

Analysis of the Road Transport Infrastructure in Wudil Town, Nigeria

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ABSTRACT

Insufficient investment in road transport infrastructure have a severe repercussion on passengers' mobility, logistics systems, and overall social and economic activity. Significant information gap exists between the several levels of government about investments in the construction of road infrastructure in Nigeria. This study was conducted to analysed road transport infrastructure in Wudil town, Nigeria. Data for this study was obtained through both primary and secondary sources. The primary source involved the use of ARCGIS 10.1 software to map out the roads and potholes in the study area. The coordinates of locations of potholes were obtained using a hand held Geographical Position System (GPS). The secondary source involved obtaining information about the existing number of roads and their ownership from Kano State ministry of works. The study reveals that 47% of the sampled roads are rated fair, 23.5% of the sampled roads are excellent, 17.7% are good roads and 5.9% are very good. Additionally, 99.26% of the surveyed roads minor roads while 0.74% are major roads. Also, 97.37% of the surveyed roads are unpaved while only 2.63% of the minor roads are paved. Descriptive statistics such as cross-tabulation, percentages and mean were used to analyse the data collected for the study. The study concludes that road transport infrastructures in the study area are grossly inadequate and the few that are available are completely in the state of disrepair calling for urgent attention. The study is recommending the need for strengthened public-private partnership in the provision and maintenance of road transport infrastructure in the study area to enhance effective and efficient movement of people, goods and services in the study area.

Keywords: Public-Private Partnership, Efficient Movement, Goods and Services, Minor Roads, Provision and Maintenance

1.0 INTRODUCTION

A road is a stabilized base used for public traffic, primarily for motor vehicles. It includes bridges, tunnels, junctions, crossings, and parking facilities. Urban roads in cities or villages are designated streets and serve both as pathways and urban space easements. Contemporary roadways are typically leveled, paved, or otherwise readied for convenient driving. A road is a recognizable path or route between two locations, usually constructed to facilitate transportation by various means such as horses, carts, or motor vehicles. Roads play a crucial role in accessing resources and facilitating connections between individuals, locations, and enterprises (Adetola, 2014; Olorunfemi, 2021).

Infrastructure encompasses several activities known as social overhead capital by development economists (Adger, 2015; Woolcock & Narayan, 2000; Okafor, 2020). Transport infrastructure refers to the framework that supports our transport system. This encompasses highways, trains, seaports, and airports (Kendrick et al., 2004). Road infrastructure encompasses the physical facilities that support the transportation of

individuals, commodities, and services via different modes of travel on roads. The elements mentioned by the authors are the carriage way, pedestrian facilities (like walkways and bus stops), drainage system, culverts (box or ring types), bridges, flyovers, street light installations, traffic signs, layby, traffic lights, speed breakers, among others (Abdulkareem and Adeoti 2004; Mayaki 2014; Olorunfemi, 2021).

Road infrastructure is a crucial traffic route that enables access to various land uses in urban areas and ensures the proper functioning of human settlements. Human settlements and urban development heavily rely on road infrastructure for their functionality (Oni, 2007; Olorunfemi, 2021). Road infrastructure significantly influences the growth and development of towns. It facilitates the transportation of people, commodities, and services between different areas, and when well-established, it creates opportunity for the development of new ideas and technologies. Transport infrastructure is essential for economic development across all socioeconomic levels (Olorunfemi, 2021).

The road infrastructure significantly influences the integration of rural and urban areas, particularly in the establishment of a developing state or economy. It is essential for promoting industrial, agricultural, and other socio-economic growth. Road infrastructure has a crucial role in both home and economic operations. Adequate road networks are crucial for economic operations. Road infrastructure plays a crucial role in promoting industrial, agricultural, and socio-economic development. Enhancing road infrastructure is crucial for speeding up Africa's regional integration, which can attract private sector involvement in various economic sectors by expanding market opportunities, enhancing productivity, creating economies of scale for potential investors, and facilitating passenger mobility (Carole et al., 2008; Olorunfemi, 2021). Road infrastructure plays a crucial role in facilitating access to many essential locations such as homes, work, recreational centers, markets, hospitals, and schools. It also improves mobility and contributes to economic productivity.

Insufficient investment in road transport infrastructure may lead to severe repercussions on passengers' mobility, logistics systems, and overall social and economic activity. Individuals relocate inside urban areas to fulfill certain needs such as work, learning, recreation, or obtaining products and services. Each travel need results in the creation of a trip. Commuters in many developing countries face discomfort, stress from commuting, and delays due to inadequate road infrastructure. To alleviate the stress experienced by passengers, it is important to make sufficient investments in road transport infrastructure to provide a dependable and efficient transportation system (Rodrigue et al., 2009; Munuzuri et al., 2005).

