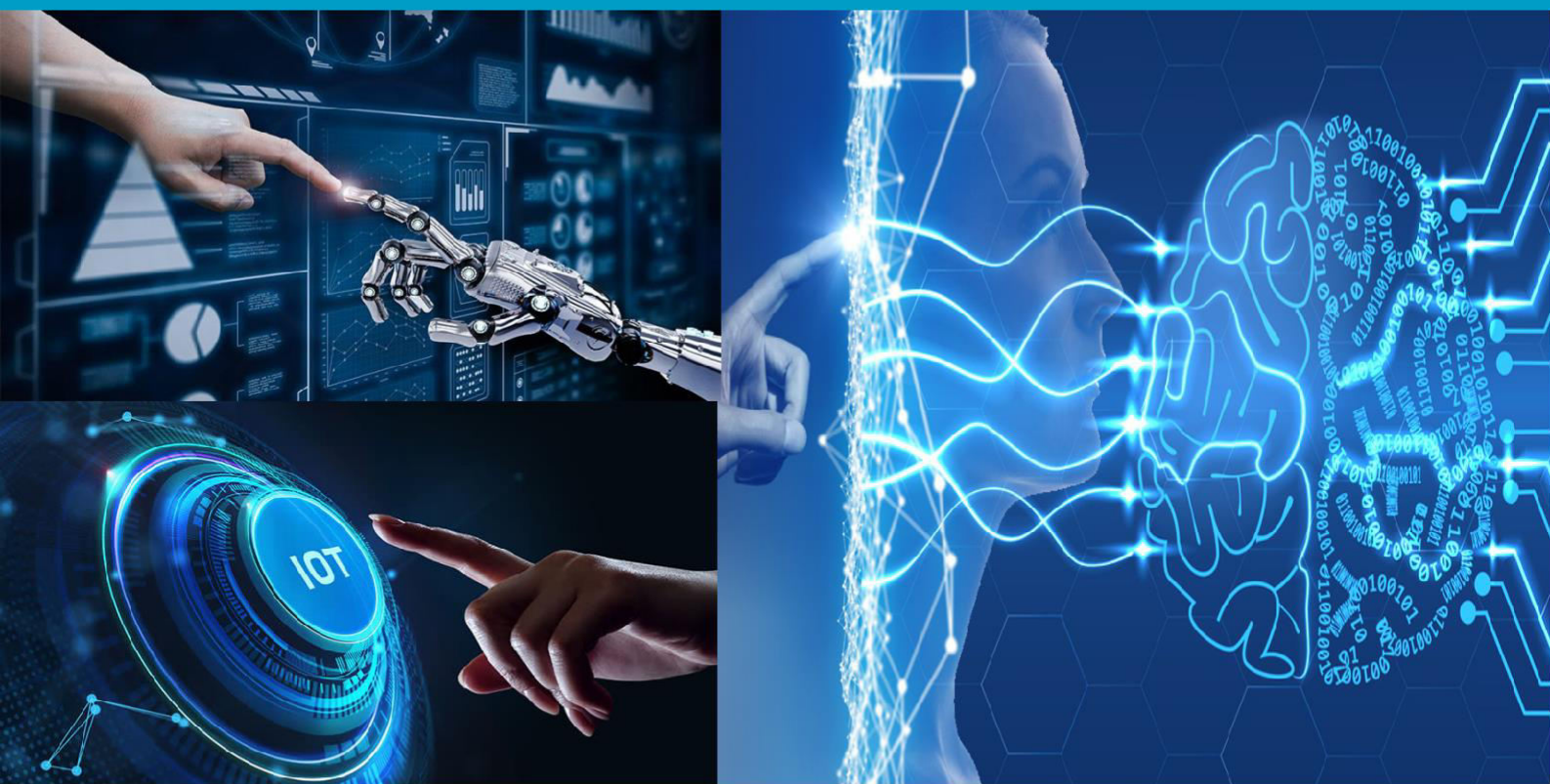




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Traffic Congestion At Warje Chowk : Causes And Solutions

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ABSTRACT: Traffic condition in most of the cities are very complex. The high increase in number of vehicles on road and increasing urbanization leads to the problem of traffic congestion, which further leads to complications and hazards on the city roads. Many arterial roads in Pune city are suffering from this problem, especially during peak traffic hours. In this work, we witnessed actual traffic congestion problems. For further analysis, we conducted traffic volume survey through manual counting of vehicles and converted this data in to the PCU coefficients. After analyzing all the work, we pinned the root problem of road and proposed a solution to avoid traffic congestions.

