

Republic of Zambia

Ex-Post Evaluation of Japanese Grant Aid Project

The Project for Improvement of Ndola and Kitwe City Roads

External Evaluator: Tsuyoshi Ito, IC Net Limited

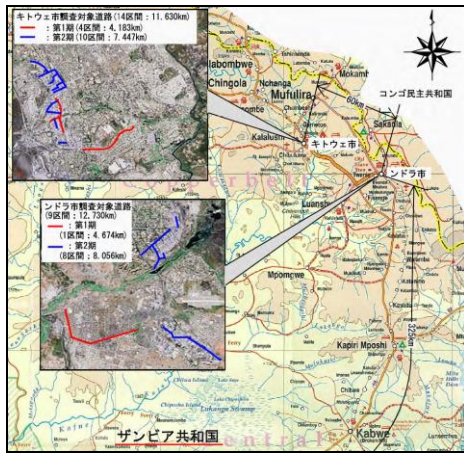
0. Summary

This project was carried out with the objective of establishing safe and smooth urban transportation by improving existing roads in imminent need of repair among the major roads running through the industrial and commercial zones and the access roads between the residential zones and the city centers in Ndola City and Kitwe City, main local cities in Zambia, thereby contributing to vitalization of the local society and economy.

Because this project is relevant to Zambia's development policy, the two cities' development needs, and Japan's aid policy, its relevance is high. Regarding efficiency, the project cost is higher than planned, and the project period was longer than planned because of difficulties in procuring construction materials and therefore is evaluated as fair. Most of the expected outputs, such as an improvement in traffic speed, have been achieved. In addition, confirmation has been made of contributions to the impacts, such as an improvement in the local residents' mobility and a decrease in transportation cost for local industries. Therefore, it can be said that the effectiveness and the impact of the project are high. The maintenance activities of two cities have minor problems: their maintenance is on a day-to-day counter measure level, and their institutional, technical, and financial capabilities are just enough to support these day-to-day level maintenance works. Although it had been planned that a system would be introduced to outsource the maintenance work, this plan had still not begun at the time of this ex-post evaluation. Therefore, the sustainability of the effects of this project is fair.

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

1. Project Description



Project Location



Maintenance work on the markings on Independence Way, Ndola

1.1 Background

According to the Fifth Five-Year National Development Plan (2006), Zambia's national development goals were sustainable economic growth, employment creation, and poverty reduction. In the field of transportation, the goals were to use resources efficiently for wealth creation, poverty reduction, and economic development through the reduction of transportation cost. To achieve these goals, maintenance of existing infrastructure and construction of new ones that support economic revitalization, environmental protection and social services were prioritized. In the subsector of roads, the Road Sector Investment Program (ROADSIP) was established in 1997. The firstROADSIP was carried out in the five years between 1998 and 2002 and it was decided that the secondROADSIP would be carried out in the ten years between 2004 and 2013. The secondROADSIP has put the priority on the development of main urban roads for economic vitalization of the major local cities that support local economic revival and social services. Among others, Ndola City (the provincial capital) and Kitwe City (the center of the mining industry) in Copperbelt Province, where the mining of copper and cobalt, the major exports of Zambia, is concentrated, have been selected as the most important local cities for local development and national economic development.

The total lengths of urban roads are 530 km in Ndola City and 582 km in Kitwe City. At the time of the planning of this project, the total lengths of repaired portions were 35 km in Ndola City and 35 km in Kitwe City. Most of the roads still needed rehabilitation and improvement and they were hindrance for smooth and stable urban transportation, and caused an obstacle to the mining and manufacturing industries, commerce, and social service activities. This project was planned against

this background.

1.2 Project Outline

The objective of this project is to establish safe and smooth urban transportation in Ndola and Kitwe Cities, major cities in Zambia by rehabilitate roads in imminent need of repair among the major roads running through the industrial and commercial zones and the access roads between the residential zones and the urban areas, thereby contributing to the vitalization of the local society and economy.

| | |
|--|--|
| Grant Limit / Actual Grant Amount | 766 million yen (for failed bidding in FY 2008), 37 million yen (for Detail Design Study in FY 2009-2011), 2,692 million yen (for Construction in FY 2009-2011) / 37 million yen (for Detail Design Study in FY 2009-2011), 2,692 million yen (for Construction in FY 2009-2011) |
| Exchange of Notes Date (/Grant Agreement Date) | November 2007 (for failed bidding in FY 2008), January 2009 (for Detail Design Study), August 2009 (for Construction) / January 2009 (for Detail Design Study), August 2009 (for Construction) |
| Implementing Agency | Ndola City Municipal, Kitwe City Municipal |
| Project Completion Date | February 2012 |
| Main Contractor(s) | Konoike Construction Co. Ltd. |
| Main Consultant(s) | Katahira & Engineers International Co. Ltd. |
| Basic Design | November 2006 (Preliminary Study) October 2007 (Basic Design Study) December 2008 (Implementation Review Study) |
| Detailed Design | December 2008 |
| Related Projects | Road Sector Investment Programme II (2004-2013) |

2. Outline of the Evaluation Study

2.1 External Evaluator

Tsuyoshi Ito, IC Net Limited

2.2 Duration of Evaluation Study

Duration of the Study: October 2014 – September 2015

Duration of the Field Study: October 19 - November 3, 2014; February 10 - 18, 2015

3. Results of the Evaluation (Overall Rating: B¹)

3.1 Relevance (Rating: ③²)

3.1.1 Relevance to the Development Plan of Zambia

(1) National development plan

Regarding the transportation sector, at the time of the planning of the project, Zambia's "Fifth Five-Year National Development Plan (2006 to 2010)" gave priority to efficient use of domestic resources by reduction of transportation cost through the new construction, rehabilitation, and appropriate maintenance of roads, thereby contributing to wealth creation, poverty reduction, and economic development. The revised Sixth Five-Year National Development Plan in 2014, at the time of this ex-post evaluation, gave the highest priority to the construction of new local roads and the maintenance and rehabilitation of existing roads.

(2) Road sector plan

In 1997, Zambia established the Road Sector Investment Program (ROADSIP) as a road sector plan. The first phase was scheduled to run from 1998 to 2002, and the second phase was scheduled to run from 2004 to 2013. Goals, such as the improvement of roads, were set up according to need and priority after consultations with the bilateral assistance partners such as JICA, and development financial institutions such as the World Bank.³

At the time of the planning of this project, during the second phase of ROADSIP, the construction of main roads for major local cities was selected as an important issue for contributing to the economic vitalization of major local cities that would serve as bases for local economic revival and social services. Ndola City, the capital of Copperbelt Province, where mining, Zambia's main export industry, is prospering, and Kitwe City, the center of mining in the province, were selected as the most important local cities. One of the components of ROADSIP was the Urban Road Support Programme, the period of which was divided into several phases like ROADSIP. In the second phase, the rehabilitation of roads was planned for five provincial capitals and 15 major cities. The total length of the roads to be rehabilitated was 775 km (which was estimated to cost 76.6 million US dollars).

