Study of Access Roads in Select Locations in Western Pune City

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Abstract

Access roads are small lengths of roads ranging between 100 m to 1 km in length. These roads are responsible for providing connectivity to residential neighbourhoods, industrial hubs, commercial spaces, highways and other bigger roads. They play an important role in a city's transportation infrastructure. Due to the negligence of the government and municipal bodies, these roads are underdeveloped, offering poor quality riding to the commuters. These roads don't receive the importance and funds required for their development and maintenance as compared with highways and other bigger roads. Pune, being one of the major tier two cities, is seeing rapid economic and technological development. The population in the city is rapidly increasing and so is the demand for transportation infrastructure. According to TomTom report, Pune has the second-highest traffic congestion in India due to its poor road infrastructure. Considering these aspects, we have carried out this study on access roads in select locations in Western Pune city. In this study we assessed the access roads, identified their deficiencies and provided a framework for the betterment of their development and maintenance in accordance with Indian standard codes and literature referred to. The objective was achieved through a detailed data collection process which included field surveys, local interviews and a user experience questionnaire. The study assessed nine access road stretches and ranked them based on the scores given on a five-point Likert scale for the conditions observed. Key observations include inadequate road width, poor pavement conditions and lack of drainage. Unauthorized parking and encroachments have reasonably reduced the road width for traffic flow. Land acquisition and legal disputes have delayed the development of these roads. Therefore, with reference to the standard codes and literature referred to, guidelines are formulated for all the bottlenecks identified.

Keywords: Access Roads, Pune city, Traffic congestion, Likert scale, Indian Standard codes, Land acquisition, Unauthorized parking, Legal disputes

1. Introduction

Road construction plays an important role in the development of any country. In India, the construction industry contributes to nearly 12 to 15% of the GDP, out of which 3 to 6% is accounted by the road transport sector. Pune is one of the fastest-growing second tier cities in India. It is the second-largest city in Maharashtra and the ninth most populous city in India. Since 1960, Pune is undergoing rapid urbanization. Many people from several states come to Pune for their jobs and to pursue their education. The city is well known for its educational institutions and therefore called the Oxford of East. Due to its rapid development, the city's population is rising. According to the latest census report collected in 2011, Pune's population was 94.29 lakhs. In 2025, it is expected to reach 1.25 crore. The city's population is increasing roughly at a rate of 30.73% every year. With the increase in the population, the demand for transportation is also increasing. According to the RTO reports of Pune city, around 43,40,676 vehicles are registered and running on the roads. The number of vehicles registered is nearly equal to half of the projected population in 2025. The city is facing serious traffic congestion. According to TomTom report, Pune is ranked second in India and seventh globally for highest traffic congestion. The main reason for the city's traffic congestion is its growing population and poor road infrastructure. Pune has 13642 km of roads, including 331 km of

National Highways and 1368 km of State Highways. The major and other district roads have a total length of 5388 km. These roads are well-developed and meet the needs of the people. But the road infrastructure connecting these roads is an issue of concern.

Access roads, also known as link roads, local streets and feeder roads, serve as entry or exit points to particular locations, such as residential areas, business centres and industrial areas. These roads are short roads between the length of 100 m to 1 km. The purpose of these roads is to link the locations they serve with the main roads, highways and other bigger roads. Access roads have a major impact on maintaining an efficient traffic flow and provide local access to the people. Many access roads in Pune lack development and offer poor quality to the users. They are not designed according to the standards prescribed, leading to traffic congestion and creating unsafe driving conditions. Due to their underdevelopment, these roads are becoming missing links for other road projects and for commuters to travel from one place to another. The Pune Municipal Corporation has identified 390 such missing link roads. This research assesses the access roads, evaluates their deficiencies and finds the probable reasons for their underdevelopment. The study also provides guidelines for their betterment with reference to Indian standard codes and literature referred.

2. Research methodology

The research methodology followed a combination of field surveys, questionnaire and interviews, to gather information about access roads.

2.1 Field survey

The study was conducted by assessing nine access road stretches. These stretches were identified from Google Earth. The parameters for the evaluation of access roads were obtained from literature referred. These parameters were further classified as qualitative and quantitative parameters.

Qualitative parameters determine the quality of the primary object. The quantities of these parameters cannot be obtained, but their presence can be determined. Quantitative parameters can be measured and the amount of their presence significantly impacts the primary object. The primary object in this study is access road. Qualitative parameters identified include determining the condition of pavements, shoulders, lane dividers, streetlights and identifying the presence of drainage and trash deposits. Quantitative parameters identified include measurement of the length of the roads, width of the roads, width of the shoulders, number of buildings connected by the road and traffic volume.

The identified parameters were analysed for each access road visited through visual observation. The access roads in Hinjewadi, Balewadi, Baner and Wakad areas were considered. For convenience, these locations are abbreviated as Hind, Bald, Ban and Wad respectively. Each access road was given a unique name. Example: AR 1 (Hind), where AR is the abbreviation for Access Roads. 1 indicates the access road number followed by the abbreviated location.