Nigeria possesses the most extensive road network in West Africa, consisting of over 200,000km of surfaced roads (Filani, 1993\ Okafor 2020). Approximately 28,980 kilometers were paved, while 179,220 kilometers were unpaved (Adepoju, 2021). Hamzat (2016) said that the Petroleum Trust Fund was established to fund road building and maintenance from 1996 to 1999. It was observed that the roads in Nigeria were inadequately constructed and lacked maintenance management mechanisms for sustainable development. Many roads built in the 1970s had not been maintained even once (CBN, 2002). In South-western Nigeria, the Lagos-Ibadan highway and Ibadan-Ogbomoso roads were assigned to contractors. However, after five years, the roads deteriorated significantly. Adepoju (2021) stated that Nigerian highways suffer from design specifications and functionality that fall below the necessary criteria.

The main challenges impacting road infrastructure development in Nigeria are linked to the procurement process and funding, as highlighted by Oyegoke (2005), Oforeh (2006), and Opawole et al. (2013). Opawole et al. (2013) conducted a study on infrastructure development which found that Nigeria was losing approximately \$265 million per year before 1999 due to various forms of manipulation in the procurement process for public contracts. The manipulations included inflating contract costs, diverting public funds to private individuals through the contract system, awarding contracts for projects that do not exist, hiring inexperienced contractors, over-invoicing, engaging in influence peddling, awarding contracts to friends, relatives, and family members, and awarding contracts without proper planning and budgetary provisions. Babalola et al. (2010) concurred that these abuses are significant factors leading to the abandonment of public projects, posing a serious danger to the sustainable development of road infrastructure in Nigeria. Poor budget implementation may be a contributing factor to the road infrastructure sustainability issues in Nigeria. Nigeria's budget implementation is characterized as inadequate, demonstrated by significant budget deficits and subpar physical performance (Olufidipe, 2003).

This study therefore, aimed at assessing road transport infrastructures in Wudil with a view of making policy recommendations that would help in facilitating industrial, agricultural and other socio-economic development of the area.

2.0 METHODOLOGY

In order to analyse road infrastructure performance in Wudil town, the researcher collected both primary and secondary data. The primary data were derived through personal observation and direct measurement of existing road infrastructure randomly selected along seventeen (17) road corridors in Wudil town covering about 35.4 kilometres. The number of roads, their ownership, and their conditions were obtained from the Kano State ministry of works. Field assistants were hired to measure the width and depth of potholes on specific roads. The roads in Wudil were rated according to the following criteria: road distances (kms) and lanes, surface conditions, depth and width of potholes, and drainage conditions. The roads were rated on a scale from 1 to 5 using road surface condition adapted from Adedotun et al. (2016). To analyze the road surface conditions, criteria such as excellent, very good, good, fair and poor were used as displayed in Table 1. Descriptive statistics, including percentages and means, were used to present and analyze data collected for the study.

Table 1: Criteria for rating and assessment of road surface condition

Categories	Rating	Assessment
Paved and with smooth surface	5	Excellent
Paved but with potholes	4	Very Good
Paved but in disrepair	3	Good
Not paved but motorable	2	Fair
Not paved and disrepair	1	Poor