At the time of the ex-post evaluation, the road sector plans included "Link Zambia 8000"

¹ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

² (3): High, (2): Fair, (1): Low

³ The following goals were set: (1) repairing and maintenance of arterial road networks with a total length of 40,113 km; (2) improvement of roads according to need and priority; (3) development of the local construction industry; (4) creation of job opportunities by proper techniques and measures; (5) improvement of road safety, environmental management, rural traffic, and mobility; (6) improvement of community roads; (7) improvement of poverty and HIV/AIDS treatment all over the country.

(2012), a plan to construct network roads from urban areas to rural areas, and “Pave Zambia 2000” (2014), a plan to construct roads in major local cities. According to Link Zambia 8000, for example, the construction of arterial roads was planned between Kitwe City, one of the target areas of this project, and Chingola City, where Nchanga copper mines are located, and between Ndola City, the other target area of this project, and Lusaka City, the capital of Zambia.

In light of the above, at the times of the planning and the ex-post evaluation, the national development plan and the road sector plans designated the maintenance and rehabilitation of major local urban roads as a priority issue. Therefore, this project’s relevance to the development policy is high.

3.1.2 Relevance to the Development Needs of Zambia

At the time of the planning of this project, roads with a total length of 35 km had been repaired in each of Ndola and Kitwe Cities in the first phase of ROADSIP. They accounted for only 6.6% of the total length of urban roads in Ndola City and only 6.0% in Kitwe City. Therefore, there were still demands for rehabilitating existing roads. In the Preliminary Study of this project (July 2006), target roads were selected, in light of improvement in access from low-income housing areas in addition to (1) public nature (industrial road, commercial road, bus route, or connection road) and (2) prospects for improvement in public nature in the future (possibility of being used as a bus route after repairing). The target routes were selected according to the priority based on the result of comparison of quantitative data gained from the inventory surveys on the major roads in both cities.⁴ Therefore, the target roads were selected appropriately. Below, development needs are examined in each of the cities at the time of the planning and the ex-post evaluation.

(1) Ndola City

The population of Ndola City was about 394,000 in 2000.⁵ Because a residential area was expanded in the southern part of the City, it was imminently necessary to construct an arterial road that connects the residential area with the city center.⁶ In addition, priority was also given to auxiliary arterial roads all over the City. Many of these roads were not paved or seriously damaged because of defective drainages. Moreover, because pedestrian-vehicle separation was not completed, vehicles had to run slowly. In this way, road conditions greatly

⁴ 21 routes in Ndola City; 30 routes in Kitwe City

⁵ According to the 2003 Census, the increasing rate of population was 1.6% per year.

⁶ Arterial roads are main routes of urban traffic. Auxiliary arterial roads are branch routes that connect residential areas with the urban area. Further branched routes are called district roads.

influenced everyday traffic and transportation, such as commuting to workplaces or schools.

At the time of the ex-post evaluation also, according to the Ndola City Municipality, the construction of secondary roads and major arterial roads for industrial districts and suburban low-income residential districts was highly necessary.⁷ There has been no significant change in development needs since the planning. The population was about 444,000 in 2009 and has been estimated to be 487,000 according to a forecast in 2014.⁸

(2) Kitwe City

The population of Kitwe City was 389,000 in 2000.⁹ It increased to 505,000 in 2009 and is estimated to be 575,000 in 2014.¹⁰ At the time of the planning of the project, because there were many copper-related factories in Kitwe City, minor arterial roads and district roads were highly demanded to connect the industrial districts with the residential districts. In the industrial districts in particular, many trucks, trailers, and other large vehicles ran, resulting in exfoliation and other damage to pavements. This led to impassability or slow driving, which gave damage to not only vehicle traffic but also the lives of the local people.

According to the Kitwe City Municipality, at the time of the ex-post evaluation, it has been also highly necessary to improve the bus routes, the routes in the industrial district, and the routes which connect the city center with the industrial district. There has been no significant change in the development needs since the planning.¹¹

In light of the above, this project is relevant to the development needs in the field of roads in both cities.

3.1.3 Relevance to Japan's ODA Policy

The Country Assistance Program for Zambia (2002) at the time of the basic design study gives priority to “support for the efforts to create a well-balanced economic framework,” and the emphasis within this policy is the importance of the “development of infrastructures that support economic activities to make distribution smooth and vitalize the domestic industries.”

The Assistance Plan aims at “industrial development without excessively depending on copper.” If the purpose in Zambia is to develop urban roads, the targets are Livingston, Ndola,

⁷ Interview with the Ndola City Government

⁸ Ndola City Government

⁹ Census 2003

¹⁰ According to the Kitwe City Government, the population growth rate is 1.1% per year.

¹¹ Interview with the Kitwe City Government

and Kitwe, if excluding Lusaka.¹²

In light of the above, this project is relevant to Japan's ODA policy, and it can be said that there is no discrepancy in the selection of the target areas.

This project has been highly relevant to the Zambia's development policy and road sector plan and development needs of both target cities of developing urban road, as well as Japan's ODA policy. Therefore its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

Table 1 shows the outputs of this project.

Table 1: Plan and actual of the outputs of the project

| Component | Basic Study | Implementation Review Study | Actual Output |
|-------------------------|--|---|--|
| Road Length | Ndola City: 12.73 km, Kitwe City: 11.63 km, Total: 24.36km | No Change | No Change |
| Pavement Work | <ul style="list-style-type: none"> ● Asphalt Concrete Surface Course (T=50mm, Ave. Width= 7.9m), 192,012 m² ● Asphalt Concrete Binder Course (T=50mm, Ave. Width= 7.9m), 60,355 m² ● Granular Base Course (T=100mm - 200mm, Ave. Width=9.9m), 239,536 m² ● Crushed Stone Subbase Course (T=100mm - 300mm, Ave. Width=9.9m), 205,538 m² | No Change | <ul style="list-style-type: none"> ● Asphalt Concrete Surface Course (T=50mm, Ave. Width= 7.9m), 192,000 m² ● Asphalt Concrete Binder Course (T=50mm, Ave. Width= 7.9m), 60,300 m² ● Granular Base Course (T=100mm - 200mm, Ave. Width=9.9m), 239,500 m² ● Crushed Stone Subbase Course (T=100mm - 200mm, Ave. Width=9.9m), 205,500 m² |
| Road Shoulder Surfacing | <ul style="list-style-type: none"> ● Asphalt Concrete Surface Course (T=30mm, Ave. Width=1.25m), 45,211 m² | No Change | <ul style="list-style-type: none"> ● Asphalt Concrete Surface Course (T=30mm, Ave. Width=1.25m), 45,200 m² |
| Footpath Surfacing | <ul style="list-style-type: none"> ● Precast Tile (50cm x 50cm) Surfacing (Width=2.0m), 6,907 m² ● Crushed Stone Subbase Course (T=100mm - 150mm, Width=2.0m), 7,196 m² | No Change | <ul style="list-style-type: none"> ● Precast Tile (50cm x 50cm) Surfacing (Width=2.0m), 6,900 m² ● Crushed Stone Subbase Course (T=100mm - 200mm, Width=2.0m)7,100 m² |
| Access Way Surfacing | <ul style="list-style-type: none"> ● Asphalt Concrete Surface Course (T=30mm) + Subbase Course (T=150mm), 467 Spots ● Crushed Stone Surfacing (T=100mm), 467 Spots | <ul style="list-style-type: none"> ● Asphalt Concrete Surface Course (T=30mm) + Subbase Course (T=150mm), 17,203 m² ● Crushed Stone Surfacing (T=100mm), 8,386 m² | <ul style="list-style-type: none"> ● Asphalt Concrete Surface Course (T=30mm) + Subbase Course (T=150mm), 17,200 m² ● Crushed Stone Surfacing (T=100mm), 8,300 m² |