KEYWORDS: Traffic congestion, peak hour traffic, Traffic volume study, traffic solution, Passenger Car Unit.

I. INTRODUCTION

Nowadays, transportation leads to a number of problems with traffic congestion being one of the most burning issues in every territory of the world. Traffic congestion is a normal phenomenon associated with transportation, especially in urban areas where the population density is high. To tackle this problem, every country is approaching differently according to their country's situation regarding population and needs, and solving their transportation problems within their capabilities.

Pune, the second largest city in Maharashtra and the ninth most populous city in the country is one of India's most famed metropolitan hubs, also being known as the "Oxford of the East" due to the presence of several well-known educational institutions. In one of its document on Smart City project, the Pune Municipal Corporation (PMC) states that the city 'aspires to become global urban centre'.

Warje Chowk is a busy intersection located in the city of Pune, India. It connects several major roads, including the Mumbai-Bangalore highway, and serves as a key transportation hub for the area. A case study of Warje Chowk could be conducted to analyze traffic volume, congestion, and other issues related to the intersection.

II. RELATED WORK

The concept of providing exclusive lanes for a particular vehicle category is quite old. The first type of exclusive lane was established as a bicycle lane in the year 1885. Later, in 1940, an exclusive bus lane was developed in Chicago, USA. Further, high occupancy vehicle lanes (HOV) were also developed in Australia, the USA, and New Zealand. The first EMCL was constructed in Malaysia along federal highway 2 (F02) in the early 1970s. Presents the evolution of different exclusive vehicle lanes. Despite EMCL being established in 1970, it's still not very popular in developed countries; one of the primary reasons for this is the low share of motorcycles in the road traffic compared to Asian countries. As per the World Road Statistics, it can be comprehended that the percentage of passenger cars is more in developed countries as compared to developing countries. In contrast, developing countries are leading in the number of motorcycles per 1000 persons.

The separate motorcycle lanes can be designed as inclusive (shared) as well as exclusive lanes. Inclusive or shared lanes are separated by painted markings or shading on the road, and it can be shared with other motor vehicles during peak hours. On the other hand, exclusive lanes are physically separated or isolated from main traffic streams to restrict the entry of other motor vehicles in the motorcycle lane during peak and off-peak hours. Such lanes help reduce conflicts with other motor vehicles and improve motorcyclist's safety. Table 1 illustrates the different EMCL roads built across the world in different countries.



Table 1
Studies associated with motorcycle-related strategies implemented in Asian countries.

Strategy	Country	Intervention	Result
Enforcement and Education	India	Efficient law enforcement and effective safety education	Reduce traffic-related injuries and fatalities in low-income countries like India
Management strategies	Malaysia	The community supports the safety program	About 85% of participants had improved their riding behavior, specifically in compliance with personal protective equipment while riding
Management strategies	Malaysia	Day-Running-Light	Running headlights campaigns and regulations have been successful in improving motorcycle safety in Malaysia
Management strategies	Malaysia	High Visibility Windbreaker (HVWB)	HVWB could be considered an important tool while on the road to increase the conspicuity level of motorcyclists among road users and could indirectly reduce the occurrence of road accidents involving motorcyclists in the nation
Enforcement	–	Ban on texting and calling while riding	Reduces the distraction and increases motorcyclist's safety
Enforcement	Thailand	Helmet use with the installation of CCTV enforcement cameras	Increment in speed was observed
Enforcement	Thailand	Surveillance or speed enforcement cameras	Significant reduction in the 85th percentile speed of motorcyclist's
Enforcement	India	Effective enforcement policies.	Crash risk and violation activities can be minimized
Education	Cambodia	School-based programme	Helmet use increased from 0% at baseline to 87% at 10–12 weeks of follow-up
Education/Enforcement	Laos	Multisectoral road safety campaign and helmet law enforcement	Helmet use increased from 11.2 to 42.5%
Legislation	Vietnam	Helmet legislation	Self-reported frequent helmet use increased from 26.2% to 73.6%
Management strategy	Thailand	Community participation approach (with the use of mass media, print media, specialized media, and activity media)	Increase of 13.2% in the rates of helmet usage

III. METHODOLOGY

- Conducting Visual Analysis.
- Conducting “Traffic Congestion Survey” with the help pedestrian and road user.
- General interview with the road users and pedestrians.
- Conducting the data of traffic volume.
- To analyze road performance, some primary data were collected by doing a survey. The survey is a road geometric survey by measuring the road using tape-measure.

