

Side Friction Problems in State Highways-A Case Study

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ABSTRACT: Good road links between the cities plays the great role in terms of connectivity, transportation and time saving. All works, like materials requirement in time depends upon the transportation of the material and road condition. Every work is time bounded and to fulfill the task in time must have the proper linking roads to connect two cities. In handling and transporting the materials these days one of the factor is coming across and affects the work greatly in road links is side friction. The friction between vehicles and roads is not only the side friction but all the factor which are directly affecting the speed of the vehicles are movement of peoples and animals in the roads, parked vehicles, encroachment in road side, shops etc. In the major district roads this problem is increasing day by day and one of the biggest factor of road accident that means this problem is directly affecting the safety measures in the roads. In this research work it is shown that how this problem leading the manpower to run behind the time. To determine the side friction and its intensity an investigation has carried out and based on results side friction intensity is defined.

KEYWORDS: Side Friction, Suburban roads.

I. INTRODUCTION

Generally in high density or highly populated areas most of the times in a day roads are full with heavy traffic and as passing through areas it is becomes more difficult to maintain the speed of the vehicles. But today in cities condition is more worse first thing traffic is there other thing problem because of side friction related to human activities within the road. Peoples are well aware about the traffic rules and regulations but numbers of activities running on the same roads which lead the condition into side friction, these are may be repair and maintains of road, non-motorized vehicles, small stalls etc. Attention is required to take care of problems related to side frictions, because any factor which is directly affecting the free flow speed of vehicles can be termed as side friction and necessary to be solved. In this research investigation Indonesian highway capacity manual (IHCM) was used to evaluate the impact of the side friction in the state highway. With the help of this methodology it becomes easier to define that the condition in particular zone is heavy side friction zone or medium or low friction zone. The main focus of this research is to identify and assess the impact of side friction on speed and capacity of urban road links, also to analyze results of side friction impacts and speed flow rate. **Chand and Chandra (2015)** Stated that the traffic characteristics of a roadway are influenced by various factors like surface type, shoulder and roadway width, terrain, driver skills, side friction or side activities, road maintenance, etc. However for urban roads, the impact of side frictions i.e. bus stops, encroachments, on-street parking, etc. is much significant than any other factor. **Tuffour et. al (2014)** Studied that the roadside vehicular activities at bus stops, taxi ranks, and similar such facilities located in the vicinity of non-CBD signalized intersections within the Kumasi Metropolis in Ghana create side friction which has adverse impact on saturation flows at the intersections. **Bang (1995)** Free-flow speed on road links, which are generally much lower than on similar western roads. Impact on the speed-flow relationship of road links by roadside activities (side friction), which can results in considerable reductions of speed as well as capacity.

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II. MATERIALS AND METHODOLOGY

The inventory exercise was conducted in February. Identified site is located in Allahabad city (India), Allahabad-Rewa road NH-27, highway chouraha near mahewa area, Naini. Allahabad-Rewa road, site- suburban, 8 km away from main city, 2lane-2way.

Site	Road Location	Geometric Condition				Environmental Condition				Traffic regulation / control condition	
		Cross section		Alignment/ Terrain	Sight Distance	Off road facilities	Weather conditions	Urban / Suburban	Pavement conditions	Speed Limits	Nearby major intersection
		Road type	Carriage way width								
Allahabad-Rewa Road	Naini-mahewa	2/2 Divided road way	7.36m/ two way	Flat and Straight	Infinity	Commercial	Day/Dry Pavement	Suburban	Paved and Smooth	100km/hr.	>2km

Table- 1: Identification of site conditions

The methodology is adopted using Indonesian highway capacity manual which is preferable for Asian roads condition. To identify the impact of the side friction condition in the selected site as per the requirement of IHCM these factors are selected for the study along the roadway and roadside, Pedestrian activity, Non-motorized vehicles, Parking and stopping vehicles and intervene of the vehicles. Generally the Indian roads are designed for the base speed of 100km/hr. As per IHCM for two lane undivided flat terrain the base capacity is 3100 (pcu/hr), this total in both direction also Capacity of the road and a weighted total of side friction can be determined by given equation below-

- i. A weighted total of side friction events (FRIC)

$$FRIC = PED \times 0.6 + PSV \times 0.8 + EEV \times 1.0 + SMV \times 0.4$$
 Where
 FRIC = Weighted Side Friction
 PED = Pedestrian Flow (Walking ped/hr + crossing ped, hr,)
 PSV = Vehicles stops and parking maneuvers (events/hr,)
 EEV = Vehicle entering and existing roadside premises (Veh/hr,)
 SMV = Slow-moving vehicles (veh/hr)

III. RESULTS AND DISCUSSION

Overall, data were collected from Naini, Allahabad urban/suburban road segments in February 2016. For this site the data collection was based on manual observation (friction) over a long base, as shown in Table 2. Friction data was manually collected over a long base extending about 150m each side of the spot-speed measurement station. The side friction survey results were manually transcribed into computer files directly from the field data sheets.

