

## Towards the Development of Total Transportation for Nigerian Cities in the 21<sup>st</sup> Century (Case-Study: The City of Calabar)

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**Abstract.** Intensive urbanization began in Nigeria after national independence on October 01, 1960. Before independence, the ratio of urban/rural residents was slightly below 30 percent; today it is above 50 percent. Provincial towns have grown into cities; and the population of Lagos has grown from less than 1 million people (before independence) to about 15 million people today. This intensive urbanization began in Nigeria in the era (the second half of the 20<sup>th</sup> century) in which the automobile was considered to be the most suitable means of transportation worldwide; and many Nigerian cities are totally auto-dependent.

Total urban transportation itself is a very vast subject. It has, thus, become prudent to narrow the discussion in this paper to three aspects of urban transportation (that are lacking in the Nigerian cities of today): pedestrianism, cycling and light-rail tram. The need to design urban motorways that make specific and ample provisions for pedestrianism and cycling has been discussed. It has been shown that light-rail trams are again being promoted as one of the most reliable and cost-effective means of mass-transit in the world, since the last two decades of the 20<sup>th</sup> century. There is, thus, the need to consciously make provisions in the designs of today's urban motorways for light-rail tramways that will certainly become very essential in the Nigerian cities of the future. In doing this, there is the need to forestall the possibilities of such provisions being eroded, in the course of time, by reason of intense urbanization pressures.

**Keywords**—Nigerian cities / auto-dependent / total transportation / pedestrianism / cycling / light-rail tramways

### 1.0. INTRODUCTION

The theme of the 3<sup>rd</sup> World Urban Forum (World Urban Forum III – WUF3) that convened in Vancouver, Canada (June 19-23 2006) was 'The Livable City'. The concept of the livable city refers to a city in which the dwellers find their daily chores and activities both rewarding, pleasureable and leisurely [1, 2, 3]. A city that is incapable of offering their residents the desired levels of access to livelihood activities, recreation and leisure ultimately tends towards decline and decay; and by convention such a city is described as a 'dying city'. In the circumstances in which the decline has become totally irreversible, the city reaches the ultimate state of decay, goes beyond the precipice and is consigned to the records of history as a 'dead city'. On the whole, very many cities have existed through several centuries. Even the concept of a 'dying city' does not several circumstances. Changes in political and socio-economic circumstances of nations could create impulses that propel dying cities back into the realms of vibrant urban life. Such situations are already ongoing in present day Nigeria.

**CALABAR:** Calabar, for instance, was once a dying city. The creation of South-Eastern State (now Cross River State) of Nigeria in May 1967 ushered in a new life in the city. According to the foreword by U. J. Esuene, (then Colonel and first Military Governor of the state), in the 1970 master-plan report of the city (Survey and Development Plan for Calabar: 1970, prepared by Tesco-Kozti Consulting Engineers Nig. Ltd; Calabar/Nigeria and Budapest/Hungary) [4]:

*'The Ancient City of Calabar has had four centuries of connections with what is usually called the modern world. .... For twenty years, 1885-1906, Calabar was the Capital of the Oil Rivers Protectorate (then of the Niger Coast Protectorate) and the Protectorate of Southern Nigeria.'* (Tesco-Kozti – Survey and Development Plan for Calabar, 1970).

During the four centuries of its connections with 'what is usually called the modern world', the two decades of its existence as the

capital of the 'Protectorate of Southern Nigeria' (1985), and about four decades thereafter, Calabar continued to experience scenarios of vibrant urban growth and a steady 'march to modernity'. The fortunes of the city began to change in the early 1950s, when, according to the then Colonel U. J. Esuene [4]:

*... that march suffered temporary interruption for almost two decades – two decades during which the waves of progress and development broke far far away and joined the calm bar of Calabar in ripples of stillness.'* ( Tesco-Kozti – Survey and Development Plan for Calabar, 1970) In essence Calabar was a dying city for two decades, and was propelled back into the realms of vibrant urban life in from 1967. From an estimated population of about 70,000 people in 1970, the population of the city has grown to nearly 0.5 million people by 2011 ( 2006 national census).