¹² Interview with the Ministry of Local Government and Housing

Table 1: Plan and actual of the outputs of the project (continue)

| Component | Basic Study | Implementation Review Study | Actual Output |
|---------------------|--|---|---|
| Drainage Structures | <ul style="list-style-type: none"> ● Stone Masonry Ditch, (Bottom W: 500 - 1200mm), 21,688m ● U-Shape Concrete Ditch (Bottom W: 500 - 1200mm), 10,990m ● L-Shape / Rolled Gutter Ditch, 3,881m ● Cross pipe, 1,167m (diameter: 600 - 1200mm) | <ul style="list-style-type: none"> ● Stone Masonry Ditch, (Bottom W: 500 - 1200mm) , 21,690m ● U-Shape Concrete Ditch (Bottom W: 500 - 1200mm), 10,990m ● L-Shape / Rolled Gutter Ditch, 3,881m ● Cross pipe, 1,167m (diameter: 600 - 1200mm) | <ul style="list-style-type: none"> ● Stone Masonry Ditch, (Bottom W: 500 - 1200mm) , 21,692m ● U-Shape Concrete Ditch (Bottom W: 500 - 1200mm), 10,991m ● L-Shape / Rolled Gutter Ditch, 3,881m ● Cross pipe, 1,164m (diameter: 600 - 1200mm) |
| Box Culvert | <ul style="list-style-type: none"> ● 1 Site, (Width=10m (3+4+3) x Height=3.5m x Length=13.1m) | <ul style="list-style-type: none"> ● 1 Site, (Width=10m (3+4+3) x Height=3.5m x Length=12.6m) | No Change |
| Kerbs | <ul style="list-style-type: none"> ● Concrete Kerb, 4,152m ● Edge block, 3,602m | No Change | No Change |
| Sign Boards | <ul style="list-style-type: none"> ● 179 Each | No Change | No Change |
| Lane Marking | <ul style="list-style-type: none"> ● Centerline, Edge Line, 68.39km (W: 150mm) | <ul style="list-style-type: none"> ● Centerline, Edge Line, 73.35km (W: 150mm) | No Change |
| Road Marking | <ul style="list-style-type: none"> ● 217 Spots (Crosswalk, Stop Line, Left/Right Turn Arrows) | No Change | No Change |
| Hump | <ul style="list-style-type: none"> ● 6 Spots (H:80mm, W:4.8m) | No change | <ul style="list-style-type: none"> ● 11 Spots (H:80mm, W:4.8m) |

Source: Basic Design Study, Implementation Review Study, document provided by JICA

This project was carried out almost according to the plan. Most of the modifications were made because of minor adjustments at the construction. Although the number of hump construction works was increased in response to Zambia's requests, the cost was within the budget and the purpose of adjusting the running speed in the urban area was clear. Therefore, these adjustments are regarded as appropriate.

Although Vitanda Street, one of the target roads in Ndola City, had been rehabilitated by Zambia before the beginning of the project, this rehabilitation was a temporary one carried out to satisfy local residents' strong request for immediate repair of the street and was limited to the renewal of the surfaces layer and the repair of pot holes. Although Zambia did not officially notify Japanese side of the temporary repair, the basic design study judged it appropriate to select the street as a target road as initially planned.¹³

In addition, it was confirmed as a result of defect inspection that all the items planned to be carried out by Zambia (acquisition of sites, measures for moving shops, acquisition of places for collecting soil and places for disposing of soil, and acquisition of places for disposing of waste materials) were carried out.

¹³ Interview with the Ministry of Local Government and Housing and consultant firms

3.2.2 Project Inputs

One of the important events related to the inputs of the project is the failure of the first bidding under the initial plan (basic design study). The E/N for the first phase was concluded in November 2007 based on the results of the basic design study, and bidding was held for the first-phase work in May 2008. However, the bidding failed as the companies eligible for the bidding refused to participate because of a sharp rise in the material cost and a concern on the work period estimated in the basic design. In response to this failure, an Implementation Review Study was conducted. As a result, given that it was difficult to complete the first-phase works by the deadline and that little time remained until the estimated deadline for the conclusion of the second-phase E/N, the first and second phases were integrated into one phase. It is necessary to take this into account when considering the project cost and the project period.

3.2.2.1 Project Cost

Based on the basic design study,¹⁴ the cost of the project was estimated to be 2,210 million yen (2,175 million yen from Japan; 35 million yen from Zambia). However, the actual cost was 2,288 million yen (only from Japan; no information on Zambia's payment was provided). Even looking only at the cost paid by Japan, the actual cost is higher than the plan (105.2% of the plan).¹⁵ As described above, the first bidding failed. The cost of supervising (preparing) the first bidding was 28.2 million yen.

3.2.2.2 Project Period

Although, based on the basic design study, the period of this project was estimated to be 24 months (including the detailed design period), the actual period was 31.5 months and longer than the plan (131.3% of the plan). Of the delay of 7.5 months, a delay of four months was due to the integration of the two phases under the basic design into one phase under the Implementation Review Study.¹⁶ The remaining delay of 3.5 months was mainly due to the following reason: because the president at the time began to promote the national road construction project around May 2011 in preparation for the president election scheduled for

¹⁴ For the purpose of this project, an implementation review study was conducted as a review of the basic design due to the failure of the bidding. Although, according to the results of the study, the budget and the estimated project period were changed, the numerical values specified in the basic design are used for the standards for assessment.

¹⁵ According to the implementation review study after the failure of the bidding, the project cost was reevaluated to be 2,771 million yen (2,731 million yen from Japan; 40 million yen from Zambia). Compared with this, the actual cost was 84% of the estimated cost, if focusing only on the cost paid by Japan.

