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PLANNING AND DESIGNING STANDARD OF RURAL ROAD CONSTRUCTION - AN EXPLORATORY STUDY: A CASE OF LUSAKA PROVINCE IN ZAMBIA

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ABSTRACT
The state of rural roads in Zambia is very poor and in a deplorable condition. Drainages are missing, or where they exist, they are narrow, inadequate and not constructed correctly. Bridges are missing, old, inadequate or wrongly constructed and usually very poorly maintained. In most roads, the shoulders are not stable. From reviewed literature, several gaps in the planning, design, specifications, funding and general roads management in Zambia were identified as being the root causes of poor-quality rural roads. An in-depth literature review was carried out as secondary sources using journals, rural road construction handbook, peer reviewed articles, dissertations and the internet. In-depth interviews were further carried out with the staff at Ministry of Finance, Road Development Agency (RDA), National Road Fund Agency (NRFA), National Council for Construction (NCC), Rural Road Unit and also the Royal Highnesses and their subjects in Chongwe and Lusaka North areas. The results show that the planning is adequate but the problem lies with the planning personnel who are not adequately trained to undertake the tasks. Designs and specifications needed to consider the alignment requirements, technical performance, pavement solutions, material requirements and structures that are specific to an area. Results indicate that planners use a one-size fits all approach kind of designing resulting in the quality deficiency in some areas. The research assist government in developing and disseminating improved policies that assists in better planning, constructing and maintenance of rural roads. It introduces mitigatory actions and recommendations which the government can utilize in coming up with sustainable and reliable quality rural roads.

Keywords: Rural, Roads, quality, compaction, Transmitter road design.

1. INTRODUCTION
It has been acknowledged that rural roads should be treated as the last link of the transport network. Despite this, they often form the most important link in terms of providing access for the rural population. Their permanent or seasonal absence acts as a crucial factor in terms of the access of rural communities to basic services such as education, primary health care, water supply, local markets and economic opportunities (Donnges, 2003). In a study in Ethiopia (Dercon et al., 2008) on 15 villages that were surveyed between 1994 and 2004, they concluded that access to all – weather rural roads reduced poverty by 6.9 per cent and increased consumption growth by 16.3 per cent. Dercon and Hoddinott (2005) found that, in Ethiopia, an increase of 10 km in the distance from the rural village to the closest market town had a dramatic effect on the likelihood that the household purchased inputs. Mu and Van de Walle (2007) showed that markets in Vietnam were more likely to develop as a result of rural road improvements where communities had access to extended networks of transport infrastructure.

It was shown in Uganda that benefits from improving access to basic education depended on complementary investments in infrastructure (Deininger and Okidi, 2003). Road improvements in Bangladeshi led to lower input and lower transportation costs, higher production, higher wages and higher output prices (Khandker et al., 2011). Access to rural roads in Nepal improved the productive capacity of poor households (Jacoby, 2000). Rural road rehabilitation in Georgia increased the opportunities for off – farm and female wage employment (Lokshin and Yemtsov, 2005). Rehabilitation and maintenance of rural roads in Peru improved access and attendance to schools and child health centres (Escobal and Ponce, 2003). According to The Rural Accessibility Index of 2010 and also Torero and Chowdhury, 2004, majority of rural communities in Africa have inadequate and unreliable infrastructure services with only 34% of rural Africans living within 2 kilometres of an all - weather road compared to 59% in Latin America, 65% in East Asia and over 90% in other developed regions. Africa Infrastructure Country Diagnostic of 2010 indicated that even where feeder roads exist; the rural environment presents particular institutional challenges for road maintenance. Only half of the existing rural road network is in good or fair condition, which is much lower than the 80% found for the inter – urban network.

Pinstrup - Anderson and Shimokawa (2010) and Fan (2011) indicated that the provision of rural infrastructure contributed to the delivery of goods and services that promoted prosperity and growth, contributed to quality of life, including social well - being, health and safety, and the quality of the environment. It will help reduce the cost of inputs and transport to markets, also increase farmer's access to enlarged markets, facilitate trade flow and spur value addition and crowd – in investment. Foster and Briceno – Garmendia in 2010 stated that the variation in road quality throughout the various Sub Saharan African countries reflected several interacting factors. Firstly, the relation to affordability where the GDP per capita is most strongly correlated with the percentage of the main road network in good condition, signifying that richer countries tended to spend more on maintenance. No such clear relationship exists for rural roads. The second factor relates to topographic and climatic influences where mountainous and wet countries normally have poorer road conditions in both main and rural networks (Johannessen, 2008). Thirdly, they observed that countries with road funds and road agencies have considerably better road conditions than those that have neither.