2.2 Checklist

A checklist was prepared to rate the condition of quantitative and qualitative parameters. For every parameter present a score of ‘1’ was allocated and for the absence of a parameter a score

of '0' was allocated. A 5 point Likert scale was used to rate the condition of every parameter which was present. Each access road was assessed for a total score of 52, which included a score of 7 for the qualitative parameters and 45 for the quantitative parameters. Based on the total scores obtained, the access roads were ranked. Table 1 shows the scores obtained and raking of access roads.

Table 1. Ranking of Access Roads Based on Total Score

Rank	Access Road	Qualitative Score	Quantitative Score	Total
1	AR 8 (Ban)	4	24	28
2	AR 7 (Ban)	4	23	27
3	AR 9 (Ban)	1	21	22
4	AR 4 (Wad)	3	17	20
5	AR 1 (Hind)	2	15	17
6	AR 6 (Bald)	3	12	15
7	AR 3 (Wad)	3	9	12
8	AR 5 (Wad)	4	6	10
9	AR 2 (Hind)	4	2	6

2.3 Interviews

The Pune Municipal Corporation has identified 390 missing link access roads. A study on one such access road connecting Maruti chowk to Pan card club was carried out. It was observed that the shoulder on one side of the road was in poor condition with a lot of vegetation growth and, on the other side, was acquired by private properties. Illegal vehicle parking had narrowed the carriageway width. During an interview with a resident of an apartment connected by the access road, it was learnt that the road development has been halted due to encroachment by slum dwellers. However, according to the slum owner, the alignment of the road did not pass through their slum, but due to money power of the local landowners, the alignment of the road had shifted. The resident also stated that the development of the road stretch will provide direct access to the road connecting the pan card club, the distance to Pan card club will be reduced, and traffic congestion will be limited. The dispute between the Pune Municipal Corporation and the slum dwellers is yet to be settled and paves the way for the development of the road.

2.4 Questionnaire

A questionnaire was designed on Google forms. The aim of the questionnaire was to gather insights from the potential home buyers and residents regarding their experience or preferences related to the access road of the property they are residing or buying. The responses were gathered by visiting the residential apartments/societies across Western Pune. About 40 responses were gathered. The questionnaire consisted of 18 questions. The initial six questions were prepared to gather demographic information, followed by rest which detailed the access road condition. The questionnaire included short answer questions, yes/no questions and rating questions. For rating questions, a five scale rating was used to gather the degree of responses. A rating of 1 indicated very poor, 2 indicated poor, 3 indicated good, 4 indicated very good and 5 indicated excellent.

3. Analysis

Through on-field surveys, it was observed that the average length of access roads was 293 m. The length of most of the access roads ranged between 100 and 300 m. The average width of the access roads visited was observed to be 6 meters. The width of most of the access roads ranged between 4.5 to 6.5 meters. Shoulders weren't found on eight of the access roads. The shoulder existed only on one of the access roads on AR 8 (Ban), which was of width 2.5 m. The traffic volume ranged between 15 and 150 vehicles per hour. These values varied depending on the kind of buildings and number of buildings connected by the road. Out of the nine access roads, seven road stretches were paved with a bitumen layer, one of the road stretch was unpaved, and another road stretch was observed to be slightly paved and unpaved. Parking of vehicles along the carriageway narrowed its width. This caused traffic along the road stretches, leading to unnecessary hindrance in the vehicle movement. Seven road stretches were found to have vehicles parked along the carriageway. Two wheelers and cars were the most common vehicles observed, parked along the road stretches along with some of the private vehicles such as autos and luggage vans. Drainages are essential for effective draining of rain water and for proper disposal of sewage water along the road stretch. They existed only along AR 8 (Ban). The lane divider was also present only on AR 8 (Ban). Streetlights were present on seven of the road stretches. The level of illumination of streetlights was classified as low, high and medium. Out of the seven roads with the presence of streetlights, five of them were classified under medium illumination and two of the road stretches were classified under low illumination. Dumping trash along sideways of roads causes discomfort and narrows the carriage way width available for the users. Trash deposits were observed on four of the roads.

The responses to the questionnaire came from a variety of professions, including software engineers, government employees, teachers, students, doctors and civil engineers. The majority of the respondents were satisfied with the access road width (22, 40%), drainage conditions (23, 58%), space given for their vehicle parking (21, 53%) and overall access road condition (22, 55%). But a significant number of people felt the width of the road was insufficient for traffic flow (18, 60%), poor drainage conditions existed (17, 42%), there was insufficient parking space due to unauthorized parking along the access road width (19, 47%) and overall access road conditions were bad (18, 45%). The respondents felt that maintenance of access roads should be undertaken by the government (17, 42%), followed by municipal bodies (14, 35%) and society developers (9, 23%). Most of the respondents have encountered frequent maintenance (17, 42%). A significant number of people have rarely seen access road maintenance (10, 25%). Few of them say maintenance work takes place very frequently (7, 17%). Some of them have never witnessed the maintenance of their society's access road (3, 8%) and some of the respondents were unaware of it (3, 8%).