¹⁶ Interview with the construction consultant. Concretely, when the period was divided into two phases, investment of necessary machinery and equipment was planned for each of the phases. As a result, it was possible to envisage that the machinery and equipment used for the first phase could be used for the second phase. Therefore, it was possible to estimate the work efficiency to be high. However, when the two phases were integrated into one phase, the total volume of invested machinery and equipment decreased and the work efficiency lowered, resulting in a longer construction period.

September 2011, the supply of road construction materials became scarce and procurement became difficult.¹⁷

Both of the project cost and the project period exceeded the plan. Therefore, efficiency of the project is fair.

3.3 Effectiveness¹⁸ (Rating: ③)

3.3.1 Quantitative Effects (Operation and Effect Indicators)

No operation or effect indicators were set up for the basic design survey of the project. Therefore, consideration was given to see if the annual average traffic volume, which is widely used as the operation indicator for road projects, can be used as the operation indicator. However, because neither Ndola nor Kitwe City had collected data on annual average traffic volume, information gained from residents and business operators along the target roads during the second field survey of this ex-post evaluation was used as the alternative data.

In addition to “improvement in possible traffic speed” (from 18.7 km/h in 2008 to 40.0 km/h in 2011), which was selected for the Implementation Review Study, the number of traffic accidents is used as an effective indicator to check the effect of safety facilities (road signs, pedestrian crossings, humps, and pedestrian-vehicle separation).

(1) Operation indicators

During the interview survey in the second field study, most of the interviewees answered that the traffic volume on almost all the target routes had increased after the completion of the roads by the project. In addition, most of them answered that the traffic volume on the target roads has been increasing at a higher rate than that on the other roads in the City. Most frequently mentioned reasons are followings: (1) the condition of the target roads is better than the condition of the other roads, and the target roads are used also as bypasses from the other roads; and (2) in the residential districts, the target roads of this project are collector roads (roads where branch routes come together) and serve as arterial roads from the residential areas to the urban area.

(2) Effect indicators

Because no record on passable speed existed in Ndola and Kitwe Cities, the traffic speed was measured by a simple method during this ex-post evaluation study. The results showed that the running speed improved on all the target roads. The average running speed is higher than the

¹⁷ Interview with the construction consultant

¹⁸ A rating is assigned based on a judgment of effectiveness with consideration also given to impact.

target speed under the basic design both in the morning and in the afternoon on almost all the target roads (Tables 2 and 3). In addition, according to the results of the beneficiary survey carried out during this ex-post evaluation, all the respondents answered that the running speed had improved and 40% of the respondents answered that the running speed had increased by more than 20 km/hour. Moreover, after this project, the legal speed limit for all the target roads was changed from a range of 20 to 30 km/hour to 65 km/hour.

Table 2: Running speed on the target roads in Ndola city

| | Basic Design Study (km/h) (2007) | | | Ex-Post Evaluation (km/h) (2014) | |
|-----------------------|-------------------------------------|---------------------|---------------------|-------------------------------------|---------------------|
| | 7 : 30~ 8 : 30 | 12 : 00~ 13 : 00 | 17 : 00~ 18 : 00 | 08 : 00~ 09 : 00 | 17 : 00~ 19 : 00 |
| Vitanda Street (N1) | 19.7 | 20.3 | 19.5 | 42.9 | 43.9 |
| Kaunda Drive (N2) | 27.0 | 28.8 | 26.4 | 46.5 | 61.8 |
| Makoli Avenue (N3) | 27.9 | 25.9 | 27.3 | 69.2 | 45.8 |
| Independence Way (N4) | 24.3 | 24.2 | 21.7 | 47.0 | 40.8 |
| Zambia Road (N5) | 18.2 | 17.6 | 16.9 | 49.3 | 48.9 |
| Matelo Road (N6) | 21.2 | 26.9 | 21.6 | 39.4 | 44.7 |
| Lukasu Road (N7) | 13.6 | 14.1 | 13.5 | 50.5 | 48.5 |
| Chambeshi Road (N8) | 21.6 | 20.2 | 21.7 | 49.3 | 48.9 |
| Livingstone Road (N9) | 16.1 | 15.9 | 17.5 | 35.3 | 45.4 |

Source: Basic Design Study, Implementation Review Study, Quick Survey during this Ex-post Evaluation

Table 3: Running speed on the target roads in Kitwe city

| | Basic Design Study (km/h) (2007) | | | Ex-Post Evaluation (km/h) (2014) | |
|---------------------------------|-------------------------------------|---------------------|---------------------|-------------------------------------|---------------------|
| | 7 : 30~ 8 : 30 | 12 : 00~ 13 : 00 | 17 : 00~ 18 : 00 | 08 : 00~ 09 : 00 | 17 : 00~ 19 : 00 |
| Dr Agrey Avenue (K1) | 13.7 | 15.3 | 17.2 | 60.5 | 62.6 |
| Euclid Road (K2) | 15.4 | 14.7 | 15.3 | 40.6 | 48.3 |
| Zomba Road (K3) | 11.6 | 14.0 | 11.1 | 42.1 | 49.9 |
| Blantyre Road (K4) | 15.0 | 17.7 | 16.7 | 60.1 | 62.9 |
| Eshowe Road (K5) | 15.1 | 17.1 | 17.5 | 35.7 | 50.8 |
| Matuka Avenue (K6) | 12.8 | 10.1 | 11.1 | 50.0 | 49.3 |
| Katanta Street (K7) | 20.4 | 18.4 | 18.7 | 58.3 | 58.6 |
| Natwange Road (K8) | 19.6 | 21.4 | 16.7 | 60.3 | 53.8 |
| Mutentemuko Road (K9) | 22.4 | 23.8 | 24.4 | 46.4 | 44.5 |
| Miseshi Street (K10) | 18.9 | 19.7 | 18.3 | 42.4 | 40.9 |
| Kanongesha Road (K11) | 18.1 | 17.3 | 18.0 | 50.3 | 48.4 |
| Mulilakwenda Road (K12) | 16.5 | 15.8 | 15.3 | 43.7 | 46.1 |
| Lilongwe Road (K13) | 22.4 | 21.1 | 18.0 | 52.3 | 43.2 |
| Independence service Lane.(K14) | | | | 40.7 | 43.4 |

Source: Basic Design Study, Implementation Review Study, Quick survey during this Ex-post Evaluation Study

There are no observable trends in the number of accidents in two cities (Table 4). Although they did not show any clear evidences, the police in the cities told that the reason the number of accidents had not decreased was increase in running speed due to the road improvement.

