

# Determination of Level of Service of Jan Marg in Chandigarh

Robin Babit<sup>1</sup>, Viranta Sharma<sup>2</sup>, Ajay K. Duggal<sup>3</sup>

<sup>1,2</sup> M.E. Scholar, Dept. of Civil Engineering, National Institute of Technical Teachers Training and Research, Chandigarh, India

<sup>3</sup> Associate Prof., Dept. of Civil Engineering, National Institute of Technical Teachers Training and Research, Chandigarh, India

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**Abstract** - As India being a developing country, the traffic in Indian cities is increasing day by day. Indian urban areas includes cities and developed towns which are not blessed enough in terms of inter and intra transportation facilities. Level of service is the measure which represents the level of facility one can derive from the road. This paper will show about the peak hour volume, peak hour factor and level of service of Jan Marg in Chandigarh.

**Key Words:** Level of Service, Jan Marg, Traffic count, Peak Hour Volume, Peak Hour Factor.

## 1. INTRODUCTION

The development of Indian cities and expansion of them are increasing the urban population. In the 21st century individuals living in Indian urban cities are nearly 285 million which is equal to 28% of the total population. Indian urban areas constitute of big cities, developed cities and towns, all of them are not blessed enough in terms of inter and intra transportation connectivity. In India, transport system has always suffered ignorance and neglect. Some statistics from Ministry of Road Transport & Highways (MoRTH) shows that the growth rate of motor vehicle population in India had grown at a tremendous rate of nearly 10.5 percent annually during the period 2002 to 2012. More interestingly, the growth of four wheelers including taxis, cars and jeeps has the highest growth rate of about 11% which clearly indicates that traffic in Indian cities is increasing and will lead to destroy the level of facility one can derive from the urban roads. Some more interesting facts, the growth rate of vehicles in some cities is more than the growth rate of their population. There were about one and half million new cars sold in India in 2007, an amount which exceeds the number sold in 2003 by more than twice and in 2015 this amount crosses the mark of 2 million for the first time, something frightening Indian transport system.

Jan Marg is the major arterial road of Chandigarh, India which sees change in traffic from last couple of years. Jan Marg is classified as V2 road classified the Chandigarh administration. Jan Marg also connects roads with major traffic generators like Madhya Marg and NH21.

## 1.1 Level of Service

The term "Level of Service" (L.O.S.) is first introduced by the Highway Capacity Manual (HCM) in 1985 which represents the level of facility an user can derive from a road under various operating characteristics and traffic volumes. A road carrying traffic volume equal to its capacity, or say ratio of volume to capacity is near to one, under ideal traffic and roadway conditions, the operating conditions will be on the poorer side. As the volume to capacity ratio is near to one frequency of delays and stops will increase. Level of service is different for different traffic volumes.

HCM describes six L.O.S. based on different operating conditions. Six level of service described in HCM are from L.O.S. 'A' to L.O.S. 'F', road with L.O.S 'A' signifies the best operating conditions among all level of services and road having L.O.S. 'F' is the worst of all defined L.O.S.

## 1.2 Level of Service in Urban Areas

Level of service determination in urban roads is different from the rural roads. Level of service in rural roads is done on the basis of flow, density, speed, gap and headways. But level of service of urban roads is mainly depends on the peak hour volume and peak hour factor. The term peak hour factor is defined as the ratio of the peak hour volume to the rate flow which is maximum during a given time period within the peak hour (say 5 minutes, 10 minutes or 15 minutes).

## 2. TRAFFIC COUNT

Traffic count study is done through the Jan Marg i.e. from Matka Chowk to Sec 42/43 roundabout and vice versa which is 5.5 kilometers. This study was conducted for a time span of one week i.e. from 23<sup>rd</sup> May, 2016 to 29<sup>th</sup> May, 2016. The traffic count was done for 24 hours on 23<sup>rd</sup> May, 2016 and from there we found the peak hours means hours which contains maximum traffic. For the purpose of study we had two teams consisting of two people each, both teams are stationed on each side of the segment considered. Calculation of traffic volume is done manually. Traffic volume contains mainly buses, cars, two-wheelers, three-wheelers and cycle and cycle rickshaws.

