



## **A Case Study on Analysis of Travel Time and Speed-Flow Relationship of Heterogeneous Traffic Condition**

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### **Abstract**

In this research, Deshapande nagar in Hubballi was selected to carry out various traffic surveys in order to understand the traffic problems in Hubballi. Since Deshapande nagar is connected to most of the areas in the city, the traffic problems are more and it is very much difficult to travel in the city during the peak hours. Few of the problems found in Deshapande nagar are congestion, travel time and delay. Due to the rapid growth in traffic volume it has become problem for delay in travel time, traffic congestion and these problems are analyzed by different traffic surveys those are, Traffic Volume Count Survey, Spot Speed Survey and Travel Time Survey. As per the classified volume survey it was found that on Friday morning peak hour was found to be between 10 to 11 am, similarly for Saturday and Sunday it was between 10 to 11 am and 4 to 5 pm respectively. As per spot speed studies conducted it was found that the average speed on selected stretch was found to be between 6 KMPH to 10 KMPH. From moving car observer method it was found that, the highest delay and journey time was found to be 7.51 minutes and 13.05 minutes respectively and average running time was found to be 18.63 minutes for north bound traffic (from Sports Club to Chennamma Circle) on working day.

**Keywords:** Congestion, Delay, Travel time, Classified volume count, Spot speed and Moving car observer method.

### **1 Introduction**

For the growing cities transportation system development is the basic needs for its growth and economy with the same goes with the automobile too because growing city also has a growth of automobile. The basic studies in traffic research are that pertaining to the relationship between speed and volume of traffic. In race of the rapid growth, it increased the industrialization of some region, to full fill the requirement of demand, it requires the rapid transportation. Motorized transport availability due to increase in the household income and increase in commercial and industrial activities that would have further added to transport demand. Flow, speed, and density are the critical parameters used to describe characteristics of traffic flow. Hubballi is the second largest city in the state of Karnataka. It forms a continuous urban area with the city of Dharwad. It is the nerve center for North Karnataka region & the fastest growing city after capital Bangalore in the state of Karnataka. In order to know the traffic problem in Hubballi we have selected Deshapande nagar as our site for project. Deshapande nagar is connected to the city most of the areas so the traffic problems are more and it is very much difficult to travel in the city during the peak hours. In view of this the case study was under taken to understand the various traffic problems in the study area.

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1.1 Traffic Volume Count Survey: Traffic volume studies are conducted to determine the number, movements, and classifications of roadway vehicles at a given location. Methods to analyse traffic volume: Manual method, Combination of manual and mechanical methods, Automatic devices, Moving car observer method, Photographic methods.

1.2 Spot Speed Survey: The Vehicle Spot Speed Study is designed to measure the speed characteristics at a specified location under the traffic and environmental conditions prevailing at the time of the study. Methods to analyse speed: Direct-timing procedure for spot speed determination (stop-watch method), Enscope, Pressure contact tube, Short base method for determining spot speed, Radar speed meters, Photographic and video camera method.

1.3 Travel Time Survey: Travel time data is useful for a wide range of transportation analyses including congestion management, transportation planning, and traveller information. Methods to analyses congestion: Moving car observer method, Registration number method, Elevated observer method. By using some of methods we have tried to resolve the traffic problem.



Figure 1. Location of area selected

for the case study

**2 Methods**

The classified traffic volume count by manual method, Spot speed survey by direct-timing procedure and Travel time survey by moving car observer method was conducted in the study area as per the IRC code (IRC-SP-2- 2001)

The Field Data sheet of traffic volume survey, spot speed survey and travel time survey for study area on working day is shown In table 1, 2 and 3 respectively

Table-1 Field data sheet for traffic volume survey along Chenamma circle to Hubballi sport club on working day

FIELD DATA SHEET														
Position:	Rotary school opposite					Date of survey:	1\3\19				Name of Enumerator:	Prof.Manjunath.V.C		
Chainage :						Day of survey:	Friday				Day / Night:	Day		
Direction :	Hubballi sports club to Chenamma circle					Weather :	Clear				Sheet number:			
Time	Passenger Vehicles					Commercial Vehicles				Agri Tractor	Others	Non-Motorized		Total Traffic
	Car/Jee p	Two wheeler	Auto Rickshaw	Mini Bus	Standard Bus	LC V	2Axl e	3Axl e	MA V			Anima l Drawn	Cycl e	
7.00 To 8.00	61	190	65	4	5	24	2	0	1	4	7	0	5	368
8.00 To 9.00	142	246	73	15	4	12	8	2	0	4	9	0	40	555
9.00 To	285	731	282	19	18	26	6	8	5	12	11	1	10	1414