**LAGOS.** Lagos presents stark realities of accelerated urban growth that policy-makers, professionals and scholars in Nigerian ought to study very closely. Shortly before independence in 1960, the population of Lagos was below 1 million people; and Lagos did not yet qualify to be listed among the world's most populous cities. By the year 2000, the population of Lagos was placed at 13.5 million people; it has been estimated that, between 1975 and 2000, Lagos had one of the highest population growth rates in the world (5.8), and that during that period of 25 years, the population of Lagos increased by 10.5 million people [5, 6]. The urban growth has been similarly phenomenal.

One of the earliest urban development problems that began to afflict Lagos, as early as the late 1960s, was transportation. Within a period of less than one decade (1960-70) the urban transportation system of Lagos had already begun to exhibit serious signs of stress; pointing towards total collapse. By the middle 1970s, it had already become evident that the exclusively automobile-centric urban transportation system was incapable of supporting the very rapidly growing city.

Following this realization, various options were introduced towards the objective of reducing the numbers of automobiles on Lagos roads: the 'park-and-ride' system and also the 'odd-and-even-plate-number' system.

These measures proved to be very short-sighted, short-lived and unsustainable; thus they fizzled out before the end of the 1980s. Meanwhile, Lagos remained in its previous urban development model: an automobile-dependent city that is expected to play host to more than 10 million dwellers, spread across a very vast urban landscape.

Towards the objectives of creating sustainable livable cities for the future of our country, there has indeed arisen the need to appropriately interpret the urban development problems of Lagos: transportation is one of the most fundamental of these problems. The attempts made since the late 1960s to resolve the problems of Lagos based on the aspiration to facilitate and enhance the movement of automobiles through the city have not yielded much dividend.

The above preliminary reviews of Calabar and Lagos lead to some fundamental facts about urbanization scenarios in present-day Nigeria. Firstly, the changing political and socio-economic circumstances of Nigeria have been inducing phenomenal impacts in the sphere of urban development: provincial towns are changing very rapidly into cities, and small cities are expanding very rapidly into large cities or megapolises. Secondly, the rapid growth of the country's population is resulting in rapid growth of urban populations and the concomitant rapid urban growth. Thirdly, the large numbers of people that presently reside in cities desire to move around in pursuit of their daily livelihood activities; and this demands appropriate articulation of urban transportation options for Nigerian cities. All these support the fact that discussion and research on the subject of total transportation for Nigerian cities have become very pertinent and urgent.

The study is aimed at reviewing literature on existing and current studies on transportation in some major cities in Nigeria. Review of pedestrianism, cycling and Light Rail tram transportation systems. Analysis of transportation in the city of Calabar.

## 1.0. METHODOLOGY

This study is based on existing and current data and materials.

An introduction to transportation and the livable cities,

A study on related literature (Understanding the transportation factors in urban development).

Results and Discussions (case study of Calabar city)

Conclusions.

## 1.0. LITERATURE REVIEW

It is not within the scope of this paper to analyze all the factors that lead to the decline or total ruin of cities; but it is suggested that transportation is one of the key factors. The fundamental relationship between total urban transportation and the scenarios of rapid urban developments in Nigeria is that cities are made up of people. People expect to move about freely, efficiently and safely in cities pursuant to the demands of their daily livelihood activities. The concept of total urban transportation embodies within itself the challenge of establishing diverse modes of urban transportation that are compatible with the diversities of demands of city dwellers: the rich and the poor, the young and the old, the able-bodied and the infirm, the healthy and the sick, etc.

Within the understanding of the diversities of demands for transportation options (to meet diversities of choices and needs) is located the philosophy of 'total transportation' - an urban transportation system that is conformable to the diversities of demands

of urban dwellers, and that also incorporates future perspectives by being adaptable to the changes that are apt to occur in the urban space, in the short-term as well as the long-term.

The understanding of the trends in the growth of cities enables the transportation engineer to appreciate the fact that the city of tomorrow is very certainly going to be different from the city of today. In order that the city of today should constitute the desirable foundation for the city of tomorrow, transportation planning in the city of today must be based on good understanding of the probable perspectives of the city of tomorrow. That means that the designs of transportation systems in cities must articulate and harmonize the present and future perspectives of urban transportation; consciously making provisions within the city of today, for transportation options that will become essential or inevitable in the city of tomorrow.

