Completion Year	1 Year after Completion	4 Year after Completion
Gitanga road - Westlands road	Off peak time: 14 minutes Peak time: 21 minutes	Off peak time: 8 minutes Peak time: 12 minutes	N/A	N/A	Off peak time: 7.8 minutes Morning peak time: 15.4 minutes Evening peak time: 15.9 minutes
James Gichuru road - Ngong road	Off peak time: 13 minutes Peak time: 23 minutes	Off peak time: 6 minutes Peak time: 9 minutes	N/A	N/A	Off peak time: 6.6 minutes Morning peak time: 12.5 minutes Evening peak time: 15.7 minutes

Table 2: Average Travel Time

Source: Documents provided by JICA (baseline), travel time survey conducted by the evaluators



Photo 1: Morning Peak Time

## 3.3.2. Qualitative Effects (Other Effects)

At the time of planning, "improvement of safety and comfort for pedestrian and bicycle users at the road sections by improving sidewalk and cycle lane" was expected to be a qualitative effect. In the beneficiary survey, 93%<sup>15</sup> responded that safety of the target road sections has been improved by the project<sup>16</sup>; interviews with community associations and transport companies found a similar result. Installation of speed bumps, which was out of the project scope at the time of planning, is positively regarded by the road users in view of safety of pedestrians and bicyclists, and many people requested installation of more speed bumps to enhance safety further. Safety for pedestrians and bicyclists can be further enhanced through

<sup>&</sup>lt;sup>15</sup> Percentage of respondents who replied "yes" to the following question: Has the safety of the road improved since the implementation of the JICA project?

<sup>&</sup>lt;sup>16</sup> Respondents who replied "no" to the question pointed out limited number of speed bumps and street lights as the reason.

appropriate maintenance, including increasing or repairing street lights, repairing damaged traffic signs, and re-painting fading crosswalk lines.

Therefore, the qualitative effect set at the time of planning has been mostly achieved.

## 3.4 Impacts

## 3.4.1 Intended Impacts

For the ex-post evaluation, "alleviation of traffic congestion nearby road sections," "improvement of access for logistics, which contributes to reduction of transport cost and promotion of local economy," and "improvement of living conditions of local residents" are defined as the desired impact of the project. The project's effects on changes in the local economy and living conditions of the residents were evaluated through interviews with transport companies using the target road sections and through the beneficiary survey.

## 3.4.1.1. Contribution to mitigation of traffic congestion at nearby roads

The interviews and the beneficiary survey also identified the impact of the project at nearby road sections. For example, it was pointed out that traffic congestion was reduced at Waiyaki Way, which was connected to James Gichuru Road, the road near the Yaya Center, which is a large shopping center, as well as Gitanga Road<sup>17</sup> because the project connected the target road sections (missing link 7) (see Figure 1 for the location of each road section).

#### 3.4.1.2. Contribution to vitalization of economy at the target areas

The interviews with bus and transport companies indicated the project's impact, such as the reduction of travel time, increase of new routes and potential customers, and reduction of fuel costs. Interviews with courier companies revealed a reduction in delivery times as a result of the project. Further, 42% of the respondents of the beneficiary survey mentioned the project's contribution to the improvement of economic activities and their livelihood.<sup>18</sup>

3.4.1.3. Contribution to improvement of living conditions of the local residents

As shown in Table 3, the results of the beneficiary survey suggest the project's contribution to the improvement of access (namely, reduction in travel times) to workplaces, social services (access to government office), schools, hospitals and markets.

 <sup>&</sup>lt;sup>17</sup> At the time of ex-post evaluation, Ngong Road, near ML7, was under construction. Therefore, the impact of the project on traffic congestion at that road was not confirmed.
 <sup>18</sup> Ratio of respondents who selected "Business Activity/Livelihood" to the question: "How did construction affect

<sup>&</sup>lt;sup>18</sup> Ratio of respondents who selected "Business Activity/Livelihood" to the question: "How did construction affect your household?" (multiple answers permitted) among 12 options (1. Business Activity/Livelihood, 2. Traffic/Lifeline, 3. Landownership/Water Concession, 4. Casualty/Infections, 5. Landscape, 6. Atmospheric Contamination, 7. Water Contamination, 8. Soil Contamination, 9. Waste, 10. Noise and Vibration, 11. Smell, and 12. Traffic Accidents.)

Access time		Average (min)
Access to workplace	Before the project	55
	At the time of ex-post evaluation	31
Access to social	Before the project	33
services (local government offices)	At the time of ex-post evaluation	21
Access to school	Before the project	33
	At the time of ex-post evaluation	25
Access to hospital	Before the project	41
	At the time of ex-post evaluation	24
Access to market	Before the project	29
	At the time of ex-post evaluation	19

Table 3: Change of Access Time

Source: beneficiary survey conducted by the evaluators

Moreover, many people specified that they go for jogging and walking more often as the safety has been improved through the construction of a sidewalk and cycle lane.