Table 4: Number of traffic accidents on the target roads in Ndola and Kitwe

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|------|------|------|------|------|------|
| Number of traffic accidents in Ndola city | 59 | 55 | 59 | 69 | 0 | 100 |
| Number of traffic accidents in Kitwe city | N.A | 170 | 143 | 183 | 158 | 140 |

Source: Ndola Police, Kitwe Police

3.3.2 Qualitative Effects

Appropriate separation between vehicles and pedestrians was an expected effect of the project. According to the results of the beneficiary survey, 92% of the respondents in Ndola City and 86% of the respondents in Kitwe City answered that they used sidewalks, if available. Therefore, it can be said that the separation has been realized.

3.4 Impact

3.4.1 Intended Impacts

The intended impacts of the project are divided into benefits to local residents and benefits to local industries. A beneficiary survey was conducted about the following items¹⁹ to inspect changes before and after the project.

Impact on Local Residents

- Improvement in residents' mobility (improvement in the amenity, running speed, and reliability of buses)
- Improvement in the accessibility between low- and middle-income residential areas and hospitals/schools

Impact on Local Industries

- Reduction in transportation costs
- Improvement in the competitiveness of industrial products through improvement of price competitiveness by cost reduction

¹⁹ The survey was conducted from October 22 to 31, 2014. The survey team members visited respondents directly, using questionnaires. The number of samples is 87 in Ndola City (41 residents along target roads; 6 restaurant or hotel owners; 18 public transit drivers; 4 public transit operators; and 22 other persons) and 70 in Kitwe City (15 residents along target roads; 14 restaurant or hotel owners; 6 public transit drivers; 10 public transit operators; and 18 other persons).

- Vitalization of local industries (increases in the numbers of shops and business operators)

(1) Improvement in residents' mobility

75% of the respondents to the beneficiary survey answered that buses became comfortable after the project because they hardly jolted. In addition, 78% of them recognized an improvement in the running speed of public transportations.

(2) Improvement in the accessibility between low- and middle-income residential areas and hospitals/schools

Regarding the improvement of the accessibility to hospitals, schools, and shops, more than 90% of the respondents recognized that the accessibility had been improved for all the destinations.

(3) Reduction in local operators' transportation costs and its effect to improvement in competitiveness

Responding to questions to carriers, 88% of the respondents answered that costs (mainly, costs of repairing vehicles) were reduced as a result of the road improvement. However, because the average annual cost cut was about 5,000 Zambian Kwacha,²⁰ 85% of the respondents answered that the reduction in transportation costs had a slight impact on the company's profit, while 15% answered that there was almost no impact on it.

(4) Vitalization of local industries

According to the results of interviews with retailing shops, hotels, and restaurants along the target roads, 85% of the respondents answered that there was an increase in the number of customers. Regarding the increasing rate, 83% answered that it was a slight increase of less than 10%, while 17% answered that it was between 10% and 20%. According to the results of additional interviews during the second field study, however, respondents along some roads answered that the number of customers had greatly increased as a result of the project.

3.4.2 Other Impacts

(1) Impacts on the natural environment

At the time of the planning of the project, any environmental impact during the use of the rehabilitated roads was not expected. Therefore, environmental monitoring after the completion of the construction was not carried out. During the construction, measures were carried out, such as using water spray to prevent spreading of dusts. As a result, no environmental problem

²⁰ 1 kwacha = 18.39 yen

occurred during the project implementation period.²¹ In addition, because the project was to rehabilitate existing roads, it was confirmed that there would be no impact on the natural environment after the end of the project either.²²

(2) Land acquisition and resettlement

Because the project was to rehabilitate existing roads, there was no land acquisition or resettlement.²³

Regarding the effectiveness of the project, although no official data is available, the annual average traffic volume can be presumed to have increased as a result of the project. In addition, the improvement of the running speed and the separation of pedestrians – initially expected effects of the project – have been achieved.

As for the impacts of the project, it was confirmed that the benefits to residents – such as an increase in the amenity of public transportations through road improvement and an increase in accessibility to hospitals, schools, etc. – have been achieved almost as planned. On the other hand, some of the expected impacts on the local economy were recognized, such as a reduction in local companies' transportation costs (a reduction in the cost of repairing vehicles) and an increase in the number of customers of commercial and service businesses along the target roads.

This project has largely achieved its objectives. Therefore effectiveness and impact of the project are high.

3.5 Sustainability (Rating: ②)

3.5.1 Institutional Aspects of Operation and Maintenance

Regarding the construction, improvement and maintenance of roads in Zambia, the city municipalities have jurisdiction over the urban roads under the supervision of the Ministry of Local Government and Housing (MLGH), while the Road Development Agency (RDA) has jurisdiction over the arterial roads (including those passing between cities). In reality, however, borders of jurisdiction are not well followed – for example, the RDA has also rehabilitated general city roads.²⁴ Since FY2014, coordination has intentionally been made among the city governments, MLGH, and RDA. When a new project is planned and examined, consultations are

²¹ Interview with a construction consultant

²² Interview with the Ndola City Government and the Kitwe City Government

²³ Ndola City Government, Kitwe City Government

²⁴ Ndola City Government, Kitwe City Government

held among the three parties.²⁵

During the defect inspection study of the project in 2013, regular patrolling for damage detection and establishment of maintenance systems were proposed. However, regular activities had not begun by the time of the ex-post evaluation. Basically, some activities are carried out only when residents give reports.²⁶ Another issue raised by the inspection study was to strengthen coordination with other related agencies, such as water supply companies and sewerage companies for more effective response to road damages caused by water leakage, however, such coordination has not been carried out sufficiently.

Attached Tables 1 and 2 show the distribution of personnel by the Engineering Department of each city.

Although it is planned that 20 staff members should be placed in the Road and Drainage Division of Ndola city, which maintains urban roads, the number of actual staff members is only six, about one-third of the planned number. In Kitwe City, the number of staff members placed in the division is 10, about a half of the planned number of 19. These staff shortage are one of the reasons why regular patrols are difficult in both cities.

To solve the above-mentioned problem, the MLGH has introduced “performance contract,” the outsourcing of road maintenance to the private sector. In the capital city of Lusaka, a performance contract has been carried out to maintain main roads constructed after 2010. Based on this experience, the MLGH plans to carry out performance contracts in other major cities. In Copperbelt Province, performance contracts are planned to be carried out in Ndola, Kitwe, Luanshya, and Mufulira from 2015. The contents of the contracts include the clearing of road surfaces and drainage channels, the repair of road surfaces and shoulders, and the repainting of marks.

Although the maintenance of urban roads should be carried out by each city municipality, it is unlikely that each of them will be capable of conducting regular road maintenance work because of staff shortage and insufficient budget, which will be described in the next section. From a realistic viewpoint, it can be deemed appropriate for the central government to take over the initiative of the regular maintenance activities at municipal level.

²⁵ Ndola City Government, MLGH, RDA

²⁶ Ndola City Government, Kitwe City Government

At the time of the second field survey of this ex-post evaluation, all major roads in the cities were planned to be maintained in this way, and MLGH had requested each municipality an estimate of the budget.

