



Pedestrianization of Road Networks in Orochiri Neighbourhood, Port Harcourt, Nigeria: A Panacea for Urban Road Safety In Developing Countries

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Abstract

The movement of man, goods and services is a key to economic development of any Nation and this can be achieved with the aids of functional transportation networks. Within the neighbourhood mobility related safety can be enhanced also the use of pedestrian lanes. The study adopts survey research design following the application of quantitative techniques by the use of structured questionnaires to collect data. The sample size was 100 derived from a present total population of 15,105 which was exponentially projected with growth rate of 2.8% from the 1991 census data of the community then Taro Yamane (1973) mode was applied. In data collection, the 100 questionnaires and 10 questionnaires each were randomly distributed to residence of five major and five minor roads in the community. Other tools include, topographical surveys, GIS tools and satellite imagery to determine the physical characteristics road networks and land use mapping. The information acquired were presented using descriptive statistics and models such as plans, maps. It is recommended to establish network of 1.5meters pedestrian tracks on both ends of the less than 6 metres right-of-way roads in the Orochiri neighbourhood to enhance safety of the people.

Key Words: Safety, Pedestrianization, transport and neighbourhood.

I. Introduction

In human and settlement history, walking on foot 'pedestrianization' as the is first means of transportation. Prior to the use horses, camels, bicycles and advent of automobiles, aircrafts, ships and other motorized or non-motorized means of transport, man has perpetually relied on pedestrianization from one place to another by walking, regardless of distance, weather and environmental factors (Allan, 2001). However, urban planning and development ensure components of

creating livable and sustainable communities in addition to provision of safe and accessible infrastructure with the aid of pedestrian ways within residential areas (Owolabi, 2010).

Pedestrian lane, also known as sidewalks or footpaths, play a crucial role in facilitating safe mobility, encouraging physical activity and fostering community connectivity (Litman, 2010). Pedestrian tracks often overlooked but essential, serve as vital arteries of community life, facilitating daily commutes, recreational strolls and social interactions (Litman, 2010). This offers more than just a means of transportation. It contributes to the overall quality of life of households in neighbourhoods. In promoting active means of transportation, such as walking or cycling, pedestrian lanes encourage physical activity, support public health initiatives, and reduce environmental impacts associated with motorized transportation. A well-designed pedestrian infrastructure enhances the aesthetic appeal of neighbourhoods, fostering a sense of place and community pride. Consequently, from the meaning expressed above, pedestrian movement can be inferred to as 'walk trips (Burke & Brown, 2007).

From the definition of cities, walk trips comprise the bulk of non-motorized travel in many. Pedestrian walk trips can be for transport purposes (active transport) made to access destinations or to access public transport route to destinations. Walking often hailed as the most basic form of human mobility, holds profound implications and embodies a mode of transport that transcends mere locomotion, fostering connections between neighbors, enabling exploration of local amenities, and nurturing a sense of belonging.

Orochiri (see figure 1&2) covered 76.732 hectares of land and is one of the residential communities in Port Harcourt the capital of Rivers State with present population of 15,105. It is observed that 98% of residential apartments are presently mixed-use. It has a few public institutions which include a campus of the state (Ignatius Ajuru



University of Education). This major social institution has necessitated development other ancillary facilities within the range of 1- 500metres from the community boundary by governments and private investors (see

fig.3). The combine effects of these activities generate a lot of traffic and congestion points in the road networks which are less standard and without walkways or lanes.