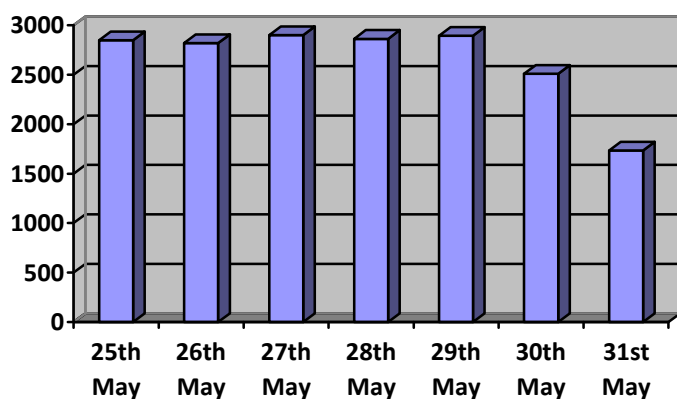
### 2.1 Peak Hour Volume

Peak hour volume is the volume of vehicles that is counted during peak hours. After the study was conducted on 23<sup>rd</sup> May, 2016, for the full 24 hours, it was observed that peak hours in both lanes are different. Peak hour for the lane moving towards Matka Chowk from sector 42/43 roundabout is in the morning and observed to be from 9am to 10am. While in the opposite lane i.e. moving towards sector 42/43 roundabout from Matka Chowk, peak hours were observed in the evening i.e. from 5pm to 7pm. Table 1 below shows the peak hour traffic of lane moving towards Matka Chowk from 9am to 10am for one week i.e. from 23<sup>rd</sup> May, 2016 to 29<sup>th</sup> May, 2016.

**Table -1:** Peak Hour Volume Moving towards Matka Chowk

Date	Peak Hour Volume
25th May	2849
26th May	2820
27th May	2900
28th May	2864
29th May	2895
30th May	2510
31st May	1734

Corresponding to the above table chart 1 shows the peak hour volume variations for the whole week.



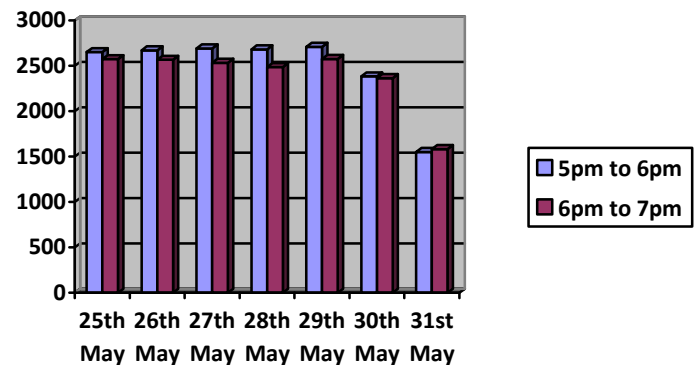
**Chart -1:** Peak Hour Volume Of Lane Moving Towards Matka Chowk.

Similarly, peak hour volume in lane moving towards sector 42/43 roundabout was studied. Peak hours of this lane are from 5pm to 7pm. Table 2 below shows the peak hour volume counted on this lane.

**Table -2:** Peak Hour Volume Moving towards Sector 42/43 Roundabout

Date	Time	Peak Hour Volume
25th May	5pm to 6pm	2651
	6pm to 7pm	2573
26th May	5pm to 6pm	2671
	6pm to 7pm	2567
27th May	5pm to 6pm	2691
	6pm to 7pm	2534
28th May	5pm to 6pm	2681
	6pm to 7pm	2486
29th May	5pm to 6pm	2710
	6pm to 7pm	2575
30th May	5pm to 6pm	2384
	6pm to 7pm	2364
31st May	5pm to 6pm	1551
	6pm to 7pm	1583

Based on above table, chart 2 shows the variations in peak hour volume of lane moving towards sector 42/43 roundabout.