In light of the above, the maintenance system is not well established. Although it is almost certain that performance contracts will be introduced, they had still not been carried out at the time of this ex-post evaluation. The sustainability from institutional aspects is judged to be fair.

3.5.2 Technical Aspects of Operation and Maintenance

Both Ndola and Kitwe have experience in many road repair projects. In past projects, both cities hired local consultants to carry out study, design, and work management. Minor repair works such as repair of potholes are done by both cities as ordinal works. They have written operating procedures for the works, and are technically capable of maintaining roads at such a level. Although many of the road maintenance machines and tools owned by Ndola municipality are not usable, repair works that require large machinery are outsourced and therefore the impact is limited.²⁷ Kitwe's repair equipment is in good condition.²⁸

Although larger-scale maintenance works, repair, and rehabilitation are outsourced, skills in study, planning, and supervision of these outsourced work for long-term maintenance are insufficient.²⁹ Although the local offices of the MLGH and the RDA in Ndola are supposed to give such technical support, little technical support has been given so far in reality, because such large-scale works were rarely carried out in the past.

In principle, the MLGH is responsible for the provision of technical support to each municipality. The MLGH places importance in the strengthening of the management capacity for maintenance, such as contract management. The MLGH's Technical Consulting Unit also gives training. The MLGH plans to strengthen training to carry out the performance contracts.³⁰ The MLGH gave group training three times in 2014. It had already given it twice this year at the time of the ex-post evaluation. Whenever a technical problem arises in a city government, the city government takes necessary measures for gaining technical information, such as sending an inquiry to the MLGH or RDA, although this has not been institutionalized.³¹

In light of the above, because both cities can do day-to-day simple repair and will not need to

²⁷ Ndola City Government

²⁸ Kitwe City Government

²⁹ Interview with the Ndola City Government and the Kitwe City Government

³⁰ MLGH

³¹ Ndola City Government, Kitwe City Government, RDA Office in the Copperbelt Province

perform many regular repair works after the introduction of performance contracts in the near future, they will not need to have work skills among themselves (it will also be unnecessary to have repair equipment). On the other hand, regarding skills in the management of performance contracts (such as preparation of specifications, quality management, and management of contract changes), although efforts to improve the skills have begun, issues remain. Therefore, the sustainability from technical aspects is fair.

3.5.3 Financial Aspects of Operation and Maintenance

Both city governments receive road maintenance budgets from the National Road Fund Agency (NRFA) and depend on funds from the NRFA for most of their budgets.

No data was gained on Ndola City’s road-related budget. Table 7 shows the actual expenditures. Regarding Kitwe City, Attached Table 3 shows the Engineering Department’s budget and actual expenditures. In the case of Kitwe, the item “Supplies & Services” in the table corresponds to the budget for road maintenance and improvement. A budget of about 10 million kwacha was allocated to the “Supplies & Services” in FY2014. Of the budget, about 90% is allocated to maintenance. In reality, however, the budget execution rate for “Supplies & Services” has been about 20% in most years. The execution rate is low not only for “operation-related” but also for the other items except personnel cost. These low execution rates are due to not only the low execution capacity as a result of staff insufficiency but also insufficient fuel cost for patrol vehicles³² and the Engineering Department’s lack of budget. Although Ndola Municipality has no data other than expenditure amounts, the interviewees answered that Ndola Municipality also cannot have a sufficient budget for carrying out maintenance activities regularly according to plan.

Table 7: Expenditure on road by Ndola Municipality (Unit: Zambian Kwacha)

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---------------------|-----------|-----------|---------|-----------|-----------|---------|
| Expenditure on road | 6,099,218 | 1,823,506 | 419,258 | 1,570,000 | 1,112,366 | 565,035 |

Source: Ndola Municipality

According to the results of the inspection of major roads in the cities during this ex-post evaluation, not many spots were found left without repair. As long as major roads are concerned, it can be inferred that there is at least minimum budget necessary for carrying out temporary measures for maintaining roads when residents make a report or complaint.

³² Kitwe City Government

On the other hand, as described in the preceding section concerning the technical aspect, the National Road Fund is used for the budget for the performance contracts. According to the MLGH, a budget of 60 million kwacha is allocated to Ndola, Kitwe, Luanshya, and Mufulira in Copperbelt Province as a budget for several years. The MLGH estimated that a performance contract would need one to two million kwacha, and the budget can supply funds for concluding performance contracts for several years.

In light of the above, it seems that the budget for maintaining roads by performance contract has been almost secured and it would enhance the sustainability in the future. However, this has still not been realized and uncertainty remains, and the sustainability from financial aspects is fair.

3.5.4 Current Status of Operation and Maintenance

In both Ndola and Kitwe, road surfaces and shoulders had some spots in need of repair, but stayed mostly in good condition. In contrast, while most sidelines remain, most central lines have disappeared. Although some central lines have been repainted in Ndola, in general, it cannot be said that they have been kept in appropriate conditions and it affects road safety.

Sediment has accumulated in many drainage channels, some of which have been damaged in their function. Although insufficient drainage had still not brought about erosion of road shoulders at the time of this ex-post evaluation, this is an issue to be solved.

In Kitwe, large vehicles are regulated and hardly enter the city. In Ndola, however, large vehicles are running in the city. Although the roads have not yet been damaged, road surfaces may receive impact in the future. In both cities, overloading vehicles are regulated on surrounding arterial roads.

Some minor problems have been observed in terms of limited capacity of road maintenance only at day-to-day and small-scale repair level. Also, although the introduction of performance contracts, under which most of the road maintenance works are outsourced, has steadily advanced, bidding had still not been prepared at the time of the ex-post evaluation. Therefore sustainability of the project effects is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was carried out with the objective of establishing safe and smooth urban transportation by improving existing roads in imminent need of repair among the major roads running through the

industrial and commercial zones and the access roads between the residential zones and the city centers in Ndola City and Kitwe City, main local cities in Zambia, thereby contributing to vitalization of the local society and economy.

Because this project is relevant to Zambia's development policy, the two cities' development needs, and Japan's aid policy, its relevance is high. Regarding efficiency, the project cost is higher than planned, and the project period was longer than planned because of difficulties in procuring construction materials and therefore is evaluated as fair. Most of the expected outputs, such as an improvement in traffic speed, have been achieved. In addition, confirmation has been made of contributions to the impacts, such as an improvement in the local residents' mobility and a decrease in transportation cost for local industries. Therefore, it can be said that the effectiveness and the impact of the project are high. The maintenance activities of two cities have minor problems: their maintenance is on a day-to-day counter measure level, and institutional, technical, and financial capabilities are just enough to support these day-to-day level maintenance works. Although it had been planned that a system would be introduced to outsource the maintenance work, this plan had still not begun at the time of this ex-post evaluation. Therefore, the sustainability of the effects of this project is fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

(1) Implementation of the performance contracts

To strengthen the management and maintenance systems, the MLGH should support both cities in determining specifications for the performance contracts to start the contracts immediately.