In the review of the work of Vuchic, V. R. [7] 'Transportation for Livable Cities', by Beimborn, E. A. [8], four levels of urban transportation planning for a livable city has been discussed:

Level-I: transportation planning at the level of designs of individual facilities, such as segments of roads and motorways;

Level-II: transportation planning leading to the development of system or network that is based on an individual mode;

Level-III: multimodal level of transportation planning in which the combination, balancing and harmonization of different modes are explored;

Level-IV: transportation planning at the city level, involving the harmonization of transportation with the urban structure, land use patterns and economy.

In the livable city, transportation planning operates through all the levels, up to level-IV. The peculiarities of urban sectors are analyzed; suitable modes of transportation are incorporated into the system in order to meet peculiarities of demands in various urban sectors, and the methods of using transportation to facilitate the urban economy are explored. Within this conceptual framework, transportation assumes its correct role in the life and economy of the city - "the driving force for planning the future" [8]. This is the concept of total urban transportation. On the other hand, in the automobile-dependent city (the typical model of Nigerian cities) transportation planning terminates at level-II, the level at which the principal aspiration is the enhancement of free flow of automobiles within cities.

The fundamental premise of transportation design and planning for a livable city is that the livable city is a city for all ages [9]; and a city for people of all social classes. A city that does not make appropriate provisions (in transportation planning) for children, the youth and the poor is one that is heading rapidly towards urban decay [9]. This is the dilemma of Nigerian cities - automobile-dependent cities in a country that does not have the industrial capacity for manufacturing automobiles.

### The Nigerian Scenarios in Urban Transportation

Virtually all Nigerian cities have been developed from the singular perspective of the automobile as the sole means of transportation that is available to all the city-dwellers. City dwellers depend on their private automobiles for movements across the city; those who do not own their private automobiles rely on taxis or autobuses. However, the automobile-dependent city is not compatible with the demographic structures of the cities of the developing world. According to W. van Vliet, "in most low-income countries, children and youth account for very large proportions of the population". [9] This group of people is in need of cities with ample provisions for pedestrian traffic and cycling; and also safe and dependable mass transit systems.

The most basic mode of transportation (pedestrianism) has not received appropriate attention in present-day urban development processes in Nigerian cities. Parents take extra caution to ensure that their children do not venture out into the streets unaccompanied. Similarly, the old and the infirm receive no consideration in the Nigerian urban space. Cycling is a problem in Nigerian cities. In general, outside the permanent users and owners of automobiles, the present-day Nigerian city does not make any provisions for other city-dwellers.

If such is the situation with the city-dwellers of the present day, then the questions arise: 1) what provisions do the Nigerian cities of today make for the diversities of urban dwellers that will occupy the Nigerian cities of tomorrow?; 2) do we expect that in the next generation all city-dwellers in Nigeria will own automobiles? (in spite of the poor economy and low industrial capacity of Nigeria); 3) what should constitute the fundamental premise of transportation design and planning for the Nigerian city of today, towards the objectives of making room for the inevitable demands of urban dwellers in the Nigerian cities of tomorrow?

Studies have shown that the automobile-centric urban model does not produce sustainable or livable cities. The trend towards the development of automobile-dependent cities in Nigeria constitutes an imitation of the American urban-transportation model, which scholars consider to be unsustainable [7, 8,10]. In the development of urban transportation options for Nigeria, there is the need to specifically understand the problems of the very large numbers of city dwellers, who are stranded daily because they have been "excluded from the car culture" [10].

There are specific parameters that make the American urban-transportation model most unsuitable for Nigeria. Nigeria does not have the industrial capacity (of the USA) for the manufacture of automobiles, in order to sustain an automobile-dependent urban culture. This has been demonstrated in the fact that there are 650 automobiles per 1000 people in the USA (1998 estimate) [11]; while in Nigeria, there are only 12 automobiles per 1000 people (1997 estimate) [5]. Light-rail mass-transit systems would offer better options in these circumstances.