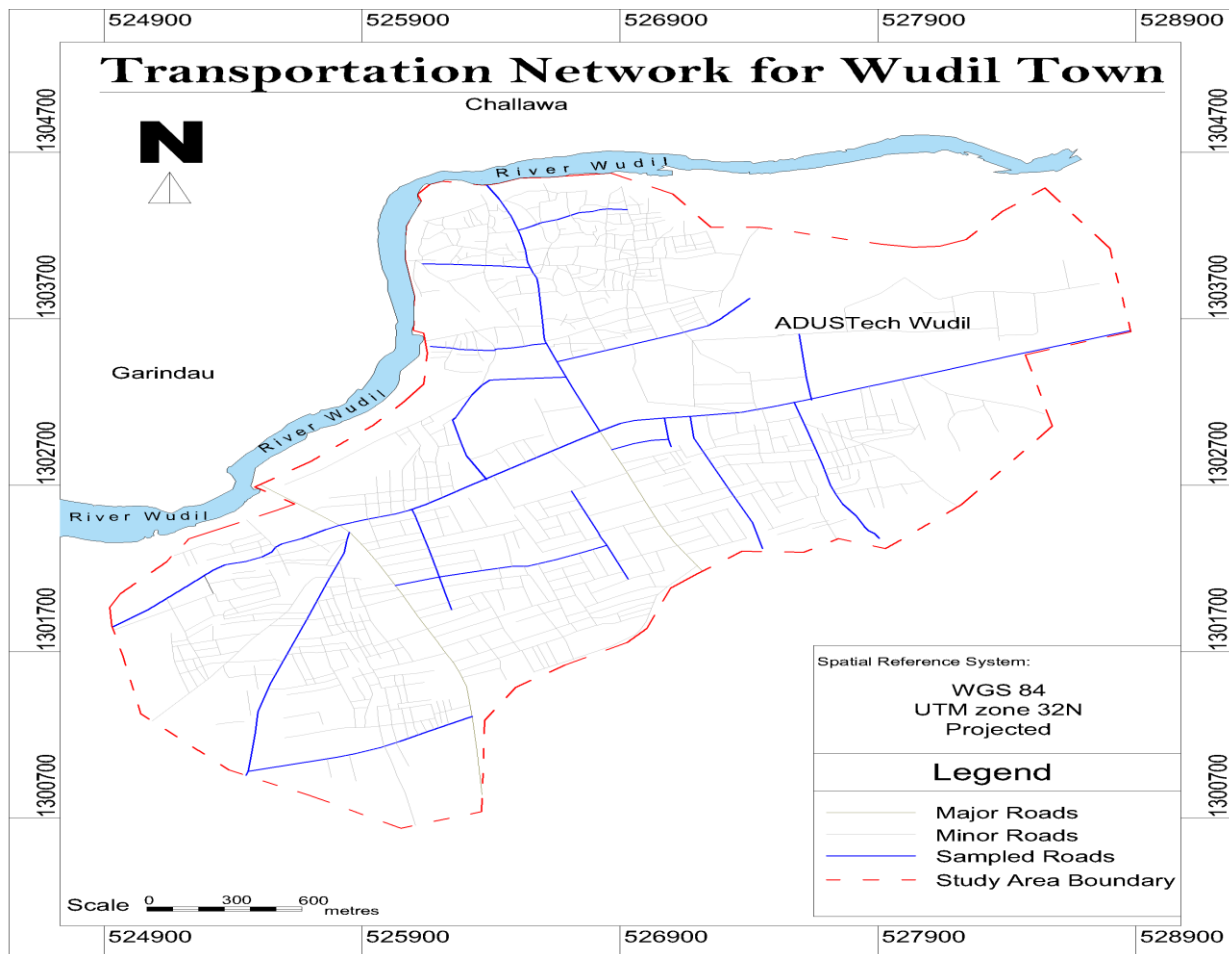


Figure 1: Transport Network of Wudil Town

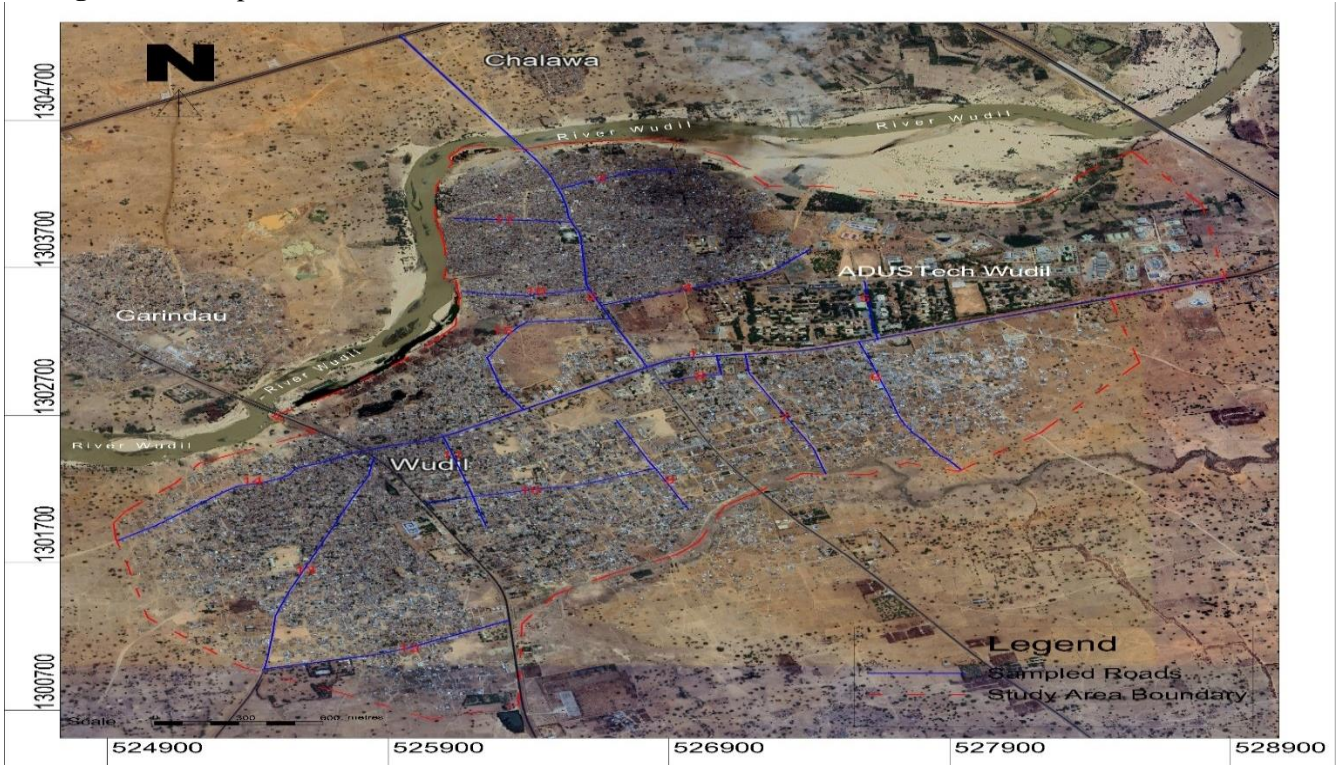


Figure 2: Satellite Image of Sample Roads in Wudil Town

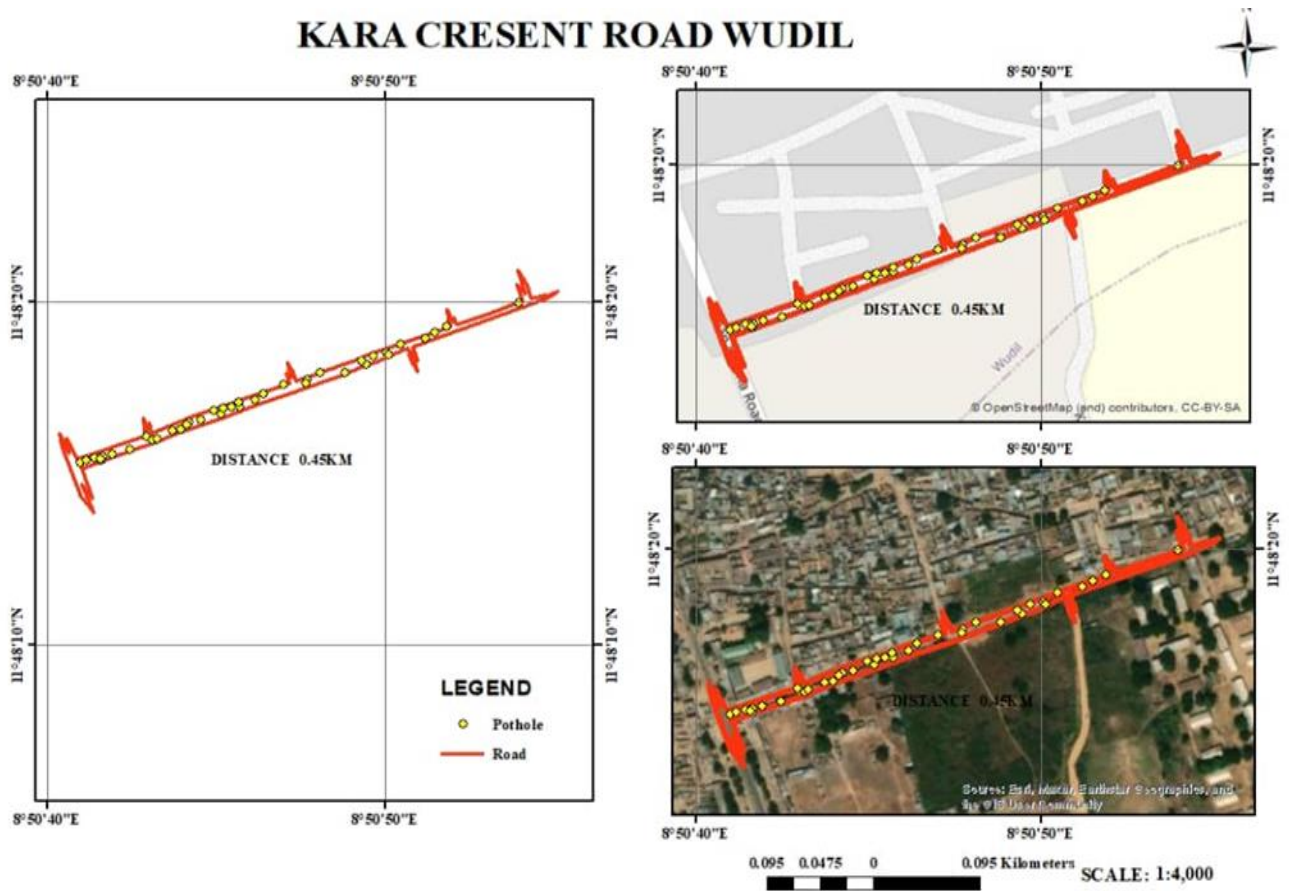


Figure 3: Potholes along Kara road, Wudil Town

3.0 Results and Discussion

3.1 Rating of selected roads in Wudil Town

The rating of the roads was carried out based of the assessment criteria adopted from the study of Adedotun, et al, (2016) as shown in Table 2. Based on this rating, out of the total of 17 roads surveyed 4 roads are rated 5 which implies that they are paved and with smooth surface, 1, road is rated 4 which indicates paved but with potholes, 3 roads are rated 3 which indicates they are paved but in disrepair condition, while 8 roads are rated 2 which implies they are not paved but motorable. The analysis shows that majority of the roads are not paved but motorable. The study also reveals that 9 of the roads surveyed are tarred with bitumen and the remaining 8 are constructed with laterite material.

Table 2: Rating of the selected roads in Wudil Town

