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A REVIEW ON STUDY OF LEVEL OF SERVICE ON NATIONAL HIGHWAYS

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Abstract: For the development of any country, transportation plays an important role. In the last few years, traffic has seen lots of changes, and for that, there have been lots of schemes and improvements, but when we give any facility or improve any existing facility, it is very important to check the performance of the facility. The level of service has been introduced in the highway capacity manual. Level of service actually shows the level of quality of facilities, and on that basis, they divided them into six different levels of service. This paper studies various parameters that will affect the LOS of urban roads.

IndexTerms **- Level of service, free – flow speed, highway, traffic, traffic ount.**

I. INTRODUCTION

The development of countries and their expansion are increasing the urban population, and transportation facilities play an important role in the development of any country. As the transportation facilities improve our connectivity with other countries, every country is coming as per their wish and trying to solve transportation issues according to the capabilities and resources they are owed. The transportation system in India is also improving as the population increases.

When we provide any facility, it is very essential to check the performance of the facility for which it is provided. In the past year, so many schemes were built to improve the transportation facility.

To check the level of performance of the roadway the highway capacity manual introduces the Level of Service. This parameter can be defined as the level of facilities provided by any roadway under different operating conditions. On the basis of their service facilities, the highway capacity manual is classified into six different levels of service, from level A to level F. Level of service A shows the highest service provider, and level of service F shows the worst service condition at different operating conditions. This parameter is helpful to check the performance of the existing road and to improve the roadway with an increase in traffic volume.

The Highway Capacity Manual (HCM) first introduced the Level of Service in 1985, which shows the level of qualitative measure of a road in different traffic conditions. This parameter is actually showing the capacity of any road in its worst condition, i.e., the ratio of actual capacity to the volume of the road.

To determine the level of service of a road, we have to perform various traffic studies, and on the basis of those studies, we can determine the level of facility.

As level of service is not well defined for highly heterogeneous traffic flow conditions on urban corridors in India, an attempt has been made in this regard to define level of service criteria in this study. Urban Street LOS is normally based on average vehicle travel.

Level of service in the highway capacity manual is defined as "a quality measure describing operational condition within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to manoeuvre, comfort, and convenience.[2]

II. LITERATURE SURVEY

According to the Prasant kumar bhuyan and K .V krishana Rao (2011) research, They identify appropriate criteria to gauge the level of service on city roadways and at signalised intersections. They take into consideration the city of Mumbai in India to assess the degree of service provided by urban roadways in mixed traffic flow with various vehicle speeds.

There are 100 street segments in this study region that span four north-south and one east-west corridor, totalling 140 km in length. They define a segment as the directional stretch of a corridor running from immediately following one signalised intersection to the next. On these five urban corridors, 10 to 12 travel runs were completed. In this investigation, they used a mobile vehicle equipped with a Global Positioning System (GPS) receiver to gather data. In order to establish the level of service requirements for urban streets, they identified typical travel speeds over each section based on the data they had collected. They found that the degree of service can be determined by traffic studies including free flow speeds, travel speeds throughout both peak and off-peak hours, inventory information, and classified traffic volume statistics.[3]

Dr Satish Chandra et al (2004), gives a systematic procedure to evaluate the capacity of a two-lane road under mixed traffic conditions. In this investigation, they collected data from more than 40 sections of two-lane roads to analyse different parts of the country. In that, they find that influencing parameters like gradient, lane with slow moving vehicles, lane width, shoulder width, traffic composition, pavement surface condition, and directional split affect the capacity of the road in different traffic operation conditions. On the basis of that influencing parameter, they give the procedure to estimate the capacity of a two-lane road.[4]