Addo – Abedi, in 2007 noted that a number of African countries had embarked on reforms in the last few decades supported by four "building blocks" namely Ownership, Financing, Responsibility and Management. The main aim of the reforms was to manage roads as a business and bring them into the market place by charging for road use on a fee – for – service basis. The mean distance to services and community assets diminished significantly due to rehabilitation of rural roads in Zambia's eastern province (Kingombe, 2011). The purpose of this study therefore is:

1. To review whether the planning of rural road construction in Lusaka province is adequate.
2. To determine whether the design standards and the technology used in Lusaka province are appropriate.

2. RESEARCH METHODOLOGY

Primary data was collected through three check lists that were filled with data collected through observations and field measurements. To help the researcher understand how to collect this data, the researcher had to undergo Rural Road Construction and Maintenance training with The National Council for Construction for a period of four months. This programme consisted of two parts: The theory part comprising Mathematics, Road Rehabilitation and Maintenance, Construction Materials, Construction Management, Pricing and Bidding, Communication Skills and Entrepreneurship and the Practical part comprising Road Rehabilitation and Maintenance only.

The research also relied on supplementary secondary data that was readily available from;

- National Road Fund Agency
- Road Development Agency
- National Council for Construction
- Ministry of Transport, Communication, Works and Supply
- Ministry of Local Government and Housing
- Ministry of Finance

Three areas were picked because of proximity, less transport cost, security reasons, assuredly supervised roads, ease of contacting the contractors and also the ease of sourcing the contract documents from the ministries involved. Two rural roads per area were also picked at random. Road dimension tests, road profile tests and physical check of the road features were conducted on the full length of these rural roads. The first test was the road dimension test using tapes to check the accuracy of the carriageway and the side drains. The second test was the road profile test using the line level were the camber of the carriageway and the longitudinal profile of the carriageway were checked and the final test was the visual test that was checking for the presence of culverts, culvert rings, wing walls, headwalls, ramps, outfalls, mitre drains, scour checks, laybys, ditch and the shoulder and these were presented in the form of check lists. The following were the check lists used:

2.1 Road Dimension Tests

The standard cross section of rural roads in Zambia is one having a carriageway of 5.5m, with a gravel coarse of 5m span, side slope of 1.2m, a ditch of 1m and a back slope of minimum 3:1 and a maximum of 1:1. Type of Tests carried out were simple checks on the dimensional accuracy of the construction works using measuring Tapes.

To Test for the camber of the carriageway and Checking on the longitudinal profile of the carriageway, the research used the line level. For the simple checks on the dimensional accuracy of the construction works, measuring Tapes were used.

2.2 Road Profile Tests

Two types of Tests were carried out.

1. Check on the camber of the carriageway
2. Check on the longitudinal profile of the carriageway

For both of them the line level was used.

2.3 Gravel Layer Test

To test the gravel for thickness of compaction and Degree of compaction, measuring Tapes and special laboratory tests were carried out.

2.3.1 Compaction

The compaction method is usually specified. The following are factors that can influence compaction.

- Moisture content
- Amount of compaction
- Thickness of layer

2.4 The Study Population and Sample

Leedy and Ormrod (2010) mention a two-stage descriptive survey as one of the means of data collection. In this study, the second stage data collection of descriptive survey was used. This approach works through collection of quantitative data coming from a designed checklist. This specific checklist was used for recording measurements from field survey. The target area being the sampled population was divided into three:

a. Two rural roads in Chongwe
b. Two rural roads in Lusaka West
c. Two rural roads in Lusaka North

2.5 Interviews and Checklist

Under qualitative analysis, structured interviews with headmen and their subjects, staff at National Council for Construction, Ministry of Finance staff, National Road Fund Agency staff, Ministry of Works and Supply and Ministry of Local Government and Housing staff were conducted. The data collected was used to come up with an informed opinion that was correlated to measurements collected. The results helped to identify the gaps in specifications and implementation. A desktop study using published literature on rural roads was also carried out.