S/N	Routes	Rating	Road Surface Condition	Surface Material
1	Wudil – Gaya Road	3	Paved but in disrepair	Bitumen
2	Dandarma Road	5	Paved and with smooth surface	Bitumen
3	Dafawa – Dogudawa Road	2	Not paved but motorable	Laterite
4	Layin Kofar Kara	4	Paved but with potholes	Bitumen
5	ADUSTECH Boulevard	5	Paved and with smooth surface	Bitumen
6	Layin Yan kwaya	2	Not paved but motorable	Laterite
7	Layin Yan Kwaya 2	2	Not paved but motorable	Laterite
8	Layin Gida Yakubu Adamu	5	Paved and with smooth surface	Bitumen
9	Layin Golden age school	2	Not paved but motorable	Laterite
10	Sabon-Gari Sakau Road	2	Not paved but motorable	Laterite
11	Sabon-Gari Wudil Road	5	Paved and with smooth surface	Bitumen
12	Wudil – Indabo – Garko Road	5	Paved and with smooth surface	Bitumen
13	Lamfadar Road	2	Not paved but motorable	Laterite
14	Layin Kuka	3	Paved but in disrepair	Bitumen
15	Dorawar Nana Road	2	Not paved but motorable	Laterite
16	Kofar Kudu – Sab. Ungwar	2	Not paved but motorable	Laterite
17	Kankarfi – Kofar Yanma	3	Paved but in disrepair	Bitumen

Source: Authors’ Field Survey, 2020

3.2 Types of roads in Wudil Town

Table 3 shows the types of roads in the study area, the Table revealed that there are about 536 roads within Wudil town, out of which 533 representing 99.26% are classified as minor roads. The minor roads are owned and manage by the Local governments and the communities. Only 3 roads representing 0.74% are classified as majors. The major roads are under the auspices of the State and Federal governments. Additionally, the analysis also reveals that only 14 roads representing 2.63% of the minor roads are paved, while 519 representing 97.37% are unpaved. However, all the major roads in the study area are paved perhaps because they are directly under the auspices of the State and Federal governments. These findings are in affirmation with the study of Adedotun (2016) that identified majority of the major roads in Osogbo were paved because they are directly under the auspices of the State and Federal governments while majority of the minor roads were unpaved because they are owned and manage by the Local governments and the communities.