## 3.4.2 Other Positive and Negative Impacts

#### 3.4.2.1. Impacts on the Natural Environment

The project was implemented in line with the *JICA Guidelines for Environmental and Social Considerations* (published in April 2004). It was considered that the project, by widening and improvement of the existing roads had potential adverse impacts (but not serious one) on the environment and society. Therefore, the project was classified as Category B.

Following Kenya's regulations for environmental impact assessment, the Ministry of Local Government conducted a social survey, resettlement action plan, and public hearing and also formulated the environmental impact assessment study report. The National Environment Management Authority issued the environment impact assessment license for the project to the Ministry of Local Government. According to the KURA, the construction was carried out according to regulations without any major problems related to the environment.<sup>19</sup>

## 3.4.2.2. Land Acquisition and Resettlement

The resettlement action plan was formulated, and necessary resettlements and land acquisitions were completed without major problems.<sup>20</sup> Although it took longer and cost more than expected because of the resettlement of an illegal roadside kiosk and the relocation of poles, replacement of underground pipes which were damaged during the digging due to lack of information of accurate locations, and unexpected underground facilities, the executing agency stated that the necessary resettlements and land acquisition were completed without any major

<sup>&</sup>lt;sup>19</sup> The ex-post evaluation was not able to confirm the presence of monitoring report on actual measures taken for environment as well as effect on environment.

 $<sup>^{20}</sup>$  The ex-post evaluation was not able to obtain information on actual number of relocation and land acquisition area.

problems. As regards the road section of 112 meters in front of the Yaya Center, it was discovered during the detailed design survey that the land issue had not been resolved; therefore, the section was not included in the scope of the project.<sup>21</sup>

## 3.4.2.3. Unintended Positive/Negative Impact

The road sections constructed during the project are described by the residents and drivers as safe and high quality roads, and Japan's aid to the road construction is also highly appreciated. The residents of nearby areas pointed out that, in addition to the improvement of safety, by constructing roads in areas that had been bushy, the project has contributed to the development of the surrounding areas, where many houses and buildings have been recently built and the value of the land has increased, thus they were highly satisfied with the project (the beneficiary survey found that 51% of the respondents are very satisfied with the result of the project).<sup>22</sup> On the other hand, 58% and 53% of the respondents mentioned the project's contribution to noise and air pollution, respectively.

The project has mostly achieved its goal of reducing travel time during off-peak times and during morning and evening peak times. It has also positively affected traffic congestion at nearby road sections. Further, it has also contributed to the reduction of fuel costs and an increase in customers for the transportation and bus companies which use the road sections, as well as the reduction of travel time to workplaces, schools and hospitals. The new road sections are well used by pedestrians and vehicles, and as routes for transportation of people and goods. There are no major negative environmental and social impacts caused by the project.

Overall, this project has mostly achieved its objectives. Therefore, the effectiveness and impact of the project are deemed to be high.

## 3.5 Sustainability (Rating: ③)

## 3.5.1 Institutional Aspects of Operation and Maintenance

At the time of planning, it was assumed that the government entity responsible for the project was the Ministry of Roads (Ministry of Transport, Infrastructure, Housing and Urban Development at present) and the executing agency was the KURA operating under the ministry, which was responsible for the management and maintenance of the road sections constructed by the project. The KURA was established in July 2009 through the reform of road sectors under the Road Act of 2007; therefore, it did not have any experience in road construction at the time of planning. However, the personnel from the Ministry of Roads, Ministry of Local Government, as well as the Nairobi City government who did have experience in the roads sector were

<sup>&</sup>lt;sup>21</sup> At time of the ex-post evaluation, the issue on land acquisition was resolved, but the construction had not been carried out yet because the executing agency had not secured the necessary budget.

<sup>&</sup>lt;sup>22</sup> Ratio of respondents who selected "very satisfied" among five options ("very satisfied," "satisfied," "neutral," "dissatisfied," and "very dissatisfied")

transferred to the KURA. The major functions of the KURA are to construct, upgrade, repair, and maintain urban roads, implement urban road policies, ensure the quality of roads, and manage safety and traffic, as well as monitor and evaluate the urban roads. Figure 2 presents the organization chart at the time of planning.

Through the government reform of 2013, the responsibilities for urban roads in Nairobi City were divided between the Nairobi County government and the KURA. After some discussions, the target road sections of the project were eventually put under the jurisdiction of the KURA.