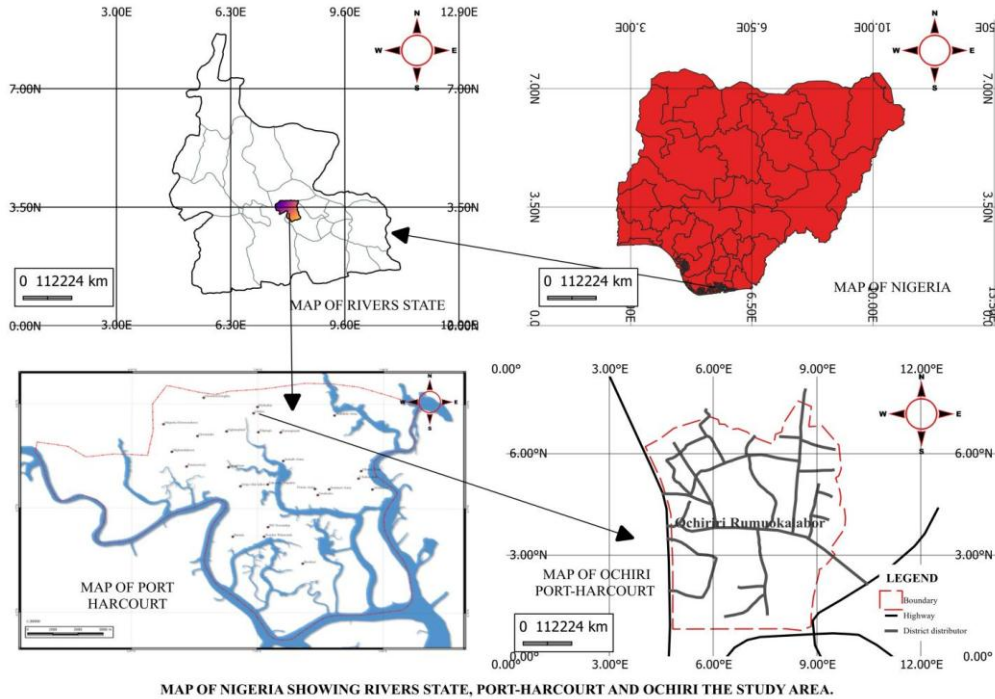


Fig. 1: Map of Nigeria Showing Rivers State, Port Harcourt Municipality and Orochiri the Study Area
Source: GIS Laboratory, Department Urban & Regional Planning, Rivers State University, 2024.

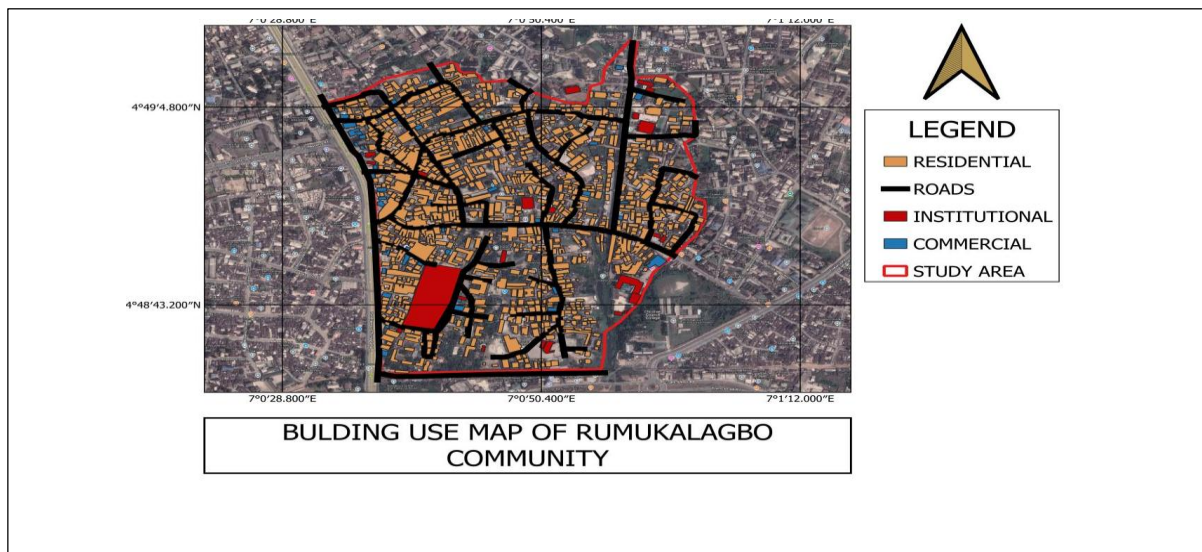


Figure 2: Spatial Setting of Orochiri Community
Source: GIS Laboratory, Department Urban & Regional Planning, Rivers State University, 2024.