Interviews and in-depth discussions were carried out with engineers under the Rural Road Unit and The National Council for Construction. This was done in order to understand the challenges that they went through and the successes as well. The interviews were aimed at obtaining preliminary data that would enhance the measurements. The interviews were limited to participants within Lusaka, the capital city, due to the short time that was required to get preliminary data and also due to the cost implications. Security reasons were also taken into account as the field visits required walking the whole length of the sampled rural road. A check list was adopted as the main research instrument which was based on the advantages that a representative sample would be realised with little time or costs. It was explained to the participants who assisted in the measurements. It was accompanied with a cover letter. The tool that was used in the research was a semi structured checklist. Interviews were another means of data collection and field measurements.

2.6 The Study Area

The study area was Lusaka Province. Lusaka province is one of the 10 provinces in Zambia. It is located in the southern part of the country. Lusaka province was taken because of its proximity to the ministries hence reducing on transport costs and lodging fees. Also, it was much easier to access data from the concerned institutions. Even interviews were easier to conduct with the officials as well. Efforts to prevent variability in sample size and analysis were made. The sample size was confined to Lusaka province because according to statistics, most of the rural roads are concentrated around the province.

3. FINDINGS AND DISCUSSION

The following data was collected on six rural roads from Lusaka West, Chongwe and Lusaka North areas. The results were compared to theory with the view of finding out whether our rural roads are built to specifications, or if not, why?

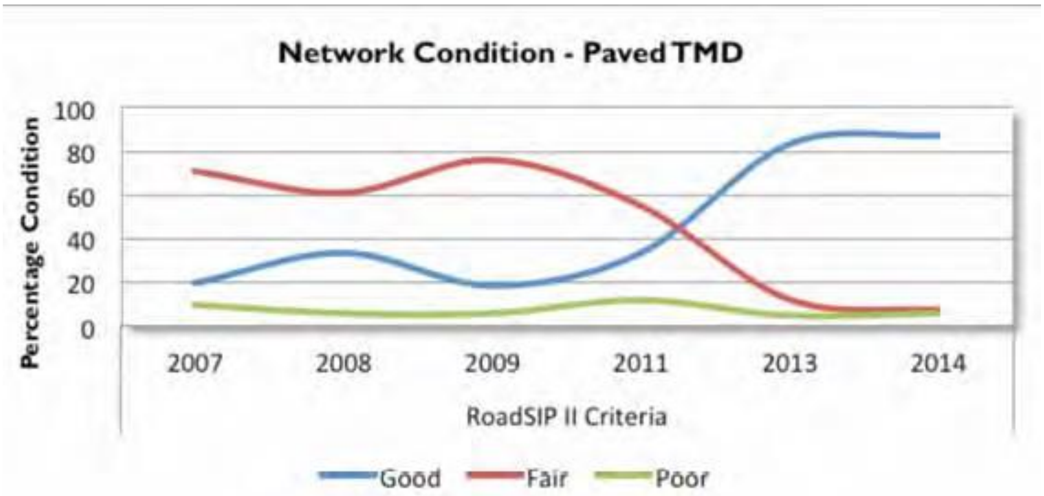

Figure 1. Network Condition – Paved TMD (Source: Road Sector Annual Work Plan for 2014)

In Zambia, the Road Development Agency undertakes annual surveys to determine the road condition indices for unpaved roads within the Core Road Network. The variations are considerable, as can be seen in figures 4-1 and 4-2 which give the status of the condition on the Core Road Network. For example, during the period 2014/2015 over 70% of unpaved Trunk, Main and District roads and 82% of the unpaved Primary Feeder Roads were in poor condition. The condition of PFR substantially remained unchanged.