(2) Support for improvement of the municipalities' contract management capacities

The MLGH should organize more technical training for the improvement of each city's capacity to manage outsourcing affairs, including the supervision of the implementation of the performance contracts. Establishment of an on-demand technical support mechanism for municipalities is also necessary.

(3) Thorough regulation of heavy vehicles in Ndola City

In order to regulate the entering of heavy vehicles into Ndola City thoroughly, the Ndola Municipality should begin consultations with the Ndola police to strengthen the cooperation between them. If needed, the MLGH should support coordination with the Ministry of Home

Affairs, which has jurisdiction over the police.

4.2.2 Recommendations to JICA

(1) Consideration of technical support in ordering and contract management

The recipient country's implementing agency sometimes outsources the construction, rehabilitation, and maintenance of roads to private companies. In such cases, it is essential to improve skills in the management of contracts with contractors, however, it is not necessarily easy for the recipient country itself to do it. In relation to the project, the MLGH hopes that Japan will give technical support in this regard. If possible, consideration should be given to whether to incorporate a contents related to contract management into "country-focused training for Zambia (road technology)" held in Japan.

Alternatively, it is advisable to consider giving technical support to introduce a contract management methodology by dispatching experts and Japan Overseas Cooperation Volunteers as a follow-up of the project.

4.3 Lessons Learned

(1) Consideration of response to higher running speed as a result of road improvement

If the running speed increases as a result of road improvement, this may increase a risk of accident. On urban roads, it is possible to reduce the running speed to some extent through the appropriate placement of humps. In this project, although the running speed has increased, it has not been confirmed that the higher running speed has resulted in an increase in the number of accidents. However, the result of an interview with the police indicates that road improvement may result in an increase in the running speed. When improving urban roads on which vehicles frequently cross pedestrians, it is necessary, at the basic design stage, to consider appropriate placement of humps along each target road with careful consideration of drivability and durability of road.

(2) Confirmation of clear grounds for the prospects for sustainability of the maintenance work at the time of planning

In case of this project, introduction of the performance contract, whereby the maintenance activities are outsourced by the use of the central government's budget, has made the prospect for the sustainability of the maintenance favorable to some extent. If there had not been any plan of the performance contract system, prospects for the sustainability would have been severe. When the basic design study was conducted, however, the conclusion from the situation at the time was that the maintenance would be possible without the performance contract. At the time of basic

design, it is necessary to judge prospects for capability of the maintenance with firm confirmation of sufficient grounds, instead of easily drawing a conclusion. If it seems difficult to have confident prospects for sustainability, more durable pavement method should be adopted if needed. Moreover, consideration should be given to taking measures for minimizing the cost of regular maintenance and prolonging the renewal period, such as the use of paints that do not need frequent repainting. In addition, to establish the sustainability of the maintenance, positive consideration should be given to donor coordination (in sharing roles in providing road improvement support, personnel training support, and financial support).

Attached Table 1: Staff allocation and actual assignment of Engineering Department, Ndola

Municipality

| Section / Position | Allocated number (Person) | Actual number (Person) |
|--|------------------------------|---------------------------|
| 1. Director | 1 | 1 |
| 2. Assistant Director | 1 | 2 |
| 3. Road and Drainage Section | 6 | 20 |
| Civil Engineer | 1 | 2 |
| Assistant Civil Engineer | 1 | 3 |
| Highways Superintendent | 1 | 1 |
| Highways Senior Engineer | 0 | 2 |
| Assistant Highways Superintendent | 1 | 2 |
| Engineering Assistant | 0 | 2 |
| Foreman | 2 | 4 |
| Draughtsman | 0 | 1 |
| Assistant Foreman | 0 | 4 |
| 4. Design Section | 0 | 5 |
| Civil Engineer | 0 | 1 |
| Assistant Civil Engineer | 0 | 2 |
| Senior Engineer Assistant | 0 | 1 |
| Draughtsman | 0 | 1 |
| 5. Traffic Lights/Street lighting Section | 5 | 12 |
| Electrical Engineer | 0 | 1 |
| Assistant Electrical Engineer | 0 | 1 |
| Superintendent | 1 | 1 |
| Assistant Superintendent | 0 | 1 |
| Senior Engineer Assistant | 0 | 1 |
| Works Supervisor | 0 | 1 |
| Electrician | 2 | 2 |
| Foreman | 0 | 2 |
| Assistant Foreman | 2 | 2 |
| 6. Administration Section | 3 | 4 |
| Senior Administrative Officer | 1 | 1 |
| Administrative Officer | 0 | 1 |
| Clerical Officer | 2 | 2 |
| 7. Architectural Section | 2 | 11 |
| Chief Architect | 0 | 1 |
| Architect | 2 | 3 |
| Assistant Architect | 0 | 2 |
| Foreman | 0 | 1 |
| Assistant Foreman | 0 | 1 |
| Senior Clerk of Works | 0 | 1 |
| Clerk of Works | 0 | 1 |
| Draughtsman | 0 | 1 |
| 8. Quantity Surveying Section | 1 | 6 |
| Senior Quantity Surveyor | 1 | 1 |
| Quantity Surveyor | 0 | 2 |
| Assistant/QS Surveyor | 0 | 1 |
| Senior Q/S Assistant | 0 | 1 |
| Quantity Surveyor Assistant | 0 | 1 |
| 9. Building Construction and Maintenance | 3 | 15 |

| Section / Position | Allocated number (Person) | Actual number (Person) |
|--|------------------------------|---------------------------|
| Building Works Manager | 1 | 1 |
| Senior Clerk of Works | 0 | 1 |
| Building Superintendent | 0 | 1 |
| Assistant Building Superintendent | 1 | 2 |
| Foreman | 0 | 4 |
| Works Supervisor | 0 | 2 |
| Assistant Foreman | 1 | 4 |
| 10. Parks and Garden Section | 2 | 12 |
| Parks Manager | 0 | 1 |
| Parks Superintendent | 1 | 1 |
| Zoo Curator | 0 | 1 |
| Assistant Parks Superintendent | 0 | 1 |
| Foreman | 1 | 2 |
| Zoo Foreman | 0 | 2 |
| Parks Supervisor | 0 | 2 |
| Assistant Parks Foreman | 0 | 2 |
| 11. Mechanical Workshop Section | 6 | 19 |
| Mechanical Engineer | 0 | 1 |
| Assistant Engineer | 0 | 1 |
| Superintendent | 1 | 1 |
| Assistant Superintendent | 0 | 1 |
| Engineering Assistant | 0 | 1 |
| Auto Electrician | 0 | 4 |
| Mechanics | 4 | 8 |
| Foreman | 1 | 1 |
| Assistant Foreman | 0 | 1 |
| 12. Fire Brigade Section | 67 | 94 |
| Chief Fire Officer | 1 | 1 |
| Deputy Chief Fire Officer | 0 | 1 |
| Division Officer | 0 | 2 |
| Assistant Division Officer | 0 | 2 |
| Station Officer | 2 | 6 |
| Sub Officer | 1 | 6 |
| Leading Fire Fighter | 3 | 6 |
| Fire Fighter | 51 | 60 |
| Fire Fighter Driver | 9 | 10 |
| Total | 97 | 196 |