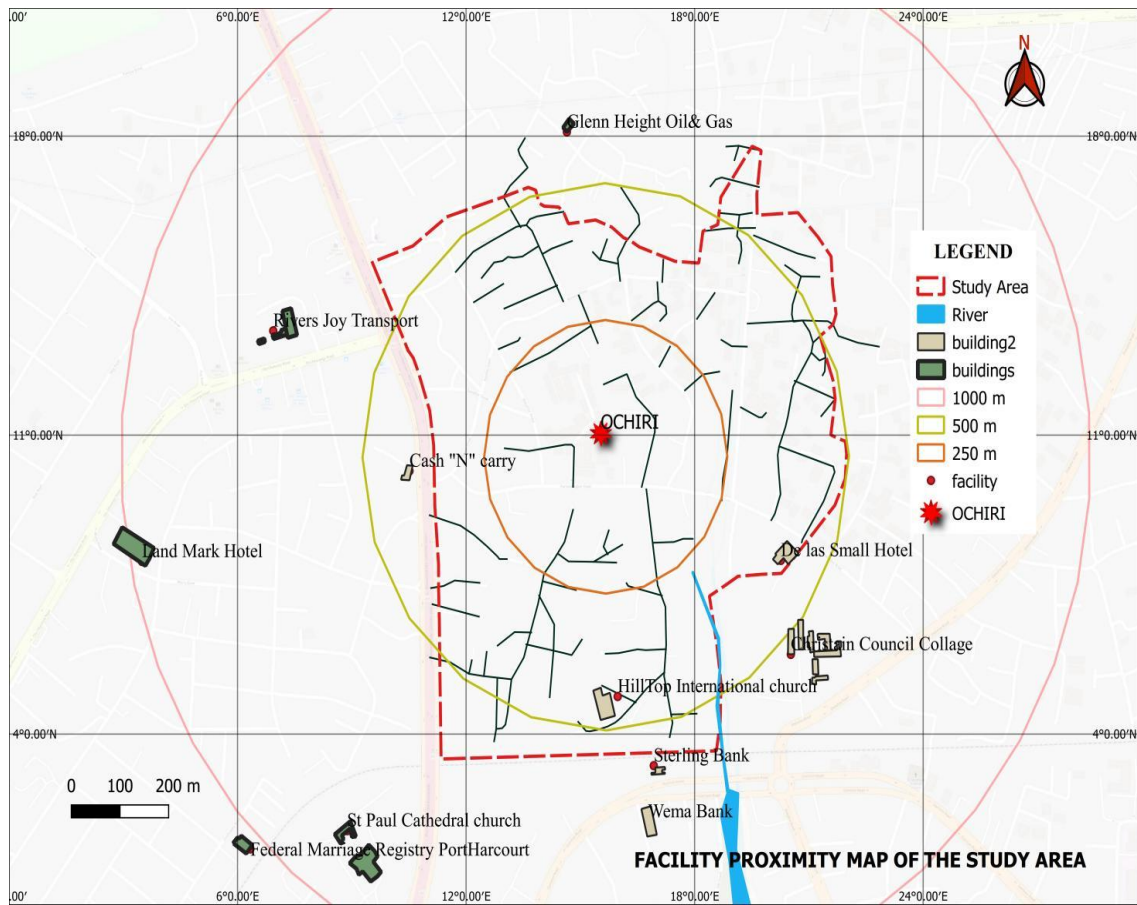


Figure 3: Ancillary Proximity Map of Orochiri Community

Source: GIS Laboratory, Department Urban & Regional Planning, Rivers State University, 2024.

Issue

Orochiri with very dense human activities grew organically with unorganized network of roads leading to a lot of complex traffics in the capacities of road networks. All roads are local accesses with less than 6meters right-of-way connected to major distributors around the neighbourhood. The frequent resultant effects are accidents, traffic congestion and other social vices especially in peak periods. These are safety issues inhibiting the people's ability to engage in active transportation and recreation among others. This impacts more on particularly the vulnerable groups such as children, elderly and persons with disabilities. These deficiencies not only compromise safety and accessibility but also undermine the community's overall livability and cohesion. Pedestrianization becomes imperative to address these challenges and implement solutions that enhance mobility to promote active transportation, and foster a safer as well as inclusive environment in Orochiri community.

II. Literature Review

Research in transportation, urban design, and planning has emphasized the existing relationship between physical environment factors and individuals' walking and cycling for transport which require pedestrian lanes in road networks. The findings from these researches have helped researchers and urban planning authorities to improve their understanding of environmental influences on physically-oriented means of transport activity. 'These researches have all indicated the relevance of neighborhood environment characteristics, including population density, connectivity, and land use mix to walking for transport'

Nico, *et al*, (2012) investigated preferences and perceptions on walking based on built environment and physical activity. The results from the multilevel analysis showed more active travel and less driving travel for residents in more pedestrian-friendly areas suburban multifamily housing developments in a medium-sized city and suggested the inclusion of urban form in the model. Gómez et



al, (2010) showed how certain built characteristics and perception strongly correlate with willingness to undertake utilitarian walking among older adults living in Bogotá.