Based on the scores obtained from the checklist prepared, it was observed that an average score of 3, 14 and 17 was obtained for the qualitative, quantitative and total scores respectively. AR 8 (Ban) secured the highest rank. The road had adequate width for traffic flow, proper drainage management, excellent quality pavement, very good visibility of road markings and intersections. In contrast, AR 2 (Hind) secured the least position. This road had a below average condition of quantitative parameters. Even though the road had adequate width and shoulders, it did not have adequate pavement or road markings. The road had unpaved shoulders, high levels of trash deposits, an inadequate number of streetlights and no provision for extra widening. The second ranked road, AR 7 (Ban), has an equal qualitative score as AR 8 (Ban).

But in comparison, the road offered comparatively poor visibility of road markings and extremely poor provision for extra widening. AR 9 (Ban) is ranked as the third best, had a good pavement condition, streetlights and very good visibility at the intersections. But it lacked adequate width, drainage, shoulders and provision for expansion. AR 4 (Wad) is ranked fourth. Even though the road has an average qualitative score, it has adequate width for traffic flow and provision for expansion. The road markings and adequate number of streetlights were absent. The road offers very good pavement and clear visibility at the intersections. Even though AR 1 (Hind) had a very good pavement condition, it is ranked fifth because of its inadequate width, absence of shoulders, road markings and no provision for widening, lesser number of streetlights with poor illumination. The roads AR 6 (Bald), AR 5(Wad) and AR 3 (Wad) had a below average total score. AR 6 (Bald) had poor pavement, streetlights, visibility at intersections and extremely poor provision for widening. Even the essential components such as road width, streetlights and shoulders ranged between poor to very poor condition. AR 3 (Wad) had adequate width for traffic flow, but the road had a very poor overall condition. AR 5 (Wad) had conditions similar to AR 3 (Wad) but had extremely poor overall condition.

4. Interpretation and recommendations

Based on the analysis of on-field surveys and questionnaire results, the following recommendations are made to the municipal bodies and related authorities for the development and maintenance of access roads. These recommendations are made based on the Indian standard codes and literature referred to. There is no separate code for access roads under the Indian Road Congress classification system. They come under the broader category of local streets, rural roads or feeder roads under the IRC 86: 2018 – "Geometric Design Standards for Urban roads and Streets" or IRC 73: 2023 – "Geometric Design Standards for Rural Non-Urban Highways".

If the access road is a feeder road providing access from rural areas to major roads, the minimum width of the road should be 3.5 to 4.5 m. If the access road is an urban road providing access within the urban areas, the minimum width of the access road should be between 5 and 7 meters [5]. Shoulders are essential for emergency stoppage of vehicles, movement of pedestrians and accommodating drainage for directing either the rain water or sewage water away from the carriageway. Therefore, it is recommended that access roads are provided with adequate shoulders and their width designed according to [5]. Illegal parking of vehicles along the road stretch narrows down the carriageway width. No parking is allowed on sub-arterial roads where the available carriageway width is less than 7.5 m and on collector streets where the available carriageway width is less than 5.5 m [7]. Suitable spaces for parking should be allocated across the city to control on-street parking. Relevant signage should be displayed along the road stretches. Fines should be imposed on people who park their vehicles on the access roads illegally. In central areas, parking may be allowed on one side of the road on one day and on the other side of the road on another day. Bollards can be placed to avoid in disciplinary parking [10]. Medians or lane dividers ensure a smooth flow of traffic by dividing the traffic on either side, preventing head-on collisions. Therefore, it is recommended that medians are suitably designed as per [5] or [6] accordingly. Streetlights are essential for the safety of road users. Good quality streetlights ensure inter visibility of road users at night, improve traffic conditions, reduce driving fatigue and effectively reduce accidents. Streetlights are to be designed in accordance with National Lighting Code 2010 and [8]. The access roads

examined by us fall under the group A2, B1 and B2 roads that represent main city streets, secondary roads with considerable traffic and secondary roads with light traffic respectively. The luminance for these roads should be 15 lux, 8 lux and 4 lux respectively [8]. Land acquisition has proved to be a major threat to the development of access roads. Suitable measures should be adopted for effective land acquisition without affecting the stakeholders to a large extent. These include developing effective town planning schemes, identifying accurate ownership of lands [2], having regular engagement with the stakeholders and affected parties, fair and adequate compensation [3].

5. Conclusion

Access roads play an important role in road infrastructure and effective traffic distribution in a city. The study identified several deficiencies of access roads which have a major impact on urban transportation, connectivity and traffic control. Issues including inadequate road widths, poor pavement conditions, lack of suitable drainage systems, illegal parking, and encroachments were identified using a combination of field surveys and user experience interviews. The research also reveals that the access roads do not meet the Indian Road Congress standards, leading to poor riding quality for the users. The legal disputes and land acquisition issues have continued to hamper the development and maintenance of the access roads. The study recommends guidelines which the responsible authorities can incorporate for the betterment of the development and maintenance of access roads.

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