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10.00														
10.00 To 11.00	255	1182	258	9	7	35	11	0	10	14	19	0	7	1807
4.00 To 5.00	187	599	232	28	7	20	2	0	0	3	8	0	51	1137
5.00 To 6.00	180	458	227	10	6	22	3	1	0	5	9	0	14	935
6.00 To 7.00	133	403	148	4	3	13	5	0	0	3	3	0	1	716
7.00 To 8.00	194	316	97	5	5	17	3	0	0	6	1	0	6	650

*Table-2 Field data sheet for spot speed survey along Chenamma circle to Hubballi sport club on working day*

SPOT SPEED DATA SHEET											
Location:			Date of survey:	8\3\2019		Name of Enumerator:	Prof.Manjunath V. C				
TEST LENGTH	50		Day of survey:	Friday		Day/Night:					
Direction:			Weather:	Clear		Sheet number:					
TIME INTERVAL	TIME IN SECONDS									Average	Speed(kmph)
	7-8 AM	8-9 AM	9-10 AM	10-11 AM	4-5 AM	5-6 PM	6-7 PM	7-8 PM			
1) Car/Jeep	12.45	15.05	13.2	12.45	16.7	12	15.45	12.2	13.68	13	
2) Two wheeler	10.2	10.45	10.55	11.9	12.2	9.25	12.45	14.4	11.42	16	
3) Auto Rikshaw	14.6	19.6	13.15	13.95	16.55	18.25	16.8	15.85	16.09	11	
4) Mini Bus	30	33.5	0	0	29.5	33.5	34	29.5	31.66	6	
5) Standard Bus	0	0	40.5	40	45	48	42	35	41.75	4	
6) LCV	20.87	26.87	16.35	15.95	28.45	24.85	28.25	26.12	23.46	8	
7) 2 Axle	0	0	23	25.5	42.75	40	39	0	34.05	5	
8) 3 Axle	0	0	0	19	0	0	0	0	19	9	
9) MAV	0	22	0	0	0	11.5	10	0	14.5	12	
10) Agri tractor	0	0	25	24	33.25	0	40.5	0	30.68	6	
11) Others	0	0	0	0	0	0	0	0	0	0	
12) Animal drawn	0	0	0	0	0	0	0	0	0	0	
13) Cycle	0	43	39.4	30	36.75	35.8	0	0	36.99	5	
Average	17.62	24.35	23.91	21.41	29.01	25.9	26.49	22.17	24.84		



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Speed (kmph)	10	7	8	8	6	7	7	8		
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Day:		Friday		Vehicle Number:		KA26M9779		Route:		Chennamma circle to sports club	
Date:		08-03-2019		Driver Name:		Md.Bilal		Recorder:		Kotresh.S.G	
Time of Start:		.....		Closing Time:		.....		Observer:		Yashma.I.Y	
				Opposing traffic (SB)				Same direction traffic (NB)			
Timing point intersection	Type of Control	Journey Time	Stopped Time	Cars	Trucks	Buses	Cycles	Overtaking Vehicles	Vehicles passed by test car	Parked vehicle	
<b>CHENNAMMA CIRCLE</b>	<b>S, P</b>	00:00			11	1	1	20	9	22	
Edga ground											
Shree laxmidas jewellaery											
<b>COURT CIRCLE</b>	<b>S, P</b>	01:38		14	1	1	23	8	13		
Neuro center											
Kotak Mahindar Bnk											
SBI											
<b>KESHWAPUR CIRCLE</b>	<b>S, P</b>	03:00		13	1	1	18	5	13		
Relaince general											
Kubera apartment											
<b>CIRCLE</b>	<b>S</b>	3.59		12		1	20	6	8		
Vivekanand hospital											
Axis bank											
<b>ROAD DIVERSION</b>	<b>CIRCLE</b>	<b>U</b>	04:41		13	1	1	19	2	9	
Eye optical											
<b>ROAD DIVERSION</b>	<b>U</b>	05:00		14	1	1	21	4	8		
Axis bank											
<b>ROAD DIVERSION</b>											
<b>ROAD DIVERSION</b>											
The bottel box											
<b>CIRCLE</b>	<b>U</b>	06:17		11	2	1	16	3	9		
Roatary school											
Dolphin and pet											
<b>ROAD DIVERSION</b>	<b>U</b>	07:00	01:09	16	1	1	23	2	8		
Hubli sports club		9.30									

Table-3 Field data sheet for travel time survey along Chennamma circle to Hubballi sport club on working day

### 3 Analysis and Results

Different types of data were collected for different types of methods. The methods used are traffic volume survey, spot-speed and moving car observer method and data is collected and analyzed to get the desired results. Following are the results obtained.

#### 3.1 Traffic volume count

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The results of traffic volume survey are explained with help of figure number from 2,3 and 4 for working day, Saturday and Sunday respectively.