Source: Ndola Municipality

Attached Table 2: Staff allocation and actual assignment of Engineering Department, Kitwe Municipality

| Section / Position | Allocated number (Person) | Actual number (Person) |
|--|---------------------------|------------------------|
| 1. Director | 1 | 1 |
| 2. Assistant Director | 1 | 1 |
| 3. Road Section | 11 | 19 |
| Senior Civil Engineer | 1 | 1 |
| Civil Engineer | 4 | 4 |
| Assistant Civil Engineer | 2 | 2 |
| Highways Superintendent | 2 | 2 |
| Senior Engineer Assistant | 1 | 1 |
| Assistant Highways Superintendent | 1 | 2 |
| Foreman | 0 | 3 |
| Draughtsman | 0 | 2 |
| Assistant Roads Foreman | 0 | 2 |
| 4. Electrical / Street lighting Section | 4 | 6 |
| Electrical Engineer | 0 | 1 |
| Assistant Electrical Engineer | 1 | 1 |
| Electrical Superintendent | 1 | 1 |
| Senior Electrical Engineer Assistant | 1 | 1 |
| Assistant Electrical Supervisor | 0 | 1 |
| Electrician | 1 | 1 |
| 5. Administration Section | 2 | 13 |
| Senior Administrative Officer | 0 | 1 |
| Administrative Officer | 0 | 1 |
| Registry Supervisor | 1 | 1 |
| Clerical Officer | 1 | 10 |
| 6. Quantity Survey / B. Maintenance Section | 2 | 9 |
| Senior Quantity Surveyor | 0 | 1 |
| Quantity Surveyor | 1 | 1 |
| Senior Architect | 0 | 1 |
| Senior Clerk of Works | 1 | 1 |
| Clerk of Works | 0 | 1 |
| Senior Architectural Assistant | 0 | 1 |
| Building Superintendent | 0 | 1 |
| Senior Q/S Assistant | 0 | 1 |
| Architectural Assistant | 0 | 1 |
| 7. Parks Section | 11 | 16 |
| Parks Manager | 0 | 1 |
| Parks Superintendent | 1 | 1 |
| Assistant Parks Superintendent | 1 | 1 |
| Parks Supervisor | 2 | 2 |
| Foreman | 0 | 1 |
| Assistant Parks Foreman | 6 | 9 |
| Clerical Officer | 1 | 1 |
| 8. Mechanical Section | 7 | 9 |
| Mechanical Engineer | 1 | 1 |
| Mechanical Superintendent | 0 | 2 |
| Heavy Duty Mechanic | 1 | 1 |
| Auto Electrician | 5 | 5 |

| Section / Position | Allocated number (Person) | Actual number (Person) |
|--------------------------------|------------------------------|---------------------------|
| 9. Fire Brigade Section | 46 | 46 |
| Chief Fire Officer | 1 | 1 |
| Deputy Chief Fire Officer | 0 | 1 |
| Divisional Officer | 1 | 0 |
| Station Officer | 3 | 3 |
| Sub Officer | 4 | 4 |
| Leading Fire Fighter | 2 | 2 |
| Fire Fighter | 35 | 35 |
| Total | 85 | 120 |

Source: Kitwe Municipality

Attached Table 3: Budget plan and actual expenditure of Engineering Department of Kitwe Municipality

(Unit: Zambian Kwacha)

| | 2009 | | | 2010 | | | 2011 | | |
|------------------------|---------------|---------------|---------|---------------|---------------|--------|---------------|---------------|--------|
| | Budget | Expenditure | Rate | Budget | Expenditure | Rate | Budget | Expenditure | Rate |
| Employee Expenses | 793,257,000 | 774,262,000 | 97.61 | 980,723,500 | 773,598,757 | 78.88 | 979,771,688 | 573,767,885 | 58.56 |
| Premises | 66,000,000 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0.00 |
| Supplies & Services | 1,627,682,000 | 61,746,600 | 3.79 | 1,598,250,000 | 390,152,236 | 24.41 | 1,148,258,000 | 373,761,000 | 32.55 |
| Transport & Plant | 1,217,578,000 | 340,175,160 | 27.94 | 1,406,486,000 | 312,640,250 | 22.23 | 1,067,666,000 | 47,888,135 | 4.49 |
| Establishment | 0 | 90,000 | -900.00 | 5,000,000 | 1,330,000 | 26.60 | 17,000,000 | 44,253,500 | 260.31 |
| Miscellaneous Expenses | 580,000,000 | 0 | 0.00 | 580,000,000 | 498,218,040 | 85.90 | 1,560,000,000 | 75,292,000 | 4.83 |
| Total | 4,284,517,000 | 1,176,273,760 | 27.45 | 4,570,459,500 | 1,975,939,283 | 43.23 | 4,772,695,688 | 1,114,962,520 | 23.36 |
| | | | | | | | | | |
| | 2012 | | | 2013 | | | 2014 | | |
| | Budget | Expenditure | Rate | Budget | Expenditure | Rate | Budget | Expenditure | Rate |
| Employee Expenses | 1,474,504,324 | 424,872,954 | 28.81 | 798,006 | 829,342 | 103.93 | 983,806 | 886,202 | 90.08 |
| Premises | 5,200,000 | 0 | 0.00 | 56,510 | 23,243 | 41.13 | 25,020 | 15,529 | 62.07 |
| Supplies & Services | 2,335,990,000 | 566,841,320 | 24.27 | 4,249,590 | 792,429 | 18.65 | 9,445,880 | 2,130,061 | 22.55 |
| Transport & Plant | 1,599,950,000 | 554,337,758 | 34.65 | 17,000 | 6,725 | 39.56 | 17,000 | 15,010 | 88.29 |
| Establishment | 101,510,164 | 4,575,000 | 4.51 | 48,000 | 1,962 | 4.09 | 15,000 | 0 | 0.00 |
| Miscellaneous Expenses | 3,419,750,000 | 1,751,220,790 | 51.21 | 13,500 | 0 | 0.00 | 13,500 | 6,300 | 46.67 |
| Total | 8,936,904,488 | 3,301,847,822 | 36.95 | 5,182,606 | 1,653,701 | 31.91 | 10,500,206 | 3,053,102 | 29.08 |

Source: Kitwe Municipality

Note: Figures before 2012 is in Old Zambian Kwacha