**Chart -2:** Peak Hour Volume of Lane Moving towards Sector 42/43 Roundabout.

### 2.2 Peak Hour Factor

Peak hour factor is the ratio of hourly traffic to the maximum traffic in 15 minutes converted in terms of hourly traffic. Maximum traffic in 15 minutes observed is:

- (i) 733 vehicles per 15 minutes in lane moving towards Matka chowk which means 2932 vehicles per hour.

(ii) 725 vehicles per 15 minutes in lane moving towards sector 42/43 roundabout which is equal to 2900 vehicles per hour.

Highway Capacity Manual describes the level of service on the basis of peak hour factor. Table 3 shows the level of service with different peak hour factors.

**Table -3:** Peak Hour Factor for Different L.O.S.

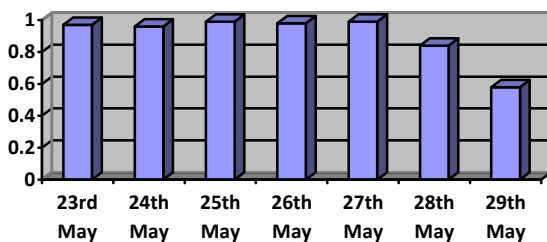
Level of Service	Peak Hour Factor
A	0.70 or less
B	0.80 or less
C	0.85 or less
D	0.90 or less
E	Less than 1 and greater than 0.90
F	Greater than 1

Peak hour factor determination for the lane moving towards Matka chowk is shown in table 4.

**Table -4:** Peak Hour Factor of Lane Moving towards Matka Chowk

Date	Time	Traffic Volume	Peak Hour Factor (traffic volume/ 2932)
25th May	09 am to 10 am	2849	0.97
26th May	09 am to 10 am	2820	0.96
27th May	09 am to 10 am	2900	0.99
28th May	09 am to 10 am	2864	0.98
29th May	09 am to 10 am	2895	0.99
30th May	09 am to 10 am	2510	0.84
31st May	09am to 10 am	1734	0.58

A chart 3 is shown below based on above table.



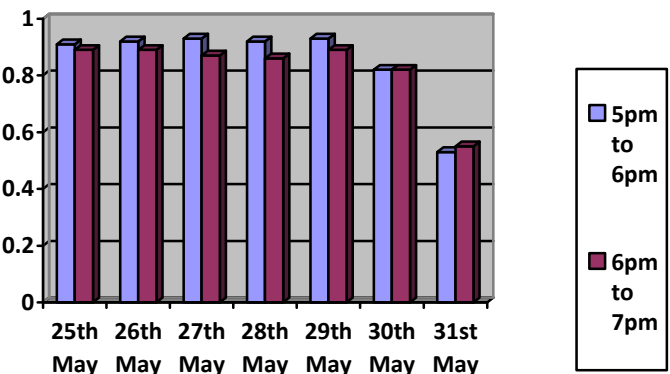
**Chart -3:** Peak Hour Factors of Lane Moving towards Matka Chowk

Similarly, peak hour factor determined for the lane moving towards sector 42/43 roundabout from Matka Chowk are shown in table 5.