In the automobile-dependent city, mass-transit programmes are based on the autobus; but studies have shown that the autobus is inferior in several respects. Firstly, there is the question of dependability of the system – mass-transit systems based on the autobus are not as dependable as those based on light-rail transit systems. An autobus can, with great ease, be redeployed away from its conventional route (of mass-transit) to other more lucrative business ventures of the day; and, in the process, commuters are left totally stranded. On the contrary, it is not so easy to redeploy light-rail transit systems from mass-transit programmes; because they run on fixed tracks [11]. Secondly, there is the question of long-term reliability of the system from the standpoints of both the urban transportation planner and the public – the autobus does not provide long-term solutions to urban transport problems; but light-rail transit (trams) do. The effective live-span of a single tram system is placed at 50 years, but that of the autobus is not up to half of that span [11]. The Nigerian experience has confirmed this second point. At the conference held in Bath (UK) in 1998 ("How a Modern Tramway System Might Solve Bath's Traffic Problems"; April 25, 1998) the problems of automobile transportation in cities were reviewed. According to Professor Lewis Lesley [11], automobile traffic "produces more pollution than all industry and power stations combined.

## 1.0. RESULTS AND DISCUSSIONS

In this study, specific attention is directed to the design and planning of urban transportation for three modes of transportation that are considered to be most fundamental in the aspiration of developing livable cities in Nigeria: pedestrianism, cycling and light-rail transits (tramways).

Mobility in the livable city should "give priority to walking over other forms of transportation" [1]. Walking has diverse benefits over other forms of transportation: it is safer and contributes to the improvement of the health and quality of life of urban dwellers. Transportation design and planning in the livable city should be guided by the aspiration to create pedestrian-friendly environment, in which appropriate buffers exist between the zones of automobile traffic and the pedestrian routes (sidewalks).

Another trend in transportation design and planning for the livable city is the aspiration to reduce automobile-dependency by enhancing cycling. Safe networks of bike-paths are incorporated into the transportation designs and plans of livable cities. Like walking, cycling also contributes significantly to health and the quality of urban life.

Light-rail transits (tramways) are now considered to be the most economic and sustainable mode of urban mass-transit systems; and many (previously automobile-dependent) cities have been developing light-rail transportation systems since the last quarter of the 20th century: San Diego and Boston (in USA), Birmingham, Sheffield, Manchester (and several other cities in the UK) etc. On the whole, many cities in the world are striving to reduce automobile-dependency by developing or reactivating light-rail. In Lesley, L. (1998) [11], the study of the International Union of Public Transport has been reported. According to this study, "light rail gives 95% of the benefits of an underground railway with only 10% of the cost". Trams are considered more compatible with pedestrian traffic than automobiles; because their routes are fixed and the risks of running into pedestrian routes or bike-tracks are absent.

Modern trams are now manufactured to meet growing demands for sustainable urban transportation in the 21<sup>st</sup> century. In configuration, the conventional city tram consists of one or two coaches. New generation trams are of low-floor construction, which grants them significant advantages over the autobus. It caters for the convenience of various categories of people in the urban space, among these: children, the aged, pregnant women and disabled persons. Another very significant advantage of the new-generation tram over the autobus is intelligent regulation of capacity; from normal capacity to the peak-hour demand levels, consisting of several coaches.

The term, light-rail transit is applied for the description of two categories of urban mass-transit systems. Light-rail trams (or light-rail tramways) are the traditional trams that operate within cities in the rights-of-way of urban motorways. Light-rail transit (in contradistinction to tram) is the mass-transit system that operates on its own distinct right-of-way (completely separated from motor traffic); it is usually located on the peripheral regions of the city. They are also often used for linking up a metropolitan area with near-by cities, towns or villages.

In discussions pertaining to total urban transportation for Nigerian cities it is essential to depart from the present mind-set that has been formulated by the reality of energy insecurity in Nigeria. This mind-set would tend to inform us that light-rail or other electricity-dependent urban transportation systems are not suitable for the Nigerian situation. However, this would amount to short-sightedness that would make Nigerian cities permanently trapped within the domains of automobile-dependent cities. Cities last for several centuries; and there is no assurance that the present situation of electrical energy insecurity will forever be in Nigeria. Thus, the most prudent approach would be to design urban motorways that would be compatible with the demands of future generations. He change from the automobile-dependent city to a sustainable (livable) city demands modifications in our conceptual models for the design of urban motorways. Thus, the design of urban motorways for the city of the future would demand the incorporation, within the rights-of-way, of provisions for the possible development of light-rail tracks in the city of the future. Some of our urban motorways already make ample provisions for such futuristic circumstances on the sides. However, this study has revealed that such provisions are short-lived. Such provisions are permanently exposed to intense urbanization pressures; and usually end up eroded by reasons of permissive urbanization processes (see Fig. 1).