According to Peter (2012), the pedestrian safety should be promoted by awakening both pedestrians and drivers about the importance of acting safely in all traffic environments by using and providing pedestrians' facilities appropriately. In ensuring safety of pedestrians, Mariya et al. (2013) observed that pedestrians on Delhi roads are often exposed to high risks. This is because the basic needs of pedestrians are not recognized as a part of the urban transport infrastructure improvement projects in India. Still, Dulaski & Liu (2013) discussed that the interaction between the pedestrian and vehicular driver at un-signalized mid-block locations when pedestrian is waiting at curb and stepping off the curb, the driver yield behaviour is more when the pedestrian steps off from the curb and it is more during morning peak hours.

Holland & Hill (2010) collected adult pedestrian accident data which demonstrated that the risk of being killed or seriously injured varied with age and gender. With increasing age, women were shown to make more unsafe mobility like crossing decisions, to leave small safety margins and to become poorer at estimating their walking speed. However, the age effects on all of these were ameliorated by driving experience. Men differed from women in that age was not a major factor in predicting unsafe pedestrians' mobility. Finally, Zhuang & Wu (2011) studied that pedestrian's mobility, crossing out of crosswalks (unmarked roadway) and those crosswalks contributed much to traffic accidents, so the safety of pedestrians would be more in danger if not provided.

III. Methodology

The study adopted survey research design following the application of quantitative techniques by the use of structured questionnaires to collect data. The sample size was 100 derived from a present total population of 15,105 which was exponentially projected with growth rate of 2.8% from the 1991 census data of the community. Then Taro Yamane (1973) mode was applied. In data collection, the 100 questionnaires and 10 questionnaires each were randomly distributed to residence of five major and

five minor roads in the community. Other tools include, topographical surveys, GIS tools and satellite imagery to determine the physical characteristics road networks and land use mapping. The information acquired were presented using descriptive statistics and models such as plans, maps.

IV. Results

The neighbourhood has more than 81% educated and (79%) active population (fig. 1) who predominantly agreed that traffic related safety as a result of road capacity standard is major in the neighborhood challenge (fig.5). Analysis indicates, more than half of the population daily involves in various economic activities outside the neighbourhood using the various means of transport in networks of road. As a result of traffic congestion especially in the peak hours of the day is observed. In mitigation, 55% of the population who are self-employment resolved to develop business outfits in their residency and at very short distances from their residencies as opined by Gómez et al, (2010). However, still they use the roads to reach other socio-economic facilities such church, markets, schools and healthcare centres when necessary (fig.4). Many self-employed individuals, as well as the unemployed (16%) and students (10%) depend on pedestrian access to reach commercial hubs and other community facilities. These self-employed and vulnerably groups will benefit substantially from pedestrian pathways that will facilitate smoother traffic and reduce road congestion if available as argued by Peter (2012).

Furthermore, information indicates that critical facilities such as markets (79%) and workplaces (44%) are facilities visited daily, underscoring the high demand for pedestrian access to these locations (fig. 4) and are less attracted to park and recreational facilities, medical and places of worship because of challenges in accessing these facilities (table 1). Safe and accessible pathways would not only make commuting safer but also improve connectivity within the community. In the case of poor connectivity between key areas, 24% of people suggesting that pedestrian tracks could bridge gaps between residential areas and frequently visited locations, enhancing the overall accessibility and cohesion of the community layout.