The organization structure for road maintenance at the time of ex-post evaluation was similar to that at the time of planning, and 11 staff members were assigned at the KURA for road maintenance (except regional department).



At the time of the planning

At the time of the ex-post evaluation

Source: Documents provided by JICA (at the time of the planning), KURA (at the time of ex-post evaluation) Figure 3: Organization Chart at the Times of Planning and Ex-Post Evaluation

Although road maintenance was carried out directly by the government in Kenya, outsourcing it to contractors has been promoted to improve efficiency. JICA has implemented the technical assistance project "Strengthening of Capacity on Roads Maintenance Management through Contracting (phase 1, 2010–2013, and phase 2, 2013–2015)," which supported capacity development for management of road maintenance through outsourcing with regard to such tasks as procurement, contract management, and construction supervision. The project promoted

the "Performance Based Road Maintenance Contract (PBC)."<sup>23</sup> In Kenya, a hybrid PBC has been common since 2012, in which PBC is used for labor-intensive maintenance such as drainage cleaning and grass cutting, whereas larger maintenance work such as pavement repairs are carried out based on Instructed Works (in which payment is based on a Bill of Quantities and agreed unit prices).

At the time of ex-post evaluation, the department of maintenance and the relevant regional manager were attending to the procurement and contracts, and supervised the contractors during maintenance work, and there was no problem in the sustainability of the project with regard to the institutional aspects of operation and maintenance.

## 3.5.2 Technical Aspects of Operation and Maintenance

The KURA was established in 2009, and had no experience at the time of planning. As experienced personnel (mostly technical staff members who had experience in road sector) from the Ministry of Road, Ministry of Local Government, and Nairobi City government were transferred to the KURA, it was assumed that there would be no problem in the implementation of the project and the maintenance of the target roads.

At the time of ex-post evaluation, maintenance work was being outsourced to contractors, and the KURA managed the contractors' maintenance work by using the guidelines, PBC manual, and cost estimation manual, which were developed under the project "Strengthening of capacity on roads maintenance management through contracting (2010–2013)." The terminal evaluation of the aforementioned project (phase 2) found that users of the roads of which the KURA was in charge indicated an improvement in the quality of roads, and suggested that PBC had contributed to the good maintenance work by the KURA.

The KURA confirmed that the contractors have no major technical problem in carrying out maintenance work because they are selected properly and in accordance with the guidelines, manuals and regulations.

Taking everything into consideration, it is fair to say that it is possible to technically sustain the maintenance of the target road sections through outsourcing under the supervision of the KURA.

## 3.5.3 Financial Aspects of Operation and Maintenance

At the time of planning, the KURA total budget (fiscal year 2009) was 184.98 million Kenyan Shilling (KES), and most of it (KES 175.95 million) was allocated for maintenance. At

<sup>&</sup>lt;sup>23</sup> Rather than specifying the quantity of work measured by physical work like in a usual contract, PBC specifies the required performance level, and the contractors are paid based on measured outputs according to the specified and target conditions of the roads in the contract. In theory, by specifying the required performance level, the contractor proactively carries out the maintenance work to meet the required performance level, thereby keeping the road in a good condition. Additionally, it is advantageous for unforeseen emergency work that can be carried out by the contractor under PBC instead of hiring a new contractor.

the time of ex-post evaluation, the budget for maintenance was KES 298.20 million, which has increased since the time of planning. The source of the maintenance fund is the road levy, which was increased to 18 cents per liter from 12 cents per liter from fiscal year 2016/2017 to secure road maintenance funds.

At the time of ex-post evaluation, the KURA stated that the budget was not sufficient for managing maintenance work and for carrying out large-scale repair work and installment of necessary facilities, such as traffic signals, for all urban roads under its jurisdiction. However, the target road sections of the project are in a good condition and do not require major repairs. Therefore, it is fair to say that there are sufficient funds to maintain the road sections in question. At the time of planning, it was estimated that approximately KES 2.342 million was annually required for the maintenance of the target roads. For fiscal year 2017/2018, KES 53.99 million was awarded to the contractor for the PBC maintenance work for road sections of 20 kilometers, including the project's target road sections (the contract period is 18 months).

Therefore, it can be inferred that maintenance of the target road sections can be financially sustainable.

#### 3.5.4 Current Status of Operation and Maintenance

The external evaluators consider the road sections to be in good condition because, although the ex-post evaluation found several areas that require repair, no serious damage was seen. The areas that require repair are corrugation near speed bumps, collapse of guard rails and signage, and fading of crosswalk and center lines. While the drainage was generally clean without much refuse during the dry season, it was found that trash had accumulated in the drainage, particularly near roadside kiosks. It was also observed that the signage of speed bumps is installed only on one side of the road (which can be seen only by the drivers on that side of the road), and it needs to be installed on the other side as well to avoid further corrugation near the bumps. Many road users requested installment of traffic signals, installment and repair of lights, as well as an increase in the number of lanes in the road.