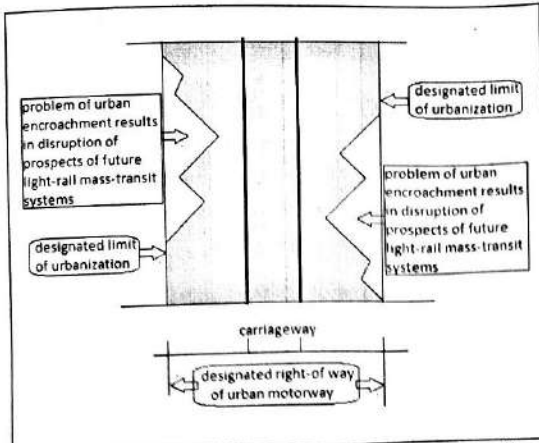


Fig. 1: Trends of erosion of prospects of future light-rail mass-transit systems in present-day Nigeria urban motorways

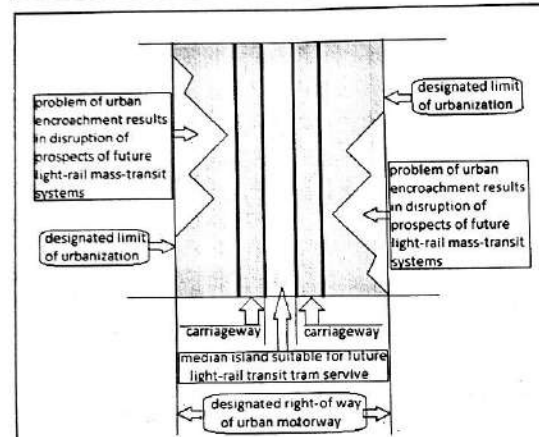


Fig. 2: Wide median island could be used to make more secure provisions for future light-rail mass-transits in Nigerian cities.

In the course of time, new buildings and structures are always being erected on portions of land that had previously been designated as the rights-of-way of urban motorways. Thus, the possibilities of development of light-rail tracks in the city of the future are already being foreclosed by the urbanization scenarios of the present-day cities. This problem has been demonstrated in the case study of Calabar, capital of Cross River State of Nigeria. There are chances of resolving this problem through the engineering designs of urban motorways. Special and ample provisions could be made in the median islands of dual-carriage ways, for the development of light-rail tramways in the future (see Fig. 2). While such provisions remain unutilized for the designated purpose, they could be well-planted with trees and shrubs and developed as amenities in the urban space.

**Case Study: Transportation in the City of Calabar**

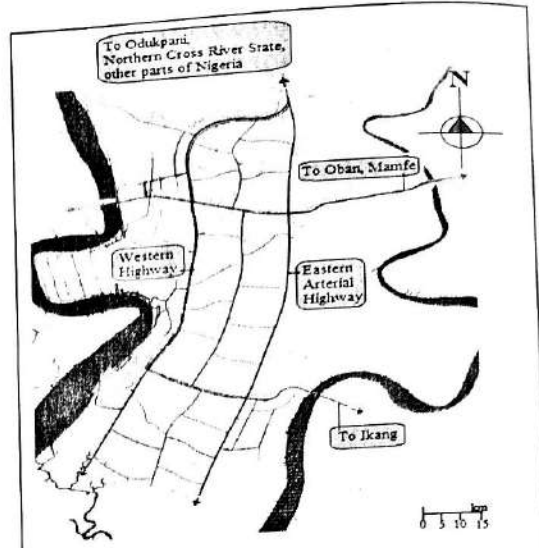
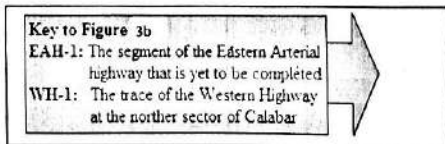