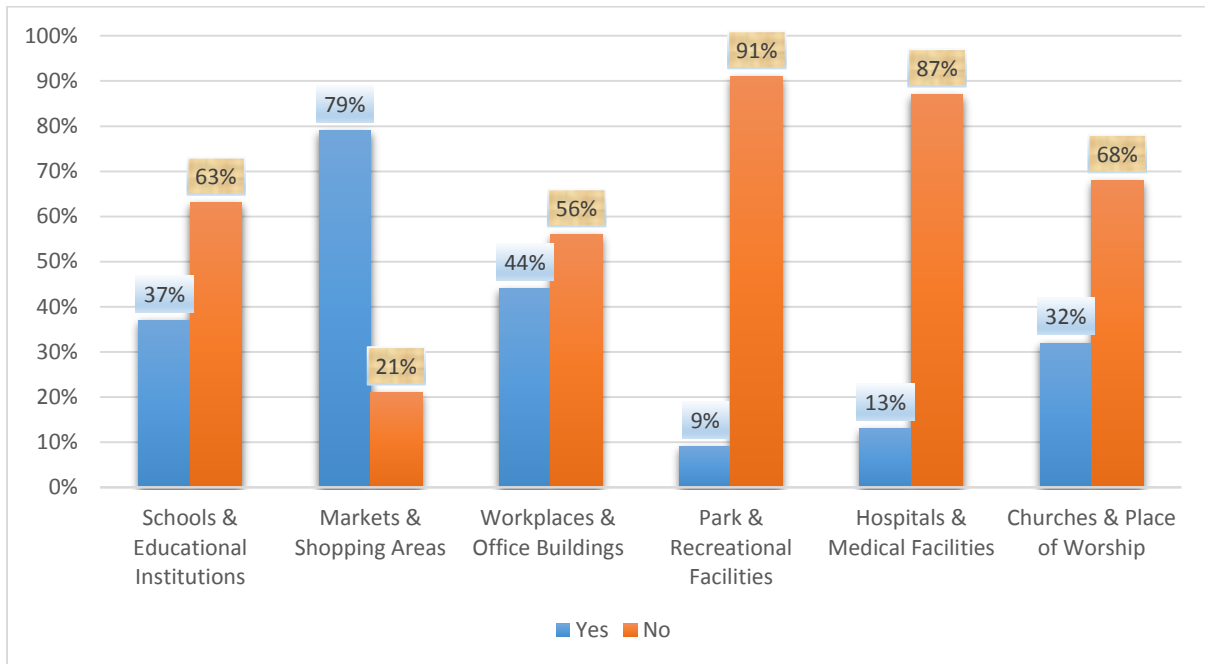


Figure 4: Neighbourhood Facilities Inducing Daily Traffic in the Road Networks
 Source: Researcher's Field Survey, 2024

Table 1: Problems Encountered on the way to using these Facilities

Problems Encountered on the way to using these Facilities	No of Responses	Percentage of Responses
Traffic congestion due to poor carriage way space	93	19.6%
Pedestrian use of carriage way (use of road)	74	15.6%
Potholes on the road	58	12.2%
On-street parking by motorist	79	16.6%
Blockage of road access by business owners	38	8%
Lack of pedestrian facilities	96	20.2%
Lack of crossing aids and traffic signage for students and disabled persons	37	7.8%
Total	475	100%

Source: Researcher's Field Survey, 2024

V. Conclusion

The Orochiri Community has a diverse distribution of land uses that significantly influence the potential use and demand for pedestrian tracks. Based on the provided map (Fig. 3), the community can be categorized into several primary land uses: residential, commercial, institutional, and recreational spaces. These categories, along with the community's spatial organization, shape the everyday movement patterns of residents and visitors, thus impacting the need for pedestrian-friendly pathways. In fig. 2, the residential areas are represented in brown and consist of various housing types, including apartments, flats, bungalows, and duplexes. The housing types spread across most parts of the community, indicating a

dense population that likely requires easy access to basic amenities and services. The high density of housing points to a consistent need for pedestrian pathways, as residents may prefer walking to nearby commercial and institutional areas rather than relying on motorized transport for short distances.

The commercial areas, marked in blue, consist of retail shops, supermarkets, a local market, and shops that sell marine equipment. These commercial zones are strategically located near residential areas, allowing for convenient access for community members. Such proximity means that residents are likely to walk to these commercial spots for daily necessities. The local market, in particular, is expected to attract substantial foot traffic, as it serves as a hub for fresh produce and other goods. The

distribution of commercial areas within and surrounding the residential zones suggests a need for well-planned pedestrian tracks that connect the housing clusters with commercial spaces, ensuring that residents can move safely and efficiently between their homes and these essential services.