Analyzing of traffic data is an important task for urban planners and managers. Traffic data have the spatio-temporal characteristics, which can reflect the variation of the presence of vehicle in different places over time as well as traffic flow dynamics among different places.

To conduct a "Traffic Congestion Survey" with the help of pedestrians and road users, you can follow these steps: 1. Identify the survey location 2. Recruit survey participants 3. Provide instructions 4. Distribute questionnaires 5. Monitor and assist 6. Collect completed questionnaires 7. Analyze the data 8. Draw conclusions and report findings

Traffic data are needed in research, planning, designing and regulation phases of traffic engineering and are also used in establishing priorities and schedules of traffic improvements. The traffic engineer must acquire general knowledge of traffic volume characteristics in order to measure and understand the magnitude, composition, and time and route distribution of volume for each area under his jurisdiction.

IV. EXPERIMENTAL RESULTS

From the below conducted survey the most of the traffic flowing from Ambedkar Chowk to NDA Road are of Motorcycles which is of 79.96 % of the total One day flowing traffic

Time of the Survey – 7:00 am – 9:00 pm

Total Percentage (%) of Motorcycle – 79.96 %

PCU of Motorcycle – 153136

Day	Bicycle	Motor cycle	Auto-rickshaw	Cars	Heavy Vehicles	BUS Public Transport	LCV
Monday	10	47229	5378	5982	220	297	257
Tuesday	15	44897	4678	4879	156	278	247
Wednesday	11	42578	5146	5769	187	256	158
Thursday	17	41589	3598	4583	256	289	189

Friday	14	43589	5412	6123	416	269	163
Saturday	18	44697	4568	4789	463	245	247
Sunday	26	41693	4899	5478	263	263	231
Total	111	306272	33679	37603	1961	1897	1492
PCU Conversion Unit	0.5	0.5	0.8	1.0	3.5	2.2	3.5
Passenger Car Unit	55	153136	26919	37603	6863	4173	5222

Date :	25/09/2023	Day :	Saturday.		
Start Time :	9:45	End Time :	10:15	Total Survey Time :	30 min.
Location :	Ambekar Chowk to Worje Malwadi.				
Traffic	Tally	Total			
Motorcycle	 				

Fig. 1. Manual Method Traffic Volume Survey Sheet

According to our survey from the above table we have known that the most of the traffic is of motorcycles. Which are always flowing and is very common in the warje. Most of the citizens also prioritize the use of motorcycle for their daily use of transport or while using the Warje Chowk are travelling through it. Due to the highest traffic at the warje chowk we recommend that there should be an Inclusive Motorcycle lane which will allow the flow of traffic smoothly. By separating the motorcycles and the other vehicles which will allow to flow the traffic smoothly.

