

**TECHNICAL NOTES
ON THE PRELIMINARY STUDY
ON THE PROJECT FOR IMPROVEMENT AND MAINTENANCE
OF NDOLA AND KITWE CITY ROADS IN THE REPUBLIC OF ZAMBIA**

- AGENDA : 1. Present Condition of Target Roads
2. Requirements of Road Rehabilitation
3. Request on Road Furniture
4. Request on Public Facilities for Community Empowerment
5. Request on Road Maintenance Equipment
6. Other requests for the Project
- DATE AND TIME : August 14, 2006; 9:00 – 12:00hrs
- VENUE : Department of Engineering Services, Kitwe City Council
- PARTICIPANTS : The participants of the meeting are as given in Annex-1

A meeting was convened by Mr. John Ngwata, Deputy Director of the Department of Engineering Services, Kitwe City Council, at 9:00hrs on August 14, 2006, to discuss and confirm certain issues necessary to be resolved before the Project for Improvement and Maintenance of Ndola and Kitwe City Roads in the Republic of Zambia (“the Project”) is executed. The following issues were taken up in the meeting, as listed in the above agenda:

1. Present Condition of Target Roads

The lengths, widths, surface conditions and prioritization or urgency of improvement and maintenance of the target roads together with their justifications, as well as the public facilities, which might be relocated due to the Project were confirmed, as presented in Annex-2. The total road length of 30 stretches has been estimated at 32.3 km by GPS survey, but the requested length is 25.4 km. Therefore, the total length should be surveyed in detail during the Basic Design Study stage.

2. Requirements of Road Rehabilitation

The target roads will require a minimum carriageway of 6.1 m (3.05 m x 2 lanes) in width, as shown in Figure 1. A wider carriageway of 7.0 m which was originally proposed by Ministry of Local Government and Housing, Zambia Government should be considered on the possibility during the Basic Design of the Project through a detailed road survey. An intermittent raised kerb should be installed to prevent the illegal parking of vehicles that causes damage to the road shoulders. The raised kerb should be designed in consideration of bus-bay and the required parking space near and in-front of a shop or office. The standard walkway width is 1.5 to 2.0 m, which should be decided in consideration of the existing road width and public spaces, and for minimizing the relocation of houses/public facilities. Furthermore, the interlocking block type of walkway is expected for installation because of easiness of the relocation of underground public facilities.

An open ditch with concrete surfacing is required to protect road structures and to prolong the road life. Concrete cover for ditches in front of house entrances and shops/offices is required. Furthermore, the storm discharge of road ditches should be adequately flown down into drainage system downstream.

An improvement of drainage system downstream is requested to conduct under the Project, if it would be possible. The dimensions of the road ditch and drainage system should be estimated in consideration of the storm runoff catchment area.

3. Request on Road Furniture

For traffic safety, traffic sign (speed limit sign, give way sign, stop sign, zebra crossing, etc.), speed hump with signboards/posts, cat-eyes, bus bay, traffic markings, etc are requested to facilitate under the Project, if it would be possible, as mentioned in Annex-3

A roundabout structure is requested to be installed at five (5) intersections on Dr. Aggrey Avenue, Euclid Road, Racecourse Twatasha Road, Mulilakwenda Road and Luanshimba West Main to enable the smooth flow of traffic. It is therefore imperative for the City Government to study the possibility of land acquisition for each structure before the Basic Design of the Project is started. A roundabout structure is recommendable because it is easier to construct and the maintenance cost is lower compared to the traffic signal.

4. Request on Public Facilities for Community Empowerment

For the sake of community empowerment to overcome poverty, sanitary reasons, etc., public toilets, bus station buildings, market shelters and/or their approach roads to the project roads are requested, at five (5) markets of Chamboli, Twatasha, Kwacha, Ipusukilo and Chipata. Interlocking block pavements in and near the markets and bus stations are also requested in consideration of easier relocation construction of underground public facilities and lower maintenance cost.