Table 3: Analysis of types of roads in Wudil Town

Road types	Road Conditions				Total	Percentage
	Paved	%	Unpaved	%		
Minor	14	2.63	519	97.37	533	99.26
Major	3	100.00	0	0.00	3	0.74
Total	17	3.35	519	96.65	536	100.00

3.3 Length, Lanes and Ownership of the Selected Roads

Based on Table 4, the total length of the 17 sample roads use for the study is 35.4 kilometers. Only 2 roads are under the auspices of the State and Federal governments. While the remaining 10 roads are owned and manage by the Local governments and the communities. Moreover, 16 of the sample roads are made up of two lanes of single carriage way of about 9 meters. While only 1 road is made up of four lanes of dual carriage

roads of about 12 meters each. These findings are in affirmation with the study of Adedotun (2016) that identified majority of the roads in Osogbo are owned and managed by the Local governments and the communities and only few of the sample roads are under the auspices of the State and Federal governments.

Table 4: Length, Lanes and Ownership of the Selected Roads

S/N	Routes	Length (KM)	Lanes	Ownership of Roads
1	Wudil – Gaya Road	20	2	Federal Government
2	Dandarma Road	2.4	2	State Government
3	Dafawa – Dogudawa Road	0.4	2	Local Government
4	Layin Kofar Kara	0.9	2	Local Government
5	ADUSTECH Boulevard	0.4	4	State Government
6	Layin Yan kwaya	0.9	2	Local Government
7	Layin Yan Kwaya 2	0.8	2	Local Government
8	Layin Gida Yakubu Adamu	0.3	2	Local Government
9	Layin Golden age school	0.6	2	Local Government
10	Sabon-Gari Sakau Road	0.9	2	Local Government
11	Sabon-Gari Wudil Road	0.6	2	Local Government
12	Wudil – Indabo – Garko Road	3	2	State Government
13	Lamfadar Road	1.4	2	Local Government
14	Layin Kuka	1.0	2	Local Government
15	Dorawar Nana Road	0.9	2	Local Government
16	Kofar Kudu – Sab. Ungwar	0.5	2	Local Government
17	Kankarfi – Kofar Yanma	0.4	2	Local Government
	Total	35.4		

3.4 Road Surface Condition in Wudil Town

Table 5 revealed the analysis of road surface condition in Wudil using assessment criteria adapted from Adedotun et al. (2016) as displayed in Table 1. Based on the criteria, 8 roads representing 47% are rated fair, 4 roads representing 23.5% are rated excellent, 3 roads representing 17.7% are rated good and the remaining roads representing 1% are rated very good and poor. This finding indicates that majority of the roads in the study area are good and motorable for the movement of people and goods.

Table 5: Roads surface condition of in Wudil Town

S/N	Categories	No. of Roads	Rating	Percentage
1.	Paved and with smooth surface	4	Excellent	23.5
2.	Paved but with potholes	1	Very Good	5.9
3.	Paved but in disrepair	3	Good	17.7
4.	Not paved but motorable	8	Fair	47.0
5.	Not paved and disrepair	1	Poor	5.9
	Total	17		100.00

3.5 Condition of Potholes in Selected Road

Table 6 shows potholes along Kara road in Wudil Town which was the only road rate 2 and characterized as paved with potholes as displayed in Table 5. ARCGIS 10.1 was used to map out and identified the locations, sizes and depths of the potholes along Kara road. Table 6 reveals a total of 37 potholes along the Kara road and the potholes are accompanied with their coordinates to show the exact point of the potholes. Based on the potholes number 12, 7 and 27 have the highest depths with -3.2, -2.9 and -2.5 respectively. While potholes number 5ft, 10ft and 23ft have the highest size with 8.5m², 7.57m² and 7.4m² respectively.

Table 6: Condition of Potholes in Selected Roads

S/N	X	Y	DEPTH/ft	SIZE/M ²
1	8.844718	11.804264	-0.2	5.71
2	8.844765	11.804268	-0.9	2.61
3	8.844836	11.804293	-0.2	3.05
4	8.844951	11.804329	-2.1	4.35
5	8.845002	11.804352	-2.3	8.58
6	8.845043	11.80438	-1.5	2.33
7	8.845128	11.804403	-2.9	5.26
8	8.845144	11.804425	-1.7	1.64
9	8.845257	11.804462	-2.2	1.91
10	8.845367	11.804501	-0.5	7.57
11	8.845447	11.804522	-1.1	0.89
12	8.845554	11.804602	-3.2	1.22
13	8.845655	11.804626	-2.1	1.66
14	8.845821	11.804666	-1.3	4.91
15	8.846	11.804758	-1.3	2.5
16	8.846083	11.804746	-2.7	3.55
17	8.846228	11.804798	-5	3.61
18	8.846411	11.804853	-1	4.31
19	8.846516	11.804885	-1.8	1.96
20	8.846503	11.804918	-3.2	1.46
21	8.846584	11.804925	-1.1	1.29
22	8.846651	11.804933	-2.7	0.62
23	8.846679	11.804979	-2.4	7.4
24	8.84754	11.805254	-1	1.36
25	8.84763	11.805302	-2.1	1.85
26	8.847655	11.805319	-2.9	2.45
27	8.847739	11.805323	-2.5	5.18
28	8.8478	11.80536	-1.8	1.19
29	8.847832	11.805371	-1	3.83
30	8.847842	11.805402	-0.2	8.89
31	8.8479	11.805404	-0.1	4.48
32	8.848026	11.805424	-0.3	4.99
33	8.848133	11.805454	-1.4	3.1
34	8.848125	11.805486	-1.7	3.43
35	8.848319	11.80552	-1.4	1.63
36	8.848333	11.805562	-2	4.44
37	8.84841	11.80555	-1.6	1.66