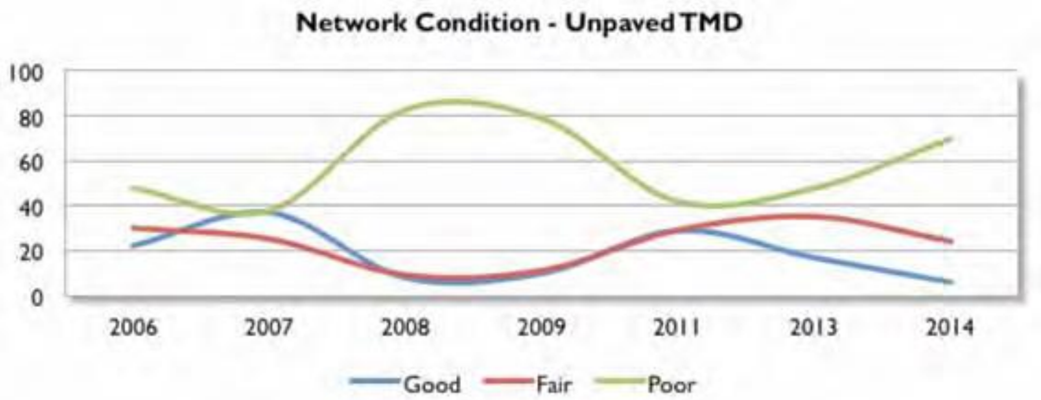

Figure 2. Network Condition – Unpaved TMD (Source: Road Sector Annual Work Plan for 2014)

It is clear from the findings that the planning process is followed adequately. It starts from the National Development Plans to The Transport Sector Plans. These are then incorporated into the Annual programs and Budgets. Local plans are then drawn from them. That is when Project plans are done and then the Detailed plans and finally the Maintenance plans are done. All these plans are governed by a Legal and Regulatory framework.

The Roads in Zambia are properly classified and those providing access to and from local communities are often under the jurisdiction of the local authorities. The government develops a set of design guidelines. These design guidelines include general directions on the geometric features of the roads, such as appropriate dimensions of the road cross – section and curvature, surfacing options, drainage solutions and road reserves.All public expenditure is governed by a comprehensive set of procedures and directives detailing how funds are to be used and accounted for. These procedures include budgeting and accounting procedures as well as detailed regulations on the contracting arrangements.

The planning process forms the basis for all budgeting and resource scheduling required in civil works projects. Roads to be constructed, improved or maintained under a particular programme are not selected in an arbitrary manner. These are done in distinct stages. The initial identification is the first step in the preparation of a list of proposed roads to be improved and maintained. This initial list is in most cases prepared with the involvement of the local communities and it must meet the pre – determined criteria by the central government. This is done in order to qualify or disqualify those roads that meet or don't meet certain criteria, are or aren't technically or economically feasible or are likely or not likely to have the expected impact. Local participation in the ranking of projects for screening is through elected representatives.

A more detailed assessment for supporting investment Cost needs is estimated and socioeconomic data assembled. After the screening and the appraisal stage, roads are selected against the limited resources. The roads are then ranked based on social impact, economic impact, and environmental impact. The road with the best score is then selected. As in all infrastructure works, the three main criteria for finally selecting a rural road are Technical Feasibility, Economic Justification and Social Considerations.

On the spot check on six rural roads that were picked in Lusaka North, Lusaka West and Chongwe, the following data was collected.

Transmitter Road in Lusaka West of Lusaka District

Total Length of Road: 2.5km; Carriageway: 5.5m.

Table 1. Transmitter Road Dimension Test (Rural road dimension test using the tape)

Test	Average	Location	Every	Tolerance
Width of carriageway	5.5m	Field	300m	+/ - 50mm
Width and depth of side drains	0.5m, and 0.2m	Field	10m	+/ - 20mm

Table 2. Transmitter Road Profile Test (Rural road dimension test using the line level)

Test	Average	Location	Test Interval	Tolerance
Camber	0.1m	Field	20m	+/ - 10mm
Longitudinal profile	-	Field	20m	+/ - 50mm

Table 3. Transmitter Road Condition Inventory Check List

Road Condition Inventory	Specifications	Comments
Soil Type	Laterite	Laterite soil present
Surface Material	Laterite	Laterite
Road Surface Width	5.5m	5.5m
Maximum Gradient	12%	<6%
Camber	5% after compaction	5%
Shoulder	1.2m	1m
Side Slope	1:4	0.2m
Side Drain Left	1m	0.5m
Side Drain Right	1m	0.5m
Tree and Stump Removal	6m clearance from centre	Not adhered to
Sand Removal	Must be removed	Done
Boulder Removal	<0.5m boulders buried along the road	No presence of boulders observed
Clear Side Drain	Must be cleared	Overgrown with grass
Clear Mitre Drains	Must be cleared	Overgrown with grass
Scour Checks	12% gradient must be 6m apart	No Scour Checks observed