5. Request on Road Maintenance Equipment

After completion of the project roads, maintenance work is required to prolong the life of pavement by the prompt repair of potholes and cracks. At present, 35 personnel of the City Government conduct maintenance work, such as cleaning of ditches and road surfaces. Around 200 casual employees conduct maintenance work during rainy season.

A set of equipment for the repair of potholes and small cracks on the pavement is requested, such as one (1) Pedestrian controlled roller, three (3) sets of Plate compactor, three (3) sets of Asphalt hand sprayer, and one (1) Water bowser. In addition, one (1) Truck-mounted crane to carry and transport maintenance equipment and repair materials is requested.

Furthermore, one (1) Tower wagon is requested for the maintenance of street-lights. One (1) Excavator is also requested for drainage channel maintenance, if possible.

6. Other Requests for the Project

For the adequate planning, implementation and maintenance of the project roads, on-the-job training at the project sites and overseas training Japan are expected. Furthermore, some sets of computer are requested to install the data on pavement conditions for the effective maintenance works.

This Technical Notes was unanimously approved and signed by both parties, at Kitwe City, Zambia, on August 15, 2006.



YUZO MIZOTA
Road Planner
JICA Study Team



JOHN NGWATA
Deputy Director
Department of Engineering Services,
Kitwe City Council



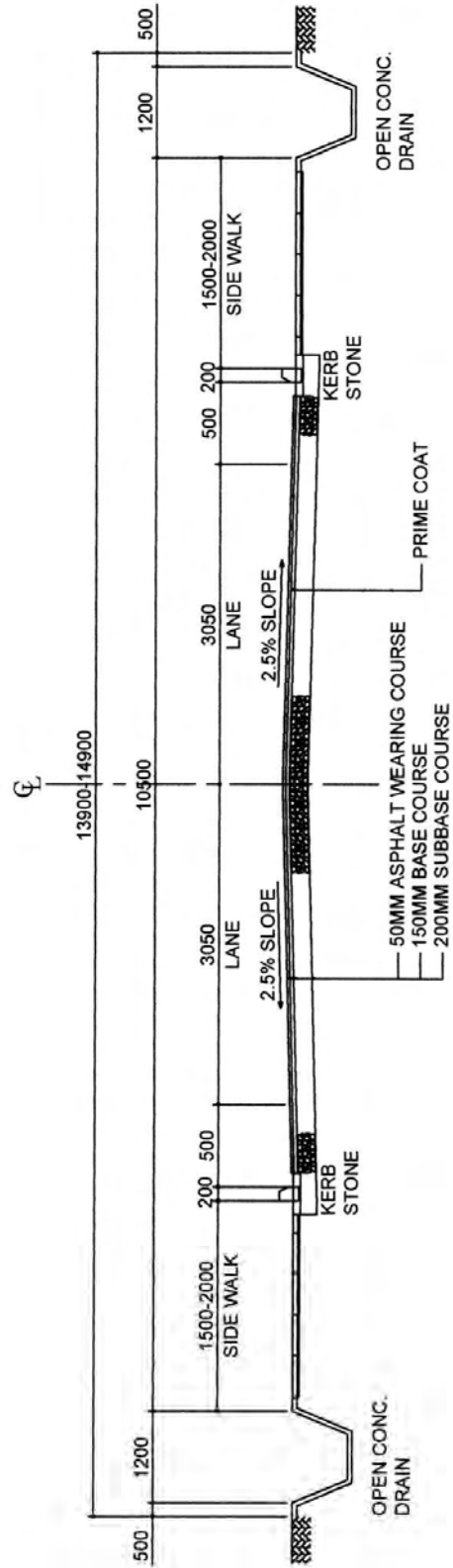


Figure 1 : Road Cross Section

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List of Attendants

Date and Time : August 14, 2006; 9:00 – 12:00
Venue : Department of Engineering Services
Kitwe City Council

(1) Kitwe City Council

Mr. John Ngwata	Deputy Director of Engineering Services
Mr. Webster Musukawa	Assistant Director of Engineering Services
Mr. Tinkano Sikwewa	Senior Civil Engineer of Engineering Services
Mr Gladford H. Chimdwa	Highway Superintendent