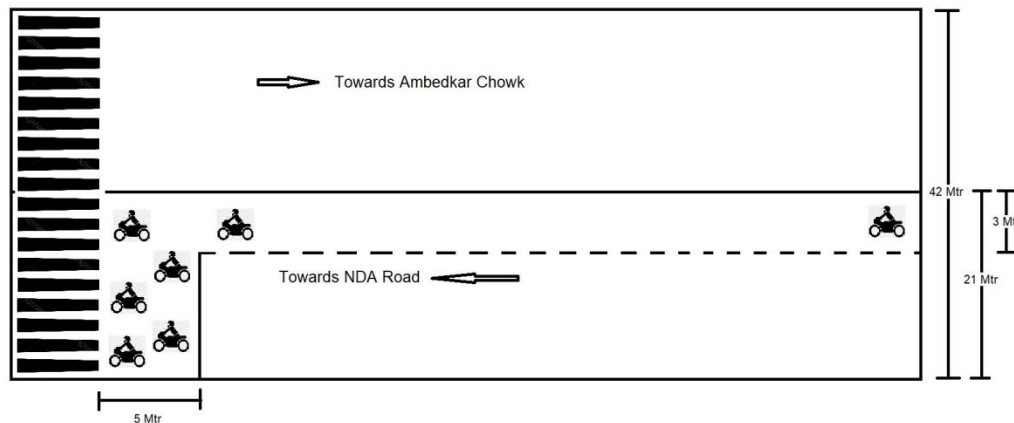


Fig. 1. Line Plan of the Non - Exclusive Motorcycle Lane

The above figure shows the design of the inclusive motorcycle lane on the warje road passing through the warje chowk to the NDA road. The separate lane for the motorcycle will be provided from the Ambedkar chowk. The bike should start segregating from the Ambedkar chowk itself. The motorcycle lane provided is of 3 Mtr. Width in which the two motorcycle according to the IRC norms will be able to ride side by side. At the signal of the warje chowk the motorcycles will be provided another 2 Mtr. Width for stopping behind the zebra crossing so that the motorcycle riders who wants to go to the right side should be able to cross the lane without disturbing the traffic safely. The other vehicles traffic should be stop by the marking provided behind the signal for the distance of 5 Mtr.

The entire N-EMCL road network's capacity depends on the estimated capacity at access points where the vehicles enter and leave. In the literature, for N-EMCL, access points are classified as ingress (entering into N-EMCL) and egress (leaving from N-EMCL) sections. The critical gap and headway parameters are of high interest for the accurate estimation of the capacity for such interruption facilities

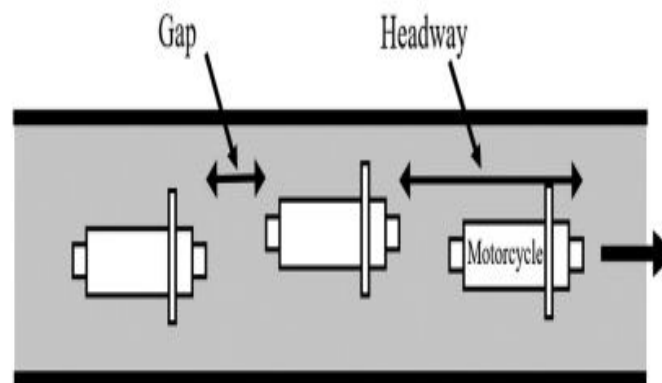


Fig. 2. Headway and Gap Concept

The geometric data of NDA Road and Warje Chowk and their Cross Section shown in fig. below.

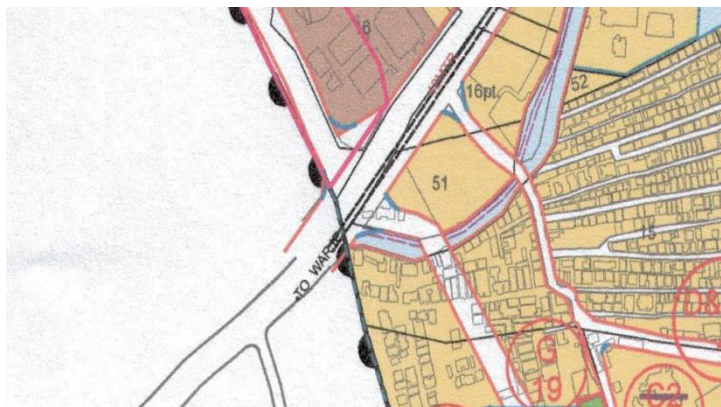


Fig. 52. Warje Road Width Measurement

Lane Markings/ Shading

A vision with road markings could be increased motorcycle safety. In the mixed traffic, motorcycles have tended to access to other motor lanes during the peak hours although road is installed by lane splitting. Under some subjective reasons, motorcyclists may be aware that they are accessing intentionally on the car lane or riding at a high speed. Segregated motorcycle lanes are fully separated from mixed traffic, mainly by painted markings or shading on the road. Markings may include symbols, words, text, arrows, lines, and other markings that give direction and attract motorcyclist on visual environment.

Bike Lane Inventory :

The system will include an inventory of existing bike lanes, their locations, and relevant attributes such as length, width, and signage details. This information will be stored in a centralized database for easy access and management.

V. CONCLUSION

As per our studies and research we suggest solution on traffic at Warje chowk that there is need to segregate the motorcycle traffic from main traffic. By considering the current conditions and traffic data and analysis we suggest the implementation of Inclusive motorcycle lane (IMCL). IMCL is method of segregation of motorcycle traffic from main lane traffic which subsequently reduce the traffic at area.

By implementing the solution of IMCL at Warje chowk is effective in point of view of construction and maintenance. IMCL will not disturb the main flow of traffic and allow continue flow of vehicles. The movement of main lane traffic will be smooth and flexible and traffic will not face any delay in time. The IMCL solution will not required any extra construction at Warje.

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