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CAPACITY AND LEVEL OF SERVICE DETERMINATION OF 4-LANE DIVIDED URBAN ROAD OF MODASA CITY

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Abstract: In Modasa, newly born City of north Gujarat, faces severe traffic congestion due to rapid and uncontrolled development by an unacceptable level of disparity in transportation demand and supply scenario resulting in environmental degradation as well. Capacity and Level of Service analysis is essential for planning, design and operation of road. The factors affecting capacity and LoS of road are physical road way, traffic, environment and control conditions. Here in this study Capacity and Level of Service are determined by new concept of Stream Equivalency Factor using newly published Indo-HCM. Here in this study only one direction of 4-Lane divided road is considered and Curb side Bus stop as a Road side friction is considered. Classified Traffic volume count is done using video recording technique. The capacity and LoS is derived from newly published Indo-HCM guidelines.

Keywords: Traffic Congestion, Capacity, Level of Service, Stream Equivalency Factor, Road Side Friction.

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INTRODUCTION

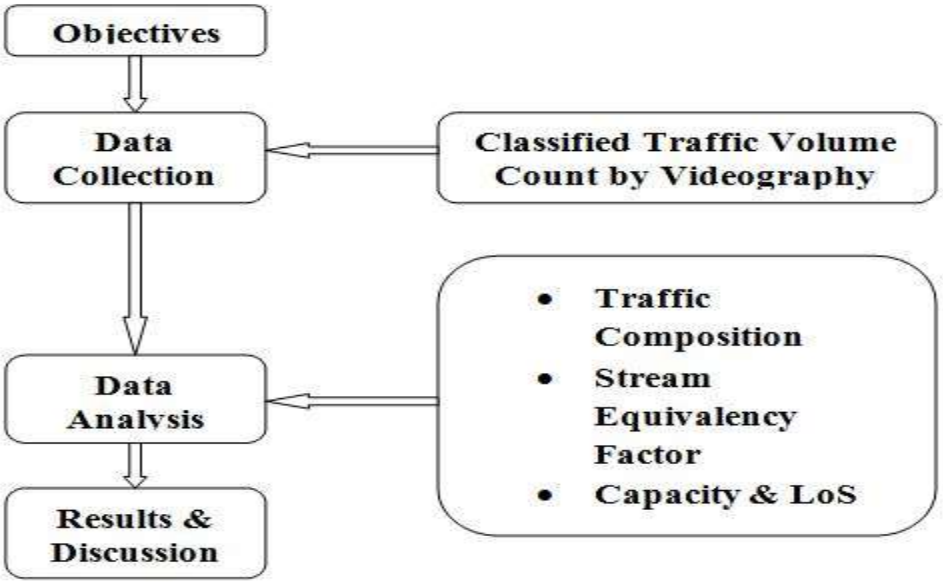
Modasa is situated in the northeast portion of the Gujarat State (INDIA) with latitude of 23.47N and longitude of 73.30E. Population in Modasa city is 94 thousands (2011). Density of population is 5300 per square Kilometres. Traffic and transportation problems in Modasa City have not been commensurate with the increasing demands for its usage. The city expanded dynamically without any planning and control due to the rapid socioeconomic changes. Modasa City is the nucleus of the greater Modasa regions and all of the divisional head office of corporate offices, the higher educational facilities (Two Pharmacy college, Two public engineering college, three private College, thirty industrial Courses, private hospitals and clinics, government colleges and schools), so many business and shopping complexes are located in or around the Modasa city. Thus, the city plays a big role in controlling the economic development of not only Modasa region but also the entire Gujarat.

The analysis of a non-uniform stream of vehicles is simplified if the relative effect of each vehicle type can be expressed in terms of some common unit. A new concept of Stream Equivalency Factor (*Se*) is introduced in Indo-HCM to take care of dynamic nature of PCU. Stream Equivalency Factor (*Se*) is defined as the ratio of flow in PCUs per hour to the flow in vehicles per hour. The factor Se is an overall equivalency factor for the entire traffic stream. It is correlated with traffic volume and its composition on the road.

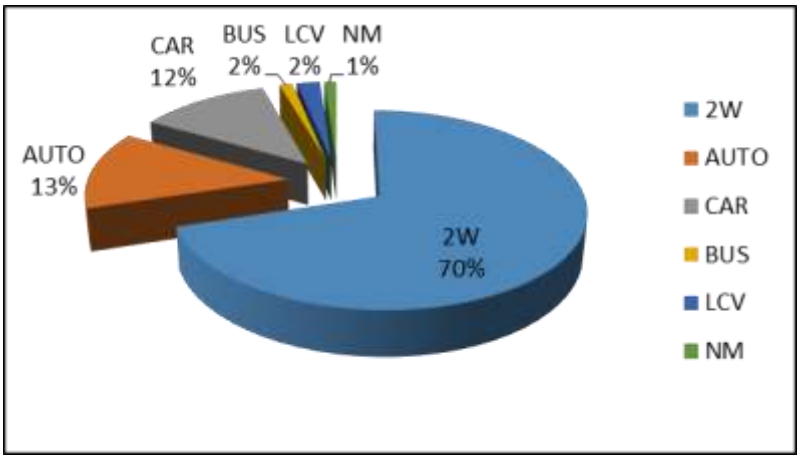
OBJECTIVES

To determine Capacity and Level of Service using Stream Equivalency Concept including quantification of curb side bus stop as a Road side friction and compare it with a base capacity which is recommended by Indo-HCM 2018.

METHODS



RESULT AND DISCUSSION



Composition of Vehicles (%)

According to Indo-HCM Stream Equivalency Factor (S_e):

$$S_e = 1 - 0.77P_{TW} - 0.28P_{AUTO} + 0.53P_{LCV} + 2.60P_{BUS} + 1.83P_{HV} - 0.66P_{NMT} + 12.71(1/N)$$

Where;

P_{TW} = Percentage composition of Motorized Two-wheelers.
P_{AUTO} = Percentage composition of Motorized Three-wheelers.
P_{LCV} = Percentage composition of Light commercial vehicles.
P_{BUS} = Percentage composition of Buses.
P_{HV}= Percentage composition of Heavy vehicles.
P_{NMT}= Percentage composition of Non-Motorized vehicles.
N = Total volume in vehicles per hour = 2763 vph

For Selected Urban Road;

S_e= 0.49

Volume by Stream Equivalency Factor is;

2763*0.49 = 1354 PCU/Hr

Curb side bus stop is considered as a Road side friction and 24 buses/hr are observed. After applying adjustment factor from Indo-HCM for Curb side bus stop as a road side friction;
Capacity of Section is; (Base Capacity * Adjustment factor for Side friction)

2700*0.80 = 2160 PCUs/hr

Level of Service;

V/C Ratio = 1354/2160 = 0.62

Level of Service of the Road section according to Indo-HCM is **LoS-C.**

From this study Volume of 4-lane divided urban road by Stream Equivalency factor is 1354 PCUs/Hr and after application of adjustment factor of road side friction from Indo-HCM capacity of this road is 2160 PCUs/Hr observed. While Indo-HCM recommended that Capacity of 4-lane divide urban road is 2700 PCUs/Hr per direction. Level of Service of selected 4-lane urban road is LoS-C.

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