**Table -5:** Peak Hour Factor of Lane Moving towards Sector 42/43 Roundabout

Date	Time	Traffic Volume	Peak Hour Factor (traffic volume/ 2900)
25th May	05 pm to 06 pm	2651	0.91
	06 pm to 07 pm	2573	0.89
26th May	05 pm to 06 pm	2671	0.92
	06 pm to 07 pm	2567	0.89
27th May	05 pm to 06 pm	2691	0.93
	06 pm to 07 pm	2534	0.87
28th May	05 pm to 06 pm	2681	0.92
	06 pm to 07 pm	2486	0.86
29th May	05 pm to 06 pm	2710	0.93
	06 pm to 07 pm	2575	0.89
30th May	05 pm to 06 pm	2384	0.82
	06 pm to 07 pm	2364	0.82
31st May	05 pm to 06 pm	1551	0.53
	06 pm to 07 pm	1583	0.55

Corresponding to above table a chart is shown below:



**Chart -4:** Peak Hour Factors of Lane Moving towards Sector 42/43 Roundabout

From above tables 3 and 4 it is observed that level of service of lane moving towards Matka Chowk is mainly "L.O.S. E" on

weekdays while for Saturday it is "L.O.S. C" and for Sunday it is "L.O.S.A".

From tables III and V level of service of the lane moving towards sector 42/43 roundabout have different L.O.S. for peak hours. For weekdays Level of service of the lane for time 5pm to 6pm is "L.O.S. E" and for time 6pm to 7pm is "L.O.S. D". While for weekend it is well below the desired L.O.S.

Graphical representation of peak hour factors are shown in Chart 3 and 4 also shows the same results.

### 3. ANALYSIS OF L.O.S.

After the data was collected and calculations were done, L.O.S. of the Jan Marg is identified. L.O.S. analysis of the Jan Marg based on peak hour factor is as follows:

- (i) From table 3 and 4 it is seen that peak hour factor in the lane moving towards Matka Chowk in weekdays is always greater than 0.95 and from table it is clear that level of service of the Jan Marg is "L.O.S. E". While in weekends it is below 0.85 that means level of service greater than "L.O.S. C".
- (ii) Table 3 and 5 shows peak hour factor in the lane moving towards sector 42/43 roundabout in week days is greater than 0.90 which defines level of service as "L.O.S. E" for the time 5pm to 6pm and peak hour factor is in between 0.85 to 0.90 for weekdays it shows level of service as "L.O.S. D". While for Weekends the Peak hour factor is below 0.85 means Jan Marg having level of service greater than "L.O.S. C".

### 4. OBSERVATION

After the data collection and calculations are done the following points are observed from the above tables and graphs:

- (i) Level of service in the lane moving towards Matka chowk is on the worst side. Level of service of this lane touches "L.O.S. E" to the extreme point. Peak hours of this lane observed in the morning from 9am to 10am. During peak hours vehicles were in long queue at signals. Some vehicles leave the queue after two full signal cycle lengths.
- (ii) Dissimilar to the lane moving towards Matka Chowk, the lane moving towards Sector 42/43 roundabout does show better level of service than the opposite lane. It shows "L.O.S. D" and "L.O.S. E" for 6pm to 7pm and 5pm to 6pm respectively. It shows Jan Marg lane moving towards sector 42/43 roundabout has mixture of "L.O.S. D" and "L.O.S. E".

### 5. CONCLUSIONS

As the traffic count was done the variation in traffic during peak hours and non peak hours is seen. During peak hours roads sees long queue at signals. The determination of level of service is done on the basis of Highway Capacity Manual. Jan Marg shows "L.O.S. E" for the lane moving towards Matka Chowk and a mixture of "L.O.S. D" and "L.O.S. E" for the lane moving towards sector 42/43 roundabout. Jan Marg in both ways doesn't fulfill the required level of service defined for the urban roads. Level of service for urban roads is "L.O.S. C" is the minimum requirement and Jan Marg is nowhere near the landmark.

There is urgent need of making level of service near to the required level of service as poorer L.O.S will lead to increase in delay time. Widening of lanes is not a case which can be done due to unavailable of land as on the both side of roads there is already too much construction has been done. So it's the public transport, only buses, as Metro is not possible in small city like Chandigarh, that needs to be good enough to make people travel through it. Or individuals need to be extra smart by doing carpool to avoid excess traffic in the lanes. If people is not smart enough than government has to do something by increasing parking fares so that it becomes uneconomical to travel through by own car.

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