(2) JICA Study Team

Mr. Yuzo Mizota	Road Planner I
Mr. Masaki Ishii	Road Planner II
Mr. Takeo Shoji	Road Planner III

(3) Zulu Burrow Limited

Mr. Amil Miyanadeniya	Manager of Kitwe Branch
Mr. Isaac Chiewa	Road Engineer

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Kitwe City Council
Engineering Services Department
Proposed Roads for Rehabilitation/Maintenance - 2006

1. The improvement of the roads in the industrial area is considered a high priority in the City due to the economic Activity and its enhancement, while the Commercial Area around the Central Business District is the next, especially near Martindale area. The bus routes situated within city area for public transportation is an added reason for prioritizing the roads.
2. Road Nos. 1, 3, 2, 4 and 5, therefore have a higher priority to be rehabilitated because they are located within the industrial areas and near to the town centre.
3. Road No. 8 is the next priority because it connects the Residential Areas in the East of the City with the Town Centre, while Road No. 7 within the Town Centre and situated near the bus terminal is the next priority road.
4. Road Nos. 23, 20, 21, 22, 18, 19 and 24 are the next priority because of they are access ways to the center of Industrial Area.
5. Road No. 30 is a service road link to the industrial area roads of No. 20, 21, 18 and 22, and it connects into the National Trunk Road T3 (Independence Road). It decongests the traffic in the Trunk Road T3 (mitigate traffic volume in Independence)
6. Road No. 25 situated within the Town Centre is the next priority because it connects the Town Centre to a School.
7. Road Nos. 12, 14 and 13 are the next priority roads because they connect the residential areas in the vicinity to the public schools. Road No.12 connects the Residential Area with a School and a Market. Road No.14 connects the residential area to a school, clinic, church and market. While Road No. 13 connects a the area with a school.
8. Road Nos.16, 15, and 17 located within the Riverside Residential areas are the next priority roads. They connect the low income residential area Chipata Compound to a public School, a Government Clinic and a Market Place.
9. Road No.10 in residential area is the next priority road to connect clinic and charch.
10. Road No. 11 in Kwacha Township, Road No. 9 in Racecourse Township, Road No. 28 in Chamboli Township and Road No. 29 in Ipusukilo Township are the next priority roads which are the major roads in low income residential areas.
11. Road Nos. 26 and 27 are proposed roads to be rehabilitated along a major road in a higher income residential area.
12. Road No. 6 in industrial area is not high priority because it is considered a minor road.

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Priority for Road Rehabilitation

No.	Road Name	Road Length (km)	Road Width (m)	Road Surface Condition	Service Facilities Within the Road Reserve	Bus Route	Priority
1	Dr. Aggrey Avenue (south)	1.0	25 ~ 27	Very Bad	Water, Sewer, Electricity, Telephone	Yes*	1
2	Euclid Road	0.6	18 ~ 25	Very Bad	- ditto -		3
3	Zomba Road	0.4	11 ~ 17	Bad	- ditto -	Yes*	2
4	Blantyre Road	0.6	21 ~ 22	Bad	- ditto -		4
5	Eshowe Road	0.4	13 ~ 15	Very Bad	- ditto -		6
6	Juba Road	0.1	9 ~ 10	Very Bad	- ditto -		30
7	Matuka Avenue	0.4	20 ~ 21	Very Bad	- ditto -	Yes	7
8	Kantanta Street	2.4	13 ~ 19	Bad	- ditto -	Yes	5
9	Racecourse Twatasha	2.9	14 ~ 15	Very Bad	- ditto -	Yes	22
10	Luangwa Walk	0.7	13 ~ 14	Very Bad	- ditto -		24
11	Chilonga Mukwae	2.7	13 ~ 19	Very Bad	- ditto -	Yes	21
12	Chinyemba/Kitwe Playing Field Road	0.9	13 ~ 14	Very Bad	- ditto -	Yes*	16
13	Congo Way	0.9	16 ~ 19	Very Bad	- ditto -		18
14	Nile Avenue	0.7	14 ~ 15	Very Bad	- ditto -		17
15	Almalic Road	1.6	13 ~ 14	Bad	- ditto -	Yes*	20
16	Kopa Street	1.1	14 ~ 15	Very Bad	- ditto -	Yes*	23
17	Lulamba Road	0.4	14 ~ 15	Bad	- ditto -		25
18	Natwange Road	0.9	13 ~ 14	Bad	- ditto -		12
19	Mutentemuko Road	1.1	14 ~ 16	Very Bad	- ditto -		13
20	Miseshi Street	0.9	11 ~ 12	Very Bad	- ditto -		9
21	Kanongesha Road	0.7	10 ~ 11	Very Bad	- ditto -		10
22	Mulilakwenda Road	0.8	9 ~ 10	Very Bad	- ditto -	Yes	11
23	Lilongwe Road	0.6	16 ~ 17	Very Bad	- ditto -		8
24	Poinsentia Drive	0.9	14 ~ 15	Very Bad	- ditto -	Yes*	15
25	Lumumba Road	1.6	14 ~ 16	Very Bad	- ditto -		14
26	Mililansola Crescent	0.7	12 ~ 13	Bad	- ditto -		28
27	Twalilwisha Crescent	0.9	12 ~ 14	Bad	- ditto -		29
28	Lwanshimba West Main	3.5	11 ~ 12	Very Bad	- ditto -	Yes	26
29	Ipusukilo Bus Route Road	0.8	8 ~ 24	Very Bad	- ditto -	Yes	27
30	Independence Service Lane	1.1	11 ~ 12	Bad	- ditto -		19

