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Transportation Planning of Tanke – University Road, Ilorin, Nigeria

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***Abstract*—Transportation planning is an important part of managing community growth and change. It makes use of a variety of tools and methods, including road classification systems, asset management plans and transportation master plans. Traffic congestion and delay for years is of great concern for the existing transportation system of the area under consideration. The unavailability of good transportation planning guide and transportation facilities are major problems of this area. The research work focus on the transportation planning of Tanke Road from Tanke Junction to UNILORIN School gate. This is done in a bid to Monitoring existing conditions, forecast future population and employment growth, including assessing projected land uses in the region and identifying major growth corridors. To identify current and projected future transportation problems and needs through detailed planning studies. To Develop long range plans and short range programs of alternative capital improvement, management, and operational strategies for moving people and goods. This write up expanded on the transportation policies of the study area and provided greater clarity about the local planning authority (Kwara State Town Planning Authority) expected requirements and options, leading to transportation and land use planning documents that are more comprehensive.**

Keywords—Transportation planning, Civil3D, Google Earth

I. INTRODUCTION

Transportation at its core is about mobility and access. Patterns of growth and activity for people and goods across Nigeria are fundamentally driven by how well the transportation system delivers mobility and access. The performance of the transportation system also affects public policy concerns, such as air quality, environmental resource consumption, social equity, climate change, land use, urban growth, economic development, safety, and security. Transportation planning recognizes the critical links between transportation needs and other societal goals. The planning process involves more than simply tabulating capital projects. It includes non-motorized strategies for operating, managing, maintaining, and financing the transportation system to advance an area's long-term goals and the regional community's shared vision for the future. Transportation planning guide the decision making needed to move towards implementation of the Tribe's envisioned future transportation system. Transportation planning starts with a long-term vision for transportation within the tribal community [1]. Creating this vision can help develop better understanding of the factors that the transportation system will impact and those factors that may impact the transportation system vision. Planning provides a framework for effective decision-making and efficient investment of limited funds.

The transportation goals and vision become the foundation for developing a long-range transportation plan (LRTP) which will guide improvements to the transportation system over the next 20years or more goals and visions can be simple, such as improved safety at intersections or improved pedestrian access to developing lands and to the existing transportation network. A transportation plan is a guide that Tribes can use to make well-informed decisions about their transportation network. An important part of the planning process is involving the public so that planners and decision makers understand the needs and concerns of the many stakeholders, people and groups who use or otherwise have an interest in the future transportation system. This information helps to clarify needs in order to meet the transportation vision. Transportation and property are important in physical and economic development of towns and cities all over the world. Property and land values tend to increase in areas with expanding transportation networks, and increase less rapidly in areas without such improvements. Rapid and continued rise in housing and land prices are expected in cities with transportation improvements and rapid economic and population growth. Man, nations, regions and the world

would be severely limited in development without transportation, which is a key factor for physical and economic growth. Transportation systems and land use are interdependent. Indeed findings of earlier studies indicate compelling and consistent connections amongst them [2]; According to [3], transportation route is part of distinct development pattern or road network and mostly described by regular street patterns as an indispensable factor of human existence, development and civilization. The route network coupled with increased transport investment result in changed levels of accessibility reflected through Cost Benefit Analysis, savings in travel time, and other benefits. This research work is restricted to the Transportation Planning of Tanke in Ilorin. Total land used of the area, Trip generation, Trip distribution, Modal choice and Assignment Trip network will be determined.

A. Aim and Objectives

Aim

To plan transportation system (network) of Tanke Junction to University of Ilorin permanent site gate in Ilorin, Kwara State, Nigeria.

Objectives

- Monitoring existing conditions.
- Forecasting future population and employment growth, including assessing projected land uses in the region and identifying major growth corridors.
- Identifying current and projected future transportation problems and needs and analyzing, through detailed planning studies.
- Developing long range plans and short range programs of alternative capital improvement, management, and operational strategies for moving people and goods.

II. METHODOLOGY

A. The Study Area

Tanke is located along 8^{O}N latitude and 4^{O}S longitude of Ilorin metropolis. The research work is on the transportation planning of Tanke Road from Tanke Junction to UNILORIN School gate. A Google map imagery of the route is shown in Fig.1. Better planning tools are increasingly available to help MPOs understand the impact of their decisions on the transportation network and the natural and human environment. A number of decision support tools are available to communities to help them tackle land use, community development, economic development, and environmental protection challenges. Geographic Information Systems (GIS)-based decision support and visualization tools assist planners with conveying information to stakeholders to encourage successful community design and informed decision making [4].
Examples of planning tools include transportation models, land use models, GIS, GIS-based decision support tools, scenario planning models, and satellite imagery [5].