VI. Recommendations

It is recommended to establish network of 1.5meters pedestrian tracks on both ends of the less

than 6 metres right-of-way roads as observed. This may be cost intensive because the irregular building set backs in the neighbourhood but a necessity to ensure pedestrian flow and connectivity. In most cases pedestrianization enhances property values and environmental quality of neighbourhoods (fig.5). It is a mobility tool for the venerable group in any society to reach and utilize facilities at less costs.

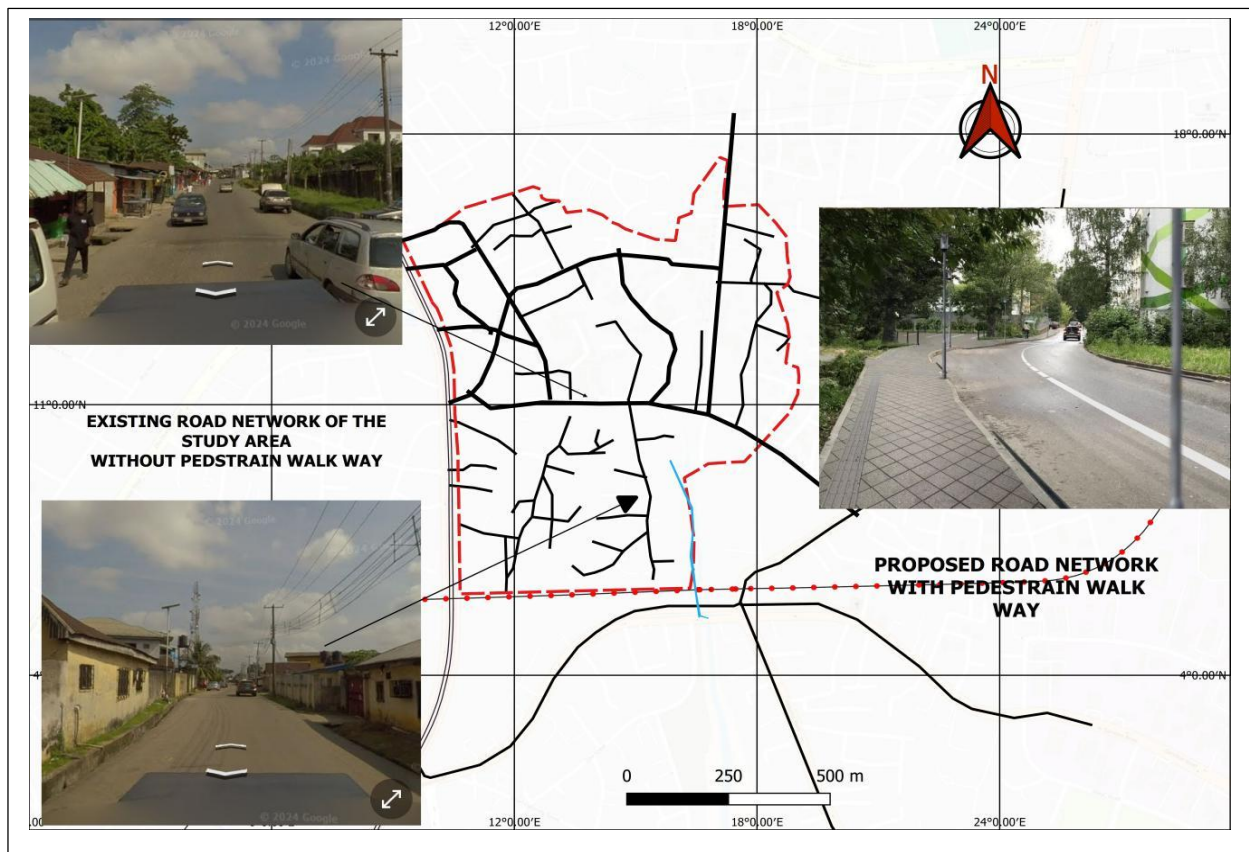


Figure 5: A Model of Proposed Pedestrian Track from the Existing in Orochiri Community
 Source: GIS Laboratory, Department Urban & Regional Planning, Rivers State University, 2024.

Given the poor connectivity reported by residents, targeted efforts to bridge gaps between residential, commercial, and institutional facilities are essential. For instance, pathways should be extended to link residential neighborhoods directly to commercial hubs and educational institutions, creating seamless and direct routes for pedestrians. To implement this, it is critical to involve community stakeholders in the planning and design process of pedestrian tracks to ensure that specific needs are met.

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