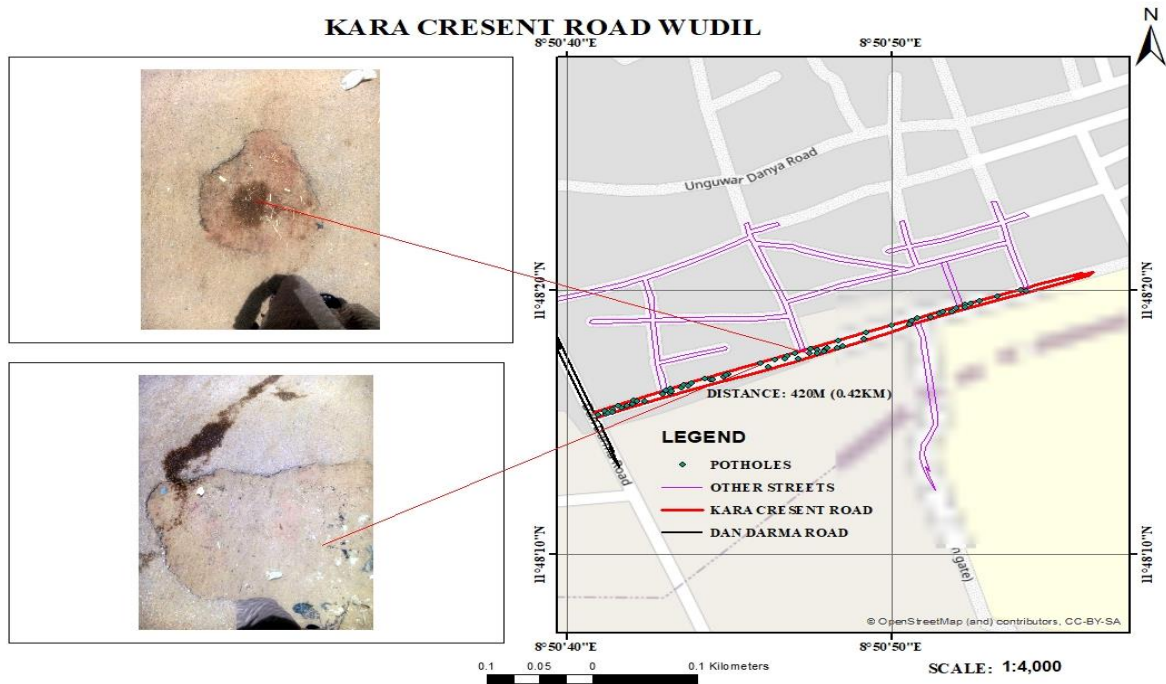


Figure 4: Plates showing samples and points of potholes

3.6 Drainage Condition

Table 7 shows the availability and the conditions of the drainages of the roads studied. The survey reveals that only eight (8) out of the seventeen (17) roads surveyed have drainage. While the remaining nine (9) roads have no drainage facility. In the same vein, seven (7) roads have opened drainage and only one (1) with closed drainage. Also, two (2) roads meet up with the trunk A road drainage standard, three (3) are of trunk B drainage standard, while the remaining three (3) of the roads are of trunk C drainage standard. The study shows, six (6) of the drainages are silted with sand, refuse and dirt which prevent free flow of water. Only four (4) roads are of the drainages are free which allows for free flow of water. The remaining seven roads lacks drainage facility that can provide free flow of water and prevent flooding and its associated effects on the road.