Grass Planting	Must be done	Done
Catch Water Drains	5m away from the Ditch	Present but less than 5m from the Side Drain
Gravel Surface Thickness	125mm after compaction	Less than 50mm thickness
Culverts per km	For Maximum Gradients of 12%, 2 to 4 per km	No Culvert for the entire stretch of the road
Culvert Pipe Size	600mm	No Culverts Pipes present
Wing Walls	45°<Centreline<75°	No Wing Walls present
Head Walls	200mm	No Head Walls present
Ramp	20m approach distance	No Ramp present
Layby	5m	No Layby found

China – Zambia Road in Lusaka West of Lusaka District
Total Length: 1.9 km; Carriageway: 5.5m

Table 4. China – Zambia Road Dimension Test

Test	Average	Location	Every	Tolerance
Width of carriage	5.5m	Field	300m	+/ - 50mm
Width and depth of side drains	0.8m and 0.2m	Field	10m	+/ - 20mm

Table 5. China – Zambia Road Profile Test

Test	Average	Location	Test Interval	Tolerance
Camber	<0.1m	Field	20m	+/ - 10mm
Longitudinal profile	-	Field	20m	+/ - 50mm

Table 6. China – Zambia Road Condition Inventory Check List

Road Condition Inventory	Specifications	Comments
Soil Type	Laterite	Laterite soil present
Surface Material	Laterite	Laterite
Road Surface Width	5.5m	5.5m
Maximum Gradient	12%	<6%
Camber	5% after compaction	5%
Shoulder	1.2m	1m
Side Slope	1:4	0.2m
Side Drain Left	1m	0.8m
Side Drain Right	1m	0.8m
Tree and Stump Removal	6m clearance from centre	Not adhered to
Sand Removal	Must be removed	Done
Boulder Removal	<0.5m boulders buried along the road	Presence of boulders observed along the road
Clear Side Drain	Must be cleared	Overgrown with grass
Clear Mitre Drains	Must be cleared	Overgrown with grass
Scour Checks	12% gradient must be 6m apart	No Scour Checks observed
Grass Planting	Must be done	Done
Catch Water Drains	5m away from the Ditch	Present but less than 5m from the Side Drain
Gravel Surface Thickness	125mm after compaction	125mm thickness
Culverts per km	For Maximum Gradients of 12%, 2 to 4 per km	No Culvert for the entire stretch of the road
Culvert Pipe Size	600mm	No Culverts Pipes present
Wing Walls	45°<Centreline<75°	No Wing Walls present

Head Walls	200mm	No Head Walls present
Ramp	20m approach distance	No Ramp present
Layby	5m	No Layby found

Kapepe School to Nyendwa Bar Road in Chongwe District
Total Length: 10.8 km; Carriageway: 5.5m

Table 7. Kapepe – Nyendwa Road Dimension Test

Test	Average	Location	Every	Tolerance
Width of carriage	5.5m	Field	300m	+/ - 50mm
Width and depth of side drains	0.5m and 0.2	Field	10m	+/ - 20mm

Table 8. Kapepe – Nyendwa Road Profile Test

Test	Average	Location	Test Interval	Tolerance
Camber	<0.1m	Field	20m	+/ - 10mm
Longitudinal profile	-	Field	20m	+/ - 50mm

Table 9. Kapepe – Nyendwa Road Condition Inventory Check List

Road Condition Inventory	Specifications	Comments
Soil Type	Laterite	Laterite soil present
Surface Material	Laterite	Laterite
Road Surface Width	5.5m	5.5m
Maximum Gradient	12%	<6%
Camber	5% after compaction	5%
Shoulder	1.2m	1m
Side Slope	1:4	0.2m
Side Drain Left	1m	0.5m
Side Drain Right	1m	0.5m
Tree and Stump Removal	6m clearance from centre	Adhered to specifications
Sand Removal	Must be removed	Done
Boulder Removal	<0.5m boulders buried along the road	No presence of boulders observed
Clear Side Drain	Must be cleared	Overgrown with grass
Clear Mitre Drains	Must be cleared	Overgrown with grass
Scour Checks	12% gradient must be 6m apart	No Scour Checks observed
Grass Planting	Must be done	Done
Catch Water Drains	5m away from the Ditch	Present at 5m from the Side Drain
Gravel Surface Thickness	125mm after compaction	Less than 50mm thickness
Culverts per km	For Maximum Gradients of 12%, 2 to 4 per km	Two Culverts per km observed
Culvert Pipe Size	600mm	300mm Culverts Pipes
Wing Walls	45°<Centreline<75°	Not to specifications
Head Walls	200mm	Not to specifications
Ramp	20m approach distance	< 20m approach distance
Layby	5m	No Layby found