Photo 2: Collapsed Guard Rails



Photo 3: Fading Center Line and Crosswalk



Photo 4: Bump Corrugation

Thus far, urban road maintenance by the KURA has been carried out through the hybrid PBC by the external contractors, which combined work to be done for carriageway and the PBC for drainage and sidewalks. The KURA will adopt PBC for all sections, including carriageways, sidewalks and guard rails starting in fiscal year 2017/2018, which is expected to further enhance the quality of road maintenance.

With technical assistance from JICA, there has been no major problem in the sustainability of the project with regard to the institutional and technical aspects of the KURA. Thus far, no major damages that would require major maintenance work have occurred at the target road sections, and the conditions of the roads are good. Although the KURA's financial capacity may need to be strengthened to take care of costly repairs and the installment of necessary facilities such as traffic signals for all urban roads in Kenya, the KURA has sufficient funds for maintenance of the target road sections given that the sections are in good condition and do not require extensive repairs. No major problems have been observed in the institutional, technical, and financial aspects and the current status of the operation and maintenance system. Therefore, the sustainability of the project effects is deemed to be high.

#### 4. Conclusion, Lessons Learned and Recommendations

## 4.1 Conclusion

This project aimed to reduce travel time and enhance safety and comfort for pedestrians and bicycle users by connecting the roads that had missing links to trunk roads in Nairobi city, thereby contributing to mitigation of traffic congestion in the nearby roads, vitalization of the economy of the areas, and improvement of living conditions of the local residents. The objectives matched the development plan and needs of the government of Kenya and Nairobi County both at the time of planning and the ex-post evaluation, as well as Japan's ODA policy at the time of planning. Therefore, the relevance of the project is high. Construction works at the missing links 3, 6 and 7 were completed mostly as planned. One of the major changes from the original plan is installation of speed bumps and signage for the bumps, which addressed a strong request from the residents in the project areas to ensure safety for pedestrians and road users. Thus, it is fair to say that an appropriate measure was taken. Although the project cost was within the budget, the project period exceeded the plan. Therefore, the efficiency of the project is fair.

This project has mostly achieved its objectives. In the project sites, travel time during off-peak time was reduced almost as expected, whereas travel time in morning and evening peak hours became shorter than the baseline. However, given the recent economic growth near the project sites, traffic volume is increasing and traffic congestion remains problematic during the peak hours. Meanwhile, the roads built by the project is fully used for transport and logistics. A few transport and bus companies claim that they reduced expenses for fuel and maintenance while increasing the number of customers by using the constructed roads. It is also fair to say that the roads helped improve accessibility to such places as workplaces, schools, and hospitals for the residents near the roads. Therefore, the effectiveness and impact of the project are high. No major problems are seen in the institutional, technical, financial aspects and current status of the operation and maintenance system. Therefore, the sustainability of the project effects is high.

In light of the above, this project is evaluated to be highly satisfactory.

#### 4.2 Recommendations

## 4.2.1 Recommendations to the Executing Agency

The ex-post evaluation found that many people asked for widening of lanes as traffic congestion occurs during morning and evening peak times due to high traffic demand at the

target sections of the project. However, to widen the lanes, many roadside kiosks along the sections may need to be relocated, and it is desirable that the KURA coordinate with relevant organizations such as the county government of Nairobi, to take necessary measures in advance for future widening works including consideration for resettlement. On the other hand, the target road sections of the project are located in residential areas where the residents are highly conscious of road safety. Many residents requested installation or repair of road lighting, installation of traffic signals, and more speed bumps (also installation of bump signage where signage is installed only on one side of the road in some sections), which the KURA needs to confirm and then consider how to address the issues.

4.2.2 Recommendations to JICA None.

#### 4.3 Lessons Learned

Importance of setting goals for improving both efficiency and safety for an urban road project

In the project, speed bumps and signage for the bumps were installed upon strong requests from the residents of the project areas, which was not originally included in the scope of project. According to the interviews at the time of ex-post evaluation, both pedestrians and vehicle drivers expressed a favorable opinion on the installation, and some requested the installation of more bumps. However, installation of speed bumps may negatively affect reduction of travel time, which is one of the effect indicators of the project. Therefore, it is desirable that both efficiency and safety be carefully considered in planning the scope and goals of a project for urban road construction, given that urban residents tend to be highly conscious of safety.