Robin Babit (2016), In this investigation, they determine the level of service for Jan Marg. Jan Marg is the major arterial road in Chandigarh, India, and has seen changes in traffic in the last couple of years. For this, they perform several traffic studies, like traffic count, peak hour volume, and peak hour factor. On the basis of the collected data, calculations were done. A traffic count was done to determine the variation in traffic during peak hours and non-peak hours. They find that during peak hours, the road sees long queues at signals. On the basis of the Highway Capacity Manual (HCM), they find the level of service for Jan Marg shows Level of Service E for the lane moving towards Matka Chowk, and for the lane moving towards Sector 42–43, it lies between Level of Service D and Level of Service E. For urban roads, Level of Service C is the minimum requirement. In this investigation, they find that the level of performance of Jan Marg is very poor and that it did not fulfil the service for which it was provided; therefore, Jan Marg led to a delay in time. Widening of lanes is not a case that can be done due to the availability of land, as on both sides of the roads there is already too much construction done. So it's the public transport only buses, as Metro is not possible in a small city like Chandigarh, that need to be good enough to make people travel through them. Or individuals need to be extra smart by carpooling to avoid excess traffic in the lanes. If people are not smart enough, then the government has to do something by increasing parking fares so that it becomes uneconomical to travel by car.[5]

Bhavneet singh et. Al (2015), In this investigation, they perform a traffic volume survey at Panjab University in Chandigarh, which is one of the oldest universities established in 1882. In the past year, there have been major changes observed in the vehicle population. In this, the major objective is to study and analyse the prevailing traffic conditions on the university roads. For that, they perform the traffic volume study by manual counting at the entry gates 1 and 2. Due to mixed traffic, they face the problem during peak hours of the day, when the traffic volume is highest on the road. And on the basis of the collected data, they classified the level of service for the university road.[6]

Abrar UL Hap Bhat's , they analysed the traffic flow survey to understand the traffic flow characteristics. In this investigation, they study traffic flow from Majri Chowk to Ramgarh by doing manual counts of traffic flow. For a better understanding of the current state of traffic flow at a junction, traffic flows are organised. With all the data collected from the field, they analysed the traffic flow pattern over different time periods.[7]

Ashish kumar patnaik research, For the purpose of trying to identify different road segments and speed ranges of LOS, Ashish Kumar Patnaik used a combination of Adaboost, Genetic Programming, Maximum Likelihood Method, and Expectation Maximisation Method to calculate speed data. FFS is first determined using clustering, and then average travel speed is computed throughout peak and off-peak hours. Homogeneity-Separation Index, Mirkin Index, Rand Index, Adjusted Rand Index, and Huburt Index were the five metrics employed. Heterogeneous traffic, variable geometry, and environmental factors are the main causes of the lower value of FFs. According to HCM (2000), the FFS ranges for urban street classes I, II, III, and IV are (90-70), (70-55), (55-50), and (55-40). Respectively. The data speed ranges were (67-90), (57-67), (45-57), and (25-45) km/hr, which are significantly slower than the speeds given in HCM (2000).

B. Raghuram kadali studies, they Analyses of pedestrian-related issues have been gaining much attention from researchers in recent years, particularly studies of pedestrian safety and pedestrian level of service (LOS) in developing countries. The focus for evaluating pedestrian LOS has shifted from quantitative methods to qualitative methods, and the factors to be considered have changed. Crosswalks (namely, signalised, unsignalized, and midblock) are complex locations because of the interaction of pedestrians with the vehicle flow. Pedestrian LOS at crosswalks is quite different from that on sidewalks. A measure of effectiveness (MOE) is usually adopted for the evaluation of pedestrian facilities, and the MOE changes with the type of facility. Pedestrian delay and space at the corner are considered MOEs for signalised intersections. The MOE might depend on pedestrian safety, delay, available vehicle gaps (crossing difficulty), and the behaviour of pedestrians as well as that of vehicle drivers at unprotected midblock crosswalks. This study sought to identify the importance of pedestrian LOS in the context of developing countries, particularly at unprotected midblock crosswalks. To achieve this objective, a review of the literature was carried out on the pedestrian LOS at various facilities, such as the sidewalk, intersection, and midblock crosswalk. The review highlighted the need for further pedestrian LOS studies at various facilities with mixed traffic.[9]