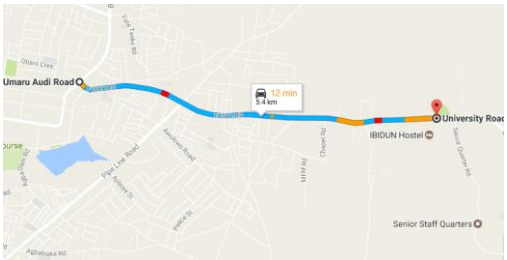

Fig 1. Google map imagery of the study area

B. Modelling

Models are simulations of the “real world” that can be used to show the impact of changes in a metropolitan area on the transportation system (such as adding a new road or transit line, or increases in population or employment). Travel models may be used to test the travel impacts of changes in land use, economic development, fuel and parking cost, and new highway or transit system capacity. Three important ingredients are part of any model used for transportation analysis:
• Key base, or current-year characteristics of travelers and the transportation system, described in terms of quantifiable variables (e.g., the number of highway travel lanes, transit service highways, household size and income, number of vehicles per household, employment patterns by type and job classification, etc.).
• The relationship between these variables and the travel behavior of individuals (e.g., the more automobiles per household, the greater the number of automobile trips per household). This relationship is most often expressed in mathematical terms [5].
• Future-year forecasts of key traveler and transportation system characteristics.
This relationship is the same for all individuals and is constant overtime.
What is the four-step modeling process?
For the past 40 years, transportation professionals have used a four-step approach in
modeling transportation demand. Most modeling approaches use some form of these The Transportation Planning Process: Key Issues Steps today. Once some understanding has been established as to what the land use, population, and employment levels are in a study area, the four modeling steps are [6]:
• Trip generation: Estimating the number of trips generated in a small geographic area, called a zone, or at a particular location, and attracted to another zone or particular location, based on the assumed relationship among socioeconomic factors, land use characteristics, and the number of trips. Trip generation then leads to:

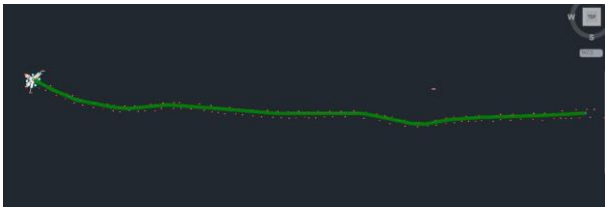

Fig 2 showing the road dimension with the aid of AutoCAD Civil 3D

• Trip distribution: Estimating the number of trips that originate in every zone in the study area, with Maintaining the Integrity of the Specifications destinations to every other zone. The result is a trip table that is used in Mode split

• Mode split: Estimating, for the number of trips predicted between each origin and destination, the number of trips made via each type of mode that is available for that trip. Thus, "x" percent are likely to drive alone, "y" percent are likely to take transit, "z" percent are likely to ride-share, etc. Mode split leads to:

• Network assignment: Estimating the number of trips via a particular mode that will take specific paths through a road or transit network. The end result, when all trips are assigned to a network, is an estimate of the total number of trips that will use each link in the network. When compared to the capacity of this link, planners can forecast the level of congestion that will occur at that location. This becomes the basis for assessing the performance of the transportation system.

III. RESULTS AND DISCUSSION

Table 1 shows the report collected from group of people about the operation of the road.

Table 1:

S/N	OCCUPATION	FREQUENCY	PERCENTAGE
1	Professionals (practicing firms of professionals)	195	34.50
2	Retail businesses	345	60.54
3	Banking	5	0.88
4	Others: car-sales, business, photocopy and repair	25	439
	TOTAL	**570**	**100**

The speed study was also carried out to determine the average speed of the road and is presented in Table 2.

Table 2: Speed study results

Interval(km/h)	Midpt(km/hr) X	Frequency f	percentage frequency %	Cumulative frequency %	fx	Fx^2
25- 34.5	30.0	5	1.73	1.73	150	4500
35-44.9	40.0	24	8.33	10.06	960	38400
45-54.9	50.0	47	16.31	26.38	2350	117500
55-64.9	60.0	58	20.13	46.52	3480	208800
65-74.9	70.0	49	17.01	63.54	3430	240100
75-84.9	80.0	44	15.27	78.81	3520	281600
85-94.9	90.0	31	10.76	89.58	2790	251100
95-104.9	100.0	18	6.25	95.83	1800	180000
105-114.9	110.0	10	3.47	99.30	1100	121000
115-124.9	120.0	2	0.69	100	240	28800
		∑F=288			∑Fx=19820	$\sum fx^2$=1501800

Arithmetic mean = $\frac{19820}{288}$= 68.82

Standard deviation (s) = $\frac{\sqrt{\sum fx^2 - n(X)2}}{n-1}$

$$= \frac{\sqrt{1501800 - 288(68.8)2}}{288 - 1}$$

S=21.9km/h

According to V = DU

where

V= volume (veh/hr)

D= density

U= speed (km/hr)

From the above equation,

D= $\frac{v}{u}$

D= $\frac{1643}{21.9}$

D=75veh/km

IV. CONCLUSION

For municipalities and planning districts, transportation planning is an important part of managing community growth and change. It makes use of a variety of tools and methods, including road classification systems, asset management plans and transportation master plans [4].

Proper planning will indicate how a transportation system will function within the boundaries of the

municipality as well as how it will link with the provincial highway network.

Transportation is tied closely to land-use. Integrating the two is critical to successful transportation systems. This is achieved by including transportation policies or zoning and design requirements in the development plan, secondary plans, zoning bylaw and other land use and development documents. Policies can be tailored to urban or rural municipalities at local or regional scales and can help to maintain a balance between mobility and land access [7].

This write up serve as a guide to expand on the transportation policies of the area under review, providing greater clarity about local planning authority requirements and options, leading to transportation and land use planning documents that are more comprehensive. The additional detail about the transportation master plan and other sources of information that may further enhance the transportation planning.

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