* Future bus route after road rehabilitation

Proposed Road Furniture

#	Road Name	Speed Hump	Zebra Crossing	Round about	Stop Signs	Giveaway signs	Bus Stop / Bus bay	Speed Limit Signs	Cats Eyes	Remarks
1	Dr. Aggrey Avenue (south)			1	4	1		2	Require	Roundabout at junction of Dr. Aggrey/Chibuluma and stop signs
2	Euclid Road			1	4			2		Roundabout at junction of Dr. Aggrey/Euclid and stop signs
3	Zomba Road	1			1	3		2	Require	Stop and giveaway signs at road junctions
4	Blantyre Road	1			2			2		- ditto -
5	Eshoowe Road				2			2		- ditto -
6	Juba Road				2			2		- ditto -
7	Matuka Avenue				2			2	Require	- ditto -
8	Kanianta Street	3			8			2	Require	- ditto -
9	Racecourse Twatasha	4	2	2	5			2	Require	Roundabout at junction of Government / Twatasha racecourse, and Racecourse/Situwala
10	Luangwa Walk							2		Stop and giveaway signs at road junctions
11	Chilonga Mukwae	4	1		4			2	Require	- ditto -

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#	Road Name	Speed Hump	Zebra Crossing	Round about	Stop Signs	Giveaway signs	Bus Stop / Bus bay	Speed Limit Signs	Cats Eyes	Remarks
12	Chinyemba/Kitwe Playing Field Road				2		1	2	Require	Stop and giveaway signs at road junctions
13	Congo Way	2			4			2		- ditto -
14	Nile Avenue	1			4			2		- ditto -
15	Almalic Road	2	1		3			2	Require	- ditto -
16	Kopa Street	2			2			2	Require	- ditto -
17	Lulamba Road	1						2		- ditto -
18	Natwange Road				3			2		- ditto -
19	Mutentemuko Road	1			2			2		- ditto -
20	Miseshi Street				3			2		- ditto -
21	Kanongesha Road				2			2		- ditto -
22	Mulilakwenda Road				3			2	Require	- ditto -
23	Lilongwe Road				3			2		- ditto -
24	Poinsentia Drive	2			2		2	2	Require	- ditto -
25	Lumumba Road	2	2		2			2		- ditto -
26	Miliansola Crescent	1						2		- ditto -
27	Twaliwisha Crescent							2		- ditto -
28	Lwanshumba West Main	5	3	1				2	Require	Roundabout at junction of Lwanshumba / west main roads
29	Ipusukilo Bus Route Road	2						2	Require	Stop and giveaway signs at road junctions
30	Independence Service Lane	1			2			2		- ditto -