K. Balaji studied the variation in speed and lateral placement of different categories of vehicles at different sections. They collect about 3000 data on lateral placement and different categories of vehicles at various sections of a two-lane road. For the collection of data, they divided the lane width into 25 cm each, and the left rear wheel of the vehicle was recorded with the time taken from stop to trap length of vehicle 30 m. With recorded data, they develop equations between the speed and lateral placement of various vehicles. This examination shows that heavy vehicles, 3-wheelers, and slow-moving vehicles follow a second-degree polynomial relation. Vehicle speed increases with vehicle shift centre as a whole polynomial relation is followed by vehicle.[10]

Darshana Othyoth studies The major goal of this study is to utilise volume capacity ratio to analyse how signalised junctions operate. To better comprehend the connection between volume capacity ratio and delay, there are several research and guides on highway capacity available. With this, they look at the link between signalised intersection delay and volume capacity ratio. This has been done using the delay model that was suggested in the Highway Capacity Manual (HCM). They discover via their analysis that there is no direct relationship between volume capacity ratio and delay values, and that delay distribution overlaps at various saturation levels. The volume-to-capacity ratio criteria for the LOS at signalised crossings under diverse traffic circumstances are suggested based on the study's findings.[11]

Abishai polus, In this investigation, they analysed the properties and characteristics of pedestrian flow on sidewalks. For analysis, they collected the data from the central business district of Haifa, Israel, with the use of a videotape recorder and digital clock. Walking speeds for men were found to be significantly greater than those for women. All speeds were found to be inversely related to densities. One and two regime linear speed-density regression models were calibrated and evaluated, and reasoning is given to support the adoption of the three regime model for speed predictions. Based on these analyses, they identify the level of service and suggest improvements to planning and pedestrian walkways.[12]

Jack Klodzinsik and Haitham M. Al-Deek(2000), studied about new technique of defining the level of service of at toll plaza. Effectiveness of level of service at toll plaza can be measured by most reliable scale delay. Effectiveness of Level of service can be evaluated by various parameter like volume/capacity ratio, delay and density. On the basis of data analysis and field investigation, delay is found out the more reliable parameter of effectiveness for measuring the level of service at toll plaza. Better result was obtained by the delay of 85th percentile of the cumulative vehicular delay. By traffic investigation for two major toll plaza Orlando, Florida collected data of different stages electronic toll collection usage. Trough authentic data collected from field 37,175 individual vehicular record are used. Determination of service time was evaluated by the level the driver start feeling uncomfortable and not convenient at toll plaza.[13]

Bhargab Maitra, P. K. Sikdar, and others primarily sought to build the congestion model. To determine the impact of a lane in regard to traffic volume and congestion. Congestion has an impact on the level of service on any given road. With the use of the data on the level of congestion, the relationship between random factors and traffic flow is studied. Additional analysis was done on the total congestion caused by various vehicle types and how it may be reduced. Out of the 10 LOS that had been proposed, 9 were in the stable zone (A-E) and 1, in the unstable zone (F). [14]

James Oliver Ensley, used the Tennessee Roadway Information System (TRIMS), a database for input data given by the Tennessee Department of Transportation, to analyse roadway efficiency and prioritise roadway projects in the state. On two-lane roadways, a comparative analysis revealed that Class III had the best LOS. Another study compared 256 segments to the findings of the EVE (Evaluation of Roadway Efficiency) database, and 42 of the segments had LOS values of D, E, or F. Further analysis of these will be done to address any problems that can cause poor LOS. When updated with HCM, it enhances decision-making skills. [15]

III. COCLUSION

According to a study, LOS is an excellent measure for determining the performance level of a road. Additionally, the current facility can be improved by using the Level of Service category. We must conduct several traffic studies, such as free flow speed, volume capacity ratio, and average travel speed, which have an impact on LOS of the road, based on the review paper to determine the category of road. Minimum LOS of "C" is needed for urban roads. The worst LOS occurs off-peak. The level of service is determined by a number of road features and the makeup of the traffic on that specific stretch.

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