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S. No.	Date	PWD Division	NH No.	Location / Meter	Name of count station	Nearest Town	Pedestrian Flow (Walking ped/hr + crossing ped, hr, 150m)	Vehicles stops and parking maneuvers (events/hr, 150m)	Vehicle entering and existing roadside premises (Veh/hr, 150m)	Slow-moving vehicles (veh/hr)
1	01/02/2016	Allahabad	NH27	150m	Naini	Naini	33	45	122	15
2	02/02/2016	Allahabad	NH27	150m	Naini	Naini	54	49	148	17
3	03/02/2016	Allahabad	NH27	150m	Naini	Naini	46	41	154	20
4	04/02/2016	Allahabad	NH27	150m	Naini	Naini	48	57	182	21
5	05/02/2016	Allahabad	NH27	150m	Naini	Naini	33	53	166	27
6	06/02/2016	Allahabad	NH27	150m	Naini	Naini	48	48	168	26
7	07/02/2016	Allahabad	NH27	150m	Naini	Naini	52	45	153	24
8	08/02/2016	Allahabad	NH27	150m	Naini	Naini	39	46	163	18
9	09/02/2016	Allahabad	NH27	150m	Naini	Naini	35	42	154	23
10	10/02/2016	Allahabad	NH27	150m	Naini	Naini	42	43	169	23
11	11/02/2016	Allahabad	NH27	150m	Naini	Naini	39	47	176	14
12	12/02/2016	Allahabad	NH27	150m	Naini	Naini	42	59	181	27
13	13/02/2016	Allahabad	NH27	150m	Naini	Naini	40	50	168	19
14	14/02/2016	Allahabad	NH27	150m	Naini	Naini	44	47	158	23
15	15/02/2016	Allahabad	NH27	150m	Naini	Naini	49	53	164	18

Table-2: The side friction survey data

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According to the collected data the impact on Side friction Weighted Frequency of Events (Both sides of a road) FRIC is given in the table 2.

Sl.No.	Date	Duration (11:00am-12:00noon)	Weighted Frequency of Events (Both sides of a road) FRIC	Side Friction Class
1	01/02/2016	1 hr	171.8	Medium
2	02/02/2016	1 hr	213.6	Medium
3	03/02/2016	1 hr	214	Medium
4	04/02/2016	1 hr	250.4	High
5	05/02/2016	1 hr	228.6	Medium
6	06/02/2016	1 hr	236.8	Medium
7	07/02/2016	1 hr	221.4	Medium
8	08/02/2016	1 hr	219.2	Medium
9	09/02/2016	1 hr	215.2	Medium
10	10/02/2016	1 hr	229.8	Medium
11	11/02/2016	1 hr	229.4	Medium
12	12/02/2016	1 hr	251.4	High
13	13/02/2016	1 hr	227.2	Medium
14	14/02/2016	1 hr	221.6	Medium
15	15/02/2016	1 hr	229	Medium

Table-3: Weighted Frequency of Events (Both sides of a road) FRIC

The IHCM classifies the side friction for interurban roads given in table .3 which is well satisfied the above results given in table 2. Also for this particular study most of the results for side friction comes under the medium side friction zone.

Weighted Frequency of Events (Both sides of a road) FRIC	Typical Conditions	Side Friction Class	
150-249	Village, Local transport and activities	Medium	M
250-350	Village, some market activities	High	H

Table-4 Classification of side friction for interurban roads (IHCM)

IV. CONCLUSION

Based on above results it can be concluded that the side friction for the developing countries may become the severe problem because it is directly affecting the speed of the vehicles. Particular road links are designed for the particular speed and flow density and it is expected to reach that points but due activities which are running roadsides are the

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major problem to achieve the speed and capacity. It is therefore required to maintain the impact of the side friction in the suburban roads because it direct affects the speed, time and flow density.

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