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主要面談者リスト

- (1) 地方自治・住宅省 (MLGH)
Mr. Maswabi M. Maimbolwa, Permanent Secretary
Mr. Peter Lubambo, Director, Department of Infrastructure and Support Service
Mr. Davies C. Zulu, Acting Assistant Director
Mr. Richard Kangwa, Senior Engineer
Mr. Nkumbu Siame, Senior Engineer
- (2) 道路開発公社 (RDA)
Mr. Daniel Mubnga, Chief Engineer, Planning
- (3) ンドラ市役所
Ms. Charity Manda Mpande, Town Clerk
Mr. Daka Lazarus, Director of Planning, Engineering Services
Mr. Zulu Joseph, Assistant Director, Engineering Services
Mr. Brian Mazuba, Acting Deputy Director, Engineering Services
Mr. Treford Chipulu, Highway Support, Engineering Services
Ms. Katayi Kamboyi, Senior Engineering Assistant, Engineering Services
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Mr. Al Simwinga, Town Clerk
Mr. John Ngwata, Deputy Director, Engineering Services
Mr. Webster L. Musukwa, Assistant Director, Engineering Services
Mr. Tinkano Sikwewa, Senior Civil Engineer, Engineering Services
Mr. Gladford H. Chimowa, Highway Superintendent, Engineering Services
- (5) ザンビア環境評議会 (ZEC)
Mr. Danny Mwango, Senior Inspector
- (6) 在ザンビア国日本大使館
宮下 特命全権大使
鈴木 公使
平田 二等書記官
- (7) JICA ザンビア事務所
乾 所長
境 次長
柳 職員
Mr. Patric M. Chibbamulilo
- (8) 第3次ルサカ市道路網整備計画
小橋 常駐監理者 (日本技術開発株式会社)

南北経済回廊の重要性

ザンビアの産業地帯は、ザンビア中央部の南北の都市、Lusaka、Ndola、Kitwe など
に分散している。最重要幹線国道である国道1号線、2号線、3号線は、これらの南北
に伸びる都市を通過しており、ジンバブエやコンゴと連結する南北経済回廊を形成して
いる。

ザンビアにおける外貨獲得手段である輸出産業は、銅やコバルトなどの鉱工業の占め
る割合が多く、2000年から2004年の統計では全輸出額の65%を占めている。鉱工業の
中心である銅やコバルトは、コッパーベルト州において採掘されており、特に、Kitwe
およびその北部周辺に集中している。

鉱工業は労働者の雇用率が高く、ザンビア9州のうちコッパーベルト州の人口が最も
多く、ルサカに次いで人口第2の都市であるKitwe市（2000年統計37.6万人）および
第3の都市であり州都であるNdola市（同統計37.5万人）を抱えている。Kitweから
Ndola、さらにLusakaを南北に結ぶ経済回廊は、社会的にも重要となっている。