Evergreen to Nyendwa Road in Chongwe District
Total Length: 9km; Carriageway: 5.5m

Table 10. Evergreen – Nyendwa Road Dimension Test

Test	Average	Location	Every	Tolerance
Width of carriage	5.5m	Field	300m	+/ - 50mm
Width and depth of side drains	0.6m and 0.1m	Field	10m	+/ - 20mm

Table 11. Evergreen – Nyendwa Road Dimension Test

Test	Average	Location	Test Interval	Tolerance
Camber	0.2m	Field	20m	+/ - 10mm
Longitudinal profile		Field	20m	+/ - 50mm

Table 12. Evergreen – Nyendwa Road Condition Inventory Check List

Road Condition Inventory	Specifications	Comments
Soil Type	Laterite	Laterite soil present
Surface Material	Laterite	Laterite
Road Surface Width	5.5m	5.5m
Maximum Gradient	12%	<6%
Camber	5% after compaction	5%
Shoulder	1.2m	1m
Side Slope	1:4	0.1m
Side Drain Left	1m	0.6m
Side Drain Right	1m	0.6m
Tree and Stump Removal	6m clearance from centre	Adhered to
Sand Removal	Must be removed	Done
Boulder Removal	<0.5m boulders buried along the road	No presence of boulders observed
Clear Side Drain	Must be cleared	Cleared
Clear Mitre Drains	Must be cleared	Cleared
Scour Checks	12% gradient must be 6m apart	Scour Checks observed
Grass Planting	Must be done	Done
Catch Water Drains	5m away from the Ditch	Present and at 5m
Gravel Surface Thickness	125mm after compaction	Spot gravelling 125mm thickness
Culverts per km	For Maximum Gradients of 12%, 2 to 4 per km	6 Culverts
Culvert Pipe Size	600mm	300mm Culverts Pipes
Wing Walls	45°<Centreline<75°	Present
Head Walls	200mm	Present
Ramp	20m approach distance	Ramp present
Layby	5m	No Layby found

Headman Mpandika's Palace Road in Lusaka North
Total Length: 4.2km; Carriageway: 5.5m

Table 13. Mpandika Palace Road Dimension Test

Test	Average	Location	Every	Tolerance
Width of carriage	5.5m	Field	300m	+/ - 50mm
Width and depth of side drains	0.6m & 0.2m	Field	10m	+/ - 20mm

Table 14. Mpandika Palace Road ProfileTest

Test	Average	Location	Test Interval	Tolerance
Camber	0.1m	Field	20m	+/ - 10mm
Longitudinal profile		Field	20m	+/ - 50mm

Table 15. Mpandika Palace Road Condition Inventory Check List

Road Condition Inventory	Specifications	Comments
Soil Type	Laterite	Laterite soil present
Surface Material	Laterite	Laterite
Road Surface Width	5.5m	5.5m
Maximum Gradient	12%	12%
Camber	5% after compaction	5%
Shoulder	1.2m	1m
Side Slope	1:4	0.2m
Side Drain Left	1m	0.6m
Side Drain Right	1m	0.6m
Tree and Stump Removal	6m clearance from centre	Adhered to
Sand Removal	Must be removed	Done
Boulder Removal	<0.5m boulders buried along the road	No presence of boulders observed
Clear Side Drain	Must be cleared	Overgrown with grass
Clear Mitre Drains	Must be cleared	Overgrown with grass
Scour Checks	12% gradient must be 6m apart	No Scour Checks observed
Grass Planting	Must be done	Done
Catch Water Drains	5m away from the Ditch	Not Present
Gravel Surface Thickness	125mm after compaction	Earth road
Culverts per km	For Maximum Gradients of 12%, 2 to 4 per km	3 Culverts
Culvert Pipe Size	600mm	600mm Culverts Pipes
Wing Walls	45°<Centreline<75°	No Wing Walls present
Head Walls	200mm	Head Walls present
Ramp	20m approach distance	No Ramp present
Layby	5m	No Layby found