Fig. 3a: Conceptual framework of the urban transportation system for Calabar, as per the 1970 Master -plan proposal ( Tesco-Kozti, 1970)

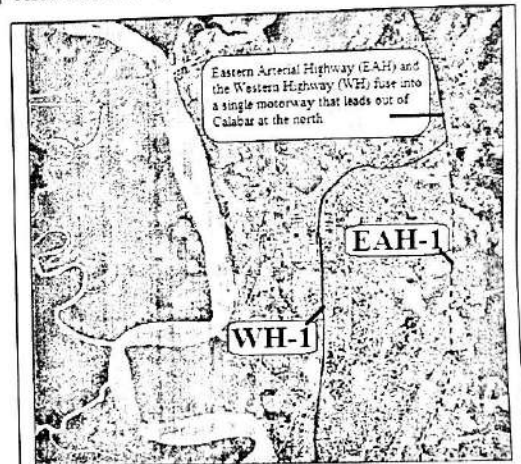


Fig. 3b: View of the northern section of Calabar city

**Key to Figure 3c**

- EAH-2:** The partially implemented segment of the Eastern Arterial Highway project in front of Margaret Ekpo International Airport in Calabar
- EAH-3:** The segment of the Eastern Arterial Highway project that has been seriously disrupted, by reason of uncontrolled urbanization in the south-eastern sector of the city
- WH-1:** Trace of the Western Highway at the southern sector of Calabar

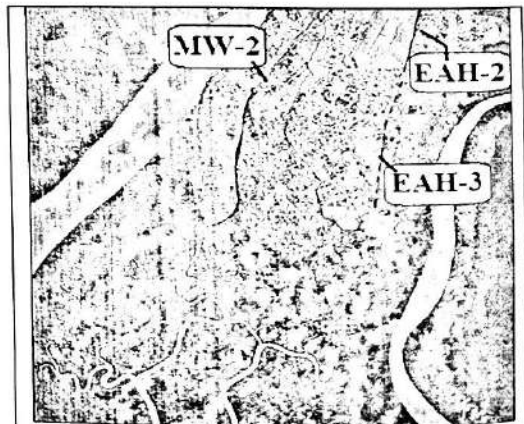


Fig. 3c: View of the southern section of Calabar city

Fig. 3: Views of Calabar from ortho-maps of the city taken in the first decade of the 21<sup>st</sup> century

By the concept of the city-planners (Tesco-Kozti Consulting Engineers Nig. Ltd), it was proposed (in the 1970 city master-plan) that the urban transportation system of Calabar would be anchored on the framework of two principal arterial highways: the Eastern Arterial Highway and the Western Highway. Both highways were designed to run from south to north, throughout the city; and to fuse into a single highway (somewhere at the north of the city) that would run northwards, connecting the city with other parts of the state and also Nigeria. The two arterial highways were to be connected at several points, throughout the city, by urban other motorways running from the west to the east. Connected also to this principal framework (of the two principal arterial highways) are two other major motorways that run from west to east, connecting metropolitan Calabar with the settlements located to the east of the city: the Calabar-Ikang Road in the south, and the Calabar-Oban-Mamfe Road in the north (see Figs. 3a, 3b and 3c).

**The Eastern Arterial Highway:** The Eastern Highway was proposed as a dual-carriage expressway, designed for rapid transit, at travelling speed of 80-100 kilometres per hour (and secured on both sides with fences). The expectation of the city-planners was that the road would be constructed in tandem with the initial phases of the growth of the city; since an expressway of this type would become very essential "by the time when the population of the city will reach or surpass the number 350,000". It was further expected that the "northern part of the road will join the present Odukpani Road ensuring connection between Calabar and the scattered settlements north of the city" [4]. In essence, the Eastern Arterial Highway was proposed as the principal axial way upon which the city would depend for the rapid evacuation of out-bound urban vehicular traffic from Calabar northwards.