5. シンドラ市・キトウェ市および要請対象道路の概況

5.1 シンドラ市およびキトウェ市の概況

5.1.1 シンドラ市



・Copperbelt 州庁舎



・閑静な住宅街



・ビルの立ち並ぶ商業施設



・中央病院



・Ndola 工場地帯



・路上で遊ぶ子供たち

5.1.2 キトウェ市



・Kitwe の工場群



・郊外の住宅街



・人通りの多い市内目抜き通り



・地方へ行く人で混雑するバスステーション



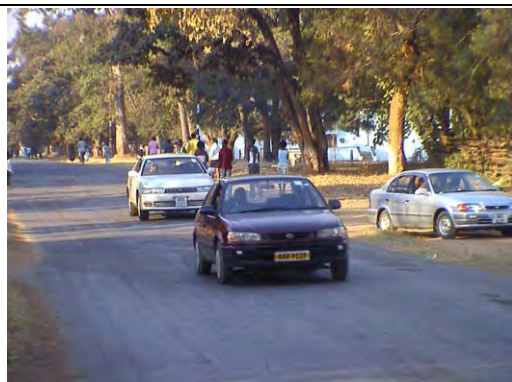
・中心街の商業施設



・低額所得者住宅と子供たち

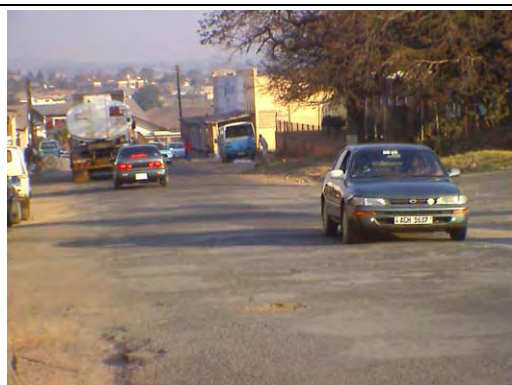
5.2 要請対象道路の概況

5.2.1 ンドラ市



- ⇒ 対象道路は市役所前の通りであり、州最高裁判所（写真上）や土地登記所等が道路沿いにある。周辺も官庁街であり、道路改修後には本邦援助の広報効果が高い。
- ⇒ 路面には損傷があり、乗り心地や車輻速度に影響する箇所がある。
- ⇒ 現在の日交通量は2,000台と1998年交通量とほぼ同様である。
- ⇒ 道路改修後は、交通量の多いPresident Avenue（1998年調査では7,000台を記録）の代替ルートとして活用されるため、交通量の増加が予想される。
- ⇒ 大型車の混入率は6%と高くない。将来、近隣の商業地の大規模開発が行われな限り、大型車混入率は増加しないものと判断される。

No. 7 Independence Way



- ⇒ 商業地の中心に位置する。現在の日交通量は2,000台であり、1998年に比べ1/4以下に激減した。この理由は、幹線道路のNkana道路（国道3号線）が2000年にリハビリされ、迂回車輻が少なくなったためである。
- ⇒ 大型車の混入率は17%とやや高い。これは周辺が商業地であることと大型車が急勾配の国道3号線を避け迂回する場合があるためである。低速大型車やポットホルの影響のためにピーク時の走行速度は20km/hと遅い。
- ⇒ 交通量の多いPresident Avenueの代替ルートとして活用されるため、交通量の増加が予想される。

No. 6 Makoli Avenue



- ⇒ 商業地帯で大きなビルや商店が立ち並ぶ。小さな露店も多い。
- ⇒ 交差点およびその周辺の路面の状態が悪いため車輦走行速度は 30km/h 未満である。
- ⇒ 日交通量 4,000 台で 1998 年に比べ 3 割程度増加している。

No.1 Vitanda Street



- ⇒ Ndola 市工業地帯における幹線道路に位置する
- ⇒ 現在の日交通量は 6,000 台と 1998 年に比べ交通量は 5 倍に増加した。近年の銅景気によるものである。
- ⇒ 時間帯にかかわらず交通量が多い。低速大型車のために旅行速度は 30km/h 程度である。
- ⇒ 大型車の混入率は 40% と高い。これらは鉱石・ガソリン・セメント・薬剤等工業関連の物資を運ぶ 8 軸・9 軸の大型トレーラーや従業員を輸送する大型バスが多い。

No.8 Zambia Road



- ⇒ 一般住宅／低所得者住宅街に位置する。近傍に Mushili 市場がある。
- ⇒ ポットホールのためピーク時の車輻走行速度は 30km/h 未満となる。改修後には、走行性・走行速度が改善され、事業効果が期待される。
- ⇒ 本道路は、幹線バスルートである。現在の日交通量は 6,000 台以上と要請対象道路では最大である。小型から中型バスの交通量が極めて多い。
- ⇒ 将来、南部住宅地の開発が進んだ場合、さらに交通量が増加する可能性がある。