Table 7: Drainage Condition

S/N	Routes	Drainage	Depth (m)	Width (m)	Condition
1	Wudil – Gaya Road	Open drainage	1.0	1.2	-
2	Dandarma Road	Open drainage	1.0	1.2	Silted
3	Dafawa – Dogudawa Road	-	-	-	Silted
4	Layin Kofar Kara	-	-	-	Silted
5	ADUSTECH Boulevard	Closed drainage	0.8	0.7	Free
6	Layin Yan kwaya 1	-	-	-	Silted
7	Layin Yan Kwaya 2	Open drainage	0.8	0.7	Free
8	Layin Gida Yakubu Adamu	Open drainage	0.5	0.6	Free
9	Layin Golden age school	-	-	-	-
10	Sabon-Gari Sakau Road	-	-	-	-
11	Sabon-Gari Wudil Road	-	-	-	-
12	Wudil – Indabo – Garko Road	Open drainage	0.8	0.7	Free
13	Lamfadar Road	Open drainage	0.5	0.6	Silted
14	Layin Kuka	Open drainage	0.5	0.6	Silted
15	Dorawar Nana Road	-	-	-	-
16	Kofar Kudu – Sab. Ungwar	-	-	-	-
17	Kankarfi – Kofar Yanma	-	-	-	-

3.7 Other Road Infrastructures

The survey shows that only two (2) of the surveyed roads have walkway. This is an indication that pedestrian and vehicles will be competing on the roads, which will hinder free flow of traffic in the study area. The study also reveals that only five (5) of the roads have road signs to alert motorist of the road conditions, while 7 of the surveyed roads have streetlight. Similarly, none of the road have pedestrian crossing and only three (3) of the surveyed roads have bus stops.

The study also reveals that none of the routes have parking facility which could result to indiscriminate stoppage of both public and commercial vehicles which often results to traffic conflict and delay by motorist and other road users. It was also discovered that only one (1) of the surveyed roads is with traffic warden to control traffic but mostly on market days.

Table 8: Other Road Infrastructures

S/N	Routes	Walkway	Road Signs	Street Lights	Pedestrian Crossing	Bus Stop	Parking Facility	Traffic Management
1	Wudil – Gaya Road	No	Yes	Yes	No	Yes	No	Yes
2	Dandarma Road	Yes	Yes	Yes	No	No	No	No
3	Dafawa–Dogudawa Road	No	No	No	No	No	No	No
4	Layin Kofar Kara	No	No	Yes	No	No	No	No
5	ADUSTECH Boulevard	Yes	Yes	Yes	No	No	No	No
6	Layin Yan kwaya	No	No	No	No	No	No	No
7	Layin Yan Kwaya 2	No	No	Yes	No	No	No	No
8	Layin Gida Yakubu Adamu	No	No	Yes	No	No	No	No
9	Layin Golden age school	No	No	No	No	No	No	No
10	Sabon-Gari Sakau Road	No	No	No	No	No	No	No
11	Sabon-Gari Wudil Road	No	Yes	Yes	No	Yes	No	No
12	Wudil – Indabo – Garko Road	No	Yes	No	No	Yes	No	No
13	Lamfadar Road	No	No	No	No	No	No	No
14	Layin Kuka	No	No	No	No	No	No	No
15	Dorawar Nana Road	No	No	No	No	No	No	No
16	Kofar Kudu – Sab. Ungwar	No	No	No	No	No	No	No
17	Kankarfi – Kofar Yanma	No	No	No	No	No	No	No

4.0 Conclusion

The study analysed road infrastructure condition in Wudil town, Kano state. The study finding shows that, majority of the roads in the study area are good because they are paved with smooth surface. Also, majority of the surveyed roads are minor roads while only few are major. Moreover, 16 of the sample roads are made up of two lanes of single carriage way of about 9 meters. While only 1 road is made up of four lanes of dual carriage roads of about 12 meters each. The study shows that that only eight (8) out of the seventeen (17) surveyed roads have drainage and the remaining nine (9) roads have no drainage facility. In conclusion, road transport infrastructure facilities in the study area are grossly inadequate and the few that are available are completely in the state of disrepair calling for urgent attention. The study is recommending the need for public-private participation in the provision, maintenance and financing of road transport infrastructure in the study area to enhance effective and efficient movement of people, goods and services in the study area. In addition, efforts should be made by Kano State government to review and upgrade where necessary the existing road infrastructure in the study area so as to enhance road users' safety and productivity. Also, standard road capacity framework for road construction, rehabilitation and maintenance across the study area should be developed and implemented.

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