Today, the population of the city is above 450,000; and much of the hopes and projections about the Eastern Arterial Highway have remained unrealized. The major problems that have obscured the vision of the Eastern Arterial Highway have been the delays in implementation of the project, and the scenarios of uncontrolled urbanization that have occurred in the city between 1970 (the official date of adoption of the city plan) and the present day. The only portion of the project that has received any measure of attention till the present day is the short segment that runs in front of Margaret Ekpo International Airport. Beyond this segment, there is the small portion of the project (still in an uncompleted state) that runs up to the Federal Government Girls College in the north. Thereafter, the critical segment of the highway project that should continue northwards and ensure the quick evacuation of out-bound urban vehicular traffic, by linking up with Odukpani Road, has remained unimplemented throughout the last four decades (see Fig. 3b).

The failure to implement the proposal of the city-planners of fencing off the right-of-way of the highway project has given room for glaring scenarios of urban encroachment. The University of Calabar (established in 1973, three years after the commencement of the city-plan) has spread across the right-of-way of the highway project making the project unrealizable as proposed in this section. In order to realize this project as conceived in this segment there would now be the need to construct fly-overs that would run for more than 3 kilometres, the high cost of which would discourage. In addition to this major impediment, other scenarios of uncontrolled urbanization have occurred south of the University of Calabar; making the realization of the Eastern Arterial Highway project virtually unattainable to the south of the Margaret Ekpo International Airport (see Fig. 3c).

The major consequences of the non-realization of the Eastern Arterial Highway project could be summarized in the following manner.

1) All the out-bound vehicular traffic that emanates from the eastern sector of the city (as well as all in-coming traffic that is destined for the eastern sector of the city) is compelled to mingle with the traffic of the city-centre.

This includes vehicular traffic that is originated from (as well as in-coming traffic that is destined for) the airport. The same situation also relates to out-bound or incoming traffic that pertains to Akpabuyo and Bakassi Local Government Areas, located to the east of Calabar.

2) Similarly, all the traffic that is originated from or destined for the south-eastern sector of the city is forced into the traffic of the central sector of the city.

3) Viewed from the perspective of the city of the future, the non-realization of the Eastern Arterial Highway project would also foreclose the possibilities of implementation of light-rail transit (tramways) that would be very essential along this axis of the city. All of these point towards serious escalation of the motor traffic situation within the central sector of the city; especially in the future, as the population of the city pushes beyond the 0.5 million mark and beyond.

**The Western Highway:** The city-planners had already observed that the Western Highway would be "the most busy road of the city" [4]. It was proposed that it should be in the form of a "dual carriage-way" of "2 x 3 traffic lanes" [4].

This concept has not been realized throughout the city. Only a short segment of the Western Highway appears to conform partially to the original specifications – the Murtala Mohamed Highway. All other segments have, so far, fallen very short of these original specifications. To the south of Metropolitan Hotel, where the road progressively traverses the old city (up to Anantigha, the capital of Calabar-South Local Government), delays in implementation of the project have created much room for urban encroachment. Construction of the type of motorway that was originally envisaged in the city-plan would cost lots of money in payment of compensations; many buildings are already located very close to the existing roads in this sector of the city.

To the north of the Calabar city-arch, the concept of the existing road has also departed very widely from the original concept ("dual carriage-way" of "2 x 3 traffic lanes"). In this segment of the road also, urban encroachment is the principal threat. The continuing expansion of metropolitan Calabar northwards has created the premise for scenarios of uncontrolled urbanization in the northern districts (Ikot Effanga, Ikot Omin, Ikot Ekpo, etc.). Over the last few decades the city development authorities have been having unending encounters with developers of illegal structures in the vicinities of Ikot Omin and Ikot Ekpo.

These trends towards obscuring the only reliable motorway into and out of Calabar pose serious existential threats to the city, now and in the future. The Western Motorway is of very critical importance to the future of Calabar; it is presently the only road-link between Calabar and the rest of Cross River State as well as the rest of the country. Viewed from the perspective of the city-of-the-future, it would be expected that the original proposal of the city-planners ("dual carriage-way" of "2 x 3 traffic lanes") would become very desirable. It would, therefore, be very essential to preserve the access that this motorway offers to Calabar for posterity.