No. 14 Chambeshi Road



- ⇒ 一般/低所得者住宅街に位置する。周辺住民の生活道路として主に活用されている。
- ⇒ 所々路肩部分から車線中央まで舗装が大きく損傷し、車輻走行速度は 30km/h 未満となっている。また、日交通量は 600 台弱と少なく、2 輪交通が 50%以上を占める。
- ⇒ 道路改修後は、市内中心部から南部住宅地へ向かう Masala 道路の代替ルートとして活用されるため、市内の主要道路となる可能性がある。さらに、バスルートとなる予定もあり、交通量が増える可能性が高い。Ndola 市全体の人口増により、南部住宅地が開発された場合、交通量が飛躍的に伸びる可能性もある。
- ⇒ 大型車の通行はほとんどない。周辺が住宅地であるため、将来も大型車混入率は、大きく増加しないものと判断される。
- ⇒ Kabushi 市場へのアクセス道路であるため、市場が活性化された場合、商業用車輻の増加が見込まれる。

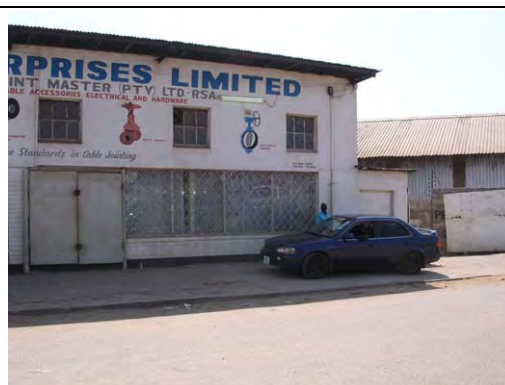
No. 15 Chitimukulu Road

5.2.2 キトウエ市



- ⇒ 工業地域の中心部に位置し、大型運送業者が居並び、大型車の割合が 30%以上と高い。日交通量は 1998 年の 3,000 台から 5,000 台に増加した。要請道路中最も交通量が多い。
- ⇒ 簡易舗装部と未舗装部分が混在しており、走行速度は 20km/h 台である。
- ⇒ 未舗装部分があるため、雨季には大型車の通行に大きな支障が生じる。
- ⇒ 道路南側部分に車輛通行が出来ない箇所があり（写真右上）、交通のボトルネックとなっている。道路改修後には工場地域の幹線道路となるため、交通量が増加する可能性が高い。
- ⇒ 道路改修後には、走行性・走行速度が増加し、幹線道路として機能するため、事業効果が期待される。

No. 1 Dr. Aggrey Avenue (South)



- ⇒ 工業地域中心部に位置する。小型車の占める割合が高い。
- ⇒ 日交通量は 1998 年と比べ 2 倍以上に増加した（現在 2,600 台）。
- ⇒ 舗装状態が劣悪で走行速度は 10km/h 台と極めて遅い。
- ⇒ 道路改修後には、走行性が改善され援助効果が高い。

No. 3 Zomba Road



- ⇒ 工業／商業地域。
- ⇒ 日交通量 1,600 台と 1998 年に比してやや増加。
- ⇒ 交差点周辺の舗装状態が極めて悪い。走行速度 10km/h 台と遅い。
- ⇒ 小型車が多い。

No. 4 Blantyre Road



- ⇒ 官庁街／住宅街。
- ⇒ 日交通量 3,000 台と 1998 年に比べ 4 倍以上に増加。
- ⇒ 所々ポットホールあり走行速度 20km/h 台。
- ⇒ 中型車がほとんど。

No. 8 Kantanta Street



- ⇒ 低所得者/一般住宅街であり、もとは鋤夫の町。Chamboli 市場がある。
- ⇒ 日交通量は 3,000 台強である。
- ⇒ 舗装が劣悪のために走行速度 10~20km/h。
- ⇒ 大型車の割合は低い。
- ⇒ 道路改修後に走行速度が改善され援助効果が大きい。

No. 28 Luwamshimba Westmain



- ⇒ 低所得者/一般住宅街（一部開発中）。Ipusukilo 市場へのアクセス。
- ⇒ バスルートであり、日交通量 1,000 台。
- ⇒ 未舗装道路で、走行速度 20km/h 未満。
- ⇒ 大型車の割合は低い。

No. 29 Ipusukilo