Spin-Along Road in Lusaka North

Total Length: 3.2km; Carriageway: 5.5m

Table 16. Spin - Along Road Dimension Test

Test	Average	Location	Every	Tolerance
Width of carriage	5.5m	Field	300m	+/ - 50mm
Width and depth of side drains	0.5m and 0.3m	Field	10m	+/ - 20mm

Table 17. Spin - Along Road Profile Test

Test	Average	Location	Test Interval	Tolerance
Camber	0.1m	Field	20m	+/ - 10mm
Longitudinal Profile	Ok	Field	20m	+/ - 50mm

Table 18. Spin - Along Road Condition Inventory Check List

Road Condition Inventory	Specifications	Comments
Soil Type	Laterite	Laterite soil present

Surface Material	Laterite	In situ Laterite
Road Surface Width	5.5m	5.5m
Maximum Gradient	12%	<6%
Camber	5% after compaction	5%
Shoulder	1.2m	No Shoulder observed
Side Slope	1:4	0.3m
Side Drain Left	1m	0.5m
Side Drain Right	1m	0.5m
Tree and Stump Removal	6m clearance from centre	Adhered to
Sand Removal	Must be removed	Done
Boulder Removal	<0.5m boulders buried along the road	No presence of boulders observed
Clear Side Drain	Must be cleared	Overgrown with grass
Clear Mitre Drains	Must be cleared	Overgrown with grass
Scour Checks	12% gradient must be 6m apart	No Scour Checks observed
Grass Planting	Must be done	Done
Catch Water Drains	5m away from the Ditch	Not Present
Gravel Surface Thickness	125mm after compaction	No gravel
Culverts per km	For Maximum Gradients of 12%, 2 to 4 per km	No Culvert for the entire stretch of the road
Culvert Pipe Size	600mm	No Culverts Pipes present
Wing Walls	45°<Centreline<75°	No Wing Walls present
Head Walls	200mm	No Head Walls present
Ramp	20m approach distance	No Ramp present
Layby	5m	No Layby found

4. LIMITATIONS

This research was only conducted in Lusaka West, Chongwe and Lusaka North areas because most of the ministries and agencies responsible for rural road design, approval, procurement, construction and supervision are located in Lusaka. Coupled to this were also issues of limited resources and time constraints. Security concerns to the researcher were also considered. Only two rural roads per area were selected arbitrarily and assessed to help understand the level of the problem.

Another limiting factor was the scarce availability of data on causes of poor quality of rural roads. That which exists is often not readily available or tailored to local conditions. Engineering guidelines are either very old or have not been refined in recent years to exploit possible potential cost savings. There are inadequacies in knowledge also and the issues of climate change adaptation and mitigation pose difficult questions about how to design, plan and build resilient rural roads and transport services without incurring even greater costs, either on the environment or on strained government budgets.

5. RECOMMENDATION

The potential contribution of rural roads to the socio – economic development of Zambia cannot be overemphasised. The impact of quality rural road infrastructure could be far – reaching, going beyond poverty reduction – a goal which many leaders now view as unambitious – to sustain economic growth and structural transformation. Zambia's large and sparsely populated landmass underscores the relevance and important role of rural roads in the successful implementation of most, if not all, development policies. In essence, poor quality rural road systems negatively affect other sectors of the economy.

1. The Public Service Management Division must recruit qualified personnel to fill up the vacant positions. The local councils must be encouraged to employ competent people who will help, especially during the planning process, to come with detailed plans, project plans and local plans. These when forwarded to Central government will help with the formulation of Annual Programmes and Budgets, Transport Sector Plans and finally National Plans. This will assist in limiting Central Government's role to coordination, guidance and oversight, policy, formulating guidelines and providing technical support in planning and contract management thereby reducing bureaucracy particularly in making payments to contractors.
2. Design standards should be based on reliability and durability not just concentrating on accessibility. We need rural roads that are adequate, cost effective and sustainable. Standards such as economic road access should place importance on essential access, spot surface improvement in critical seasons, on surface drainage and essential structures rather than on geometric characteristics determined by design speed. Attention must also be paid to topography.

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