**Median or Central Reserve.** The transportation plan of the city made some provisions for median strips in the middle of the dual carriageways of the two principal arterial motorways (Eastern Arterial Highway and the Western Highway); in the form of "a 6m wide central reserve with low plantation" [4]. This aspect of the urban transportation plan has been neglected in road designs all over the city. From the perspective of the city-of-the-future, it is exactly a provision, such as this, that would be able to accommodate the light-rail transit (tramways) that would ultimately become desirable and probably feasible. However, in order to appropriate accommodation for light-rail transit (tramways), it would be desirable to specify a minimum of 9.0 metres for the median or central reserve. A facility such as the median or central reserve that is dedicated to the future development of light-rail transit (tramways) needs to be secured from urban encroachment (see Fig. 2).

**Pedestrianism and Cycling.** In the manner in which they have now been implemented, the two arterial highways of Calabar have made absolutely no distinct provisions for pedestrian traffic and cycling tracks. The same situation is observed in all the motorways of the city. The ample provisions that had once been made on both sides of the principal arterial highways have been eroded over these several years, by reason of uncontrolled urbanization. The city authorities have also not developed any definitive guidelines for the creation of pedestrian routes and cycling tracks along the motorways of the city. The opinion of this paper is that the resolution of this problem should begin with the development, by the city authorities, of guidelines for creation of pedestrian routes and cycling tracks for the city of Calabar.

The outline review of the transportation structure of Calabar has created a picture of a city in which the transportation system is hitherto deficient and incapable of supporting a livable city.

Firstly, in spite of the existence of a transportation plan for the city, since 1970 (when the population of the city was about 80,000), the plan has not until recently received the requisite attention. Consequently, the growth of the city's population to nearly 0.5 million met a city that is unprepared. It was not until the beginning of the 21<sup>st</sup> century that effort began being made to remedy the urban transportation distortions that have ensued out of the non-implementation of the city's transportation plan. Among these attempts are: 1) the extension and dualisation of Marian Road, through Parliamentary Road, through Parliamentary Extension in order to apply it in directing traffic out of the city; 2) the on-going attempt at the partial implementation of the Eastern Arterial Highway, north of Margaret Ekpo International Airport, i.e. the ongoing construction of the Airport Bypass Road, a 6km dual carriageway road. Secondly, the city is making effort to wrestle with the challenges of the future – imminent increases in urban populations and the concomitant rapid urban growth – in its transportation plan. It is evident that urban transportation is being established in its right place in the development programmes of the city; i.e. making transportation the foundation of the modern city.

Transportation planning deserves to be given its proper place (as the foundation of the modern city) in order to enable Calabar to grow gradually into a livable city in the future. This also applies to the great majority of Nigerian cities where transportation has not yet received its rightful place in urban planning. Most Nigerian cities are totally unprepared for the challenge of moving the teeming masses across the urban landscapes; and the development of light-rail transit (tramways) and pedestrianism have become pertinent and very urgent.

It must, however, be acknowledged that the optimal solution will reside in the application of various transportation modes. The concept of levels of urban transportation that have been developed in the work of V. R. Vuchic [7] is applicable to the Nigerian situation. With reference to that work, in Nigeria, urban transportation planning has not yet evolved beyond the second level – planning for an individual mode. The challenge of total urban transportation is to move urban transportation planning in Nigeria to the next levels, where it would involve multimodal planning that is directed towards the improvement of urban economies [7, 8].

**5.0. CONCLUSION**

From this paper, the following inferences have been reached towards urban transportation design and planning for Nigerian cities of the present and the future in order to sustain the cities as livable.

1) Light-rail mass-transits (especially trams) constitute the most suitable transportation option for both small and large cities, now and in the future. They are cheaper than metros, more cost-effective than autobuses (in the long run), constitute less atmospheric pollution than the autobus, and are also more dependable and reliable in the long term (than the autobus). Above all, light-rail mass-transits are more flexible in daily urban transportation designs; they can easily be adjusted to meet peak-hour demands.

2) Cycling should be developed to complement light-rail mass-transit as a mode of transportation for Nigerian cities.

- 3) Appropriate provisions should also be made to develop pedestrianism as a mode of transportation in Nigerian cities
- 4) As mass-transit transportation, the autobus should gradually be downplayed for its unreliability and atmospheric pollution.
- 5) The metro should not be considered as a viable mass-transit option for Nigerian cities for its high capital outlay and non-cost-effectiveness.

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