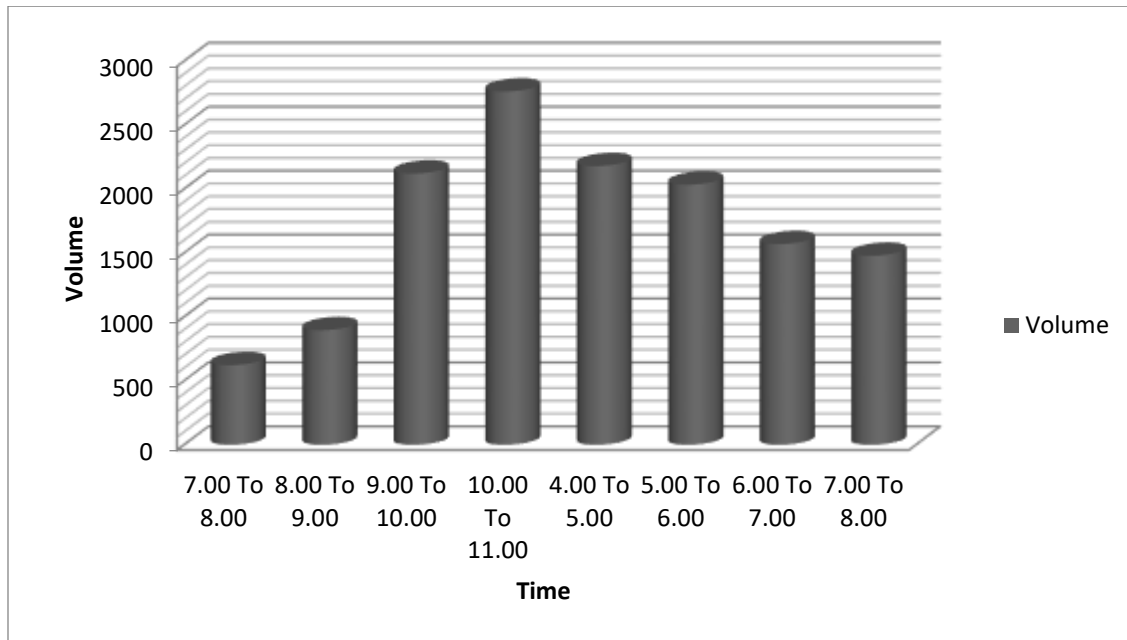


Figure 2. The average traffic volume on working day.

In the above given figure the lowest traffic volume is found at the 7am to 8 am and the highest traffic volume is found at 10 am to 11am on the working day.

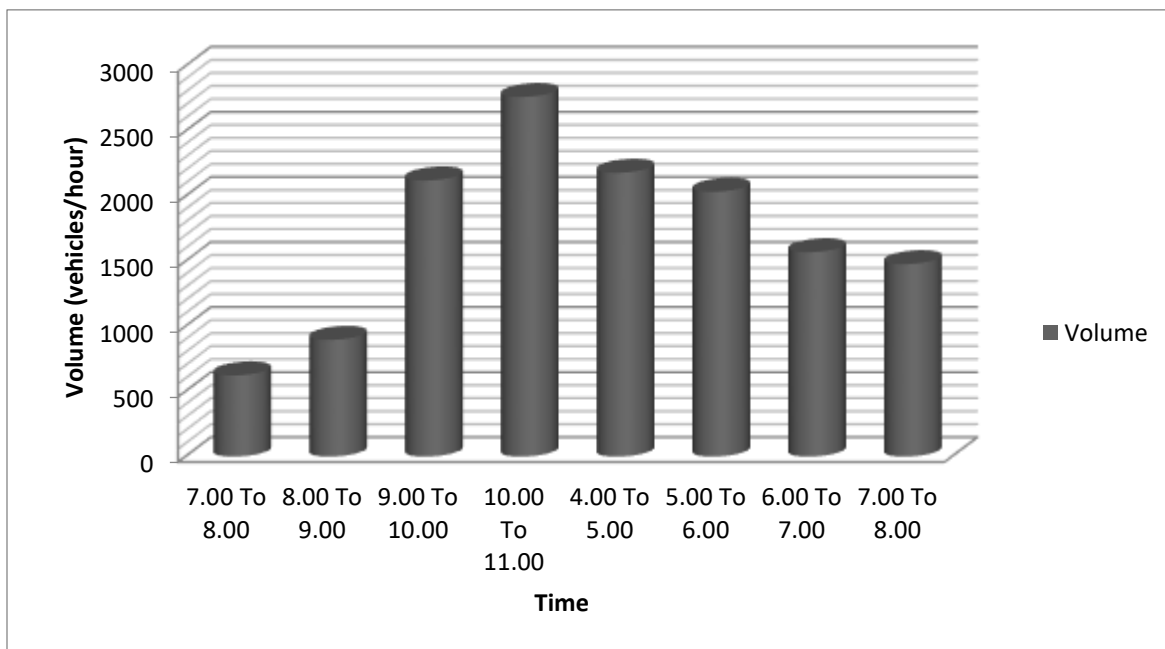


Figure 3. The average traffic volume on Saturday.

In the above given figure the lowest traffic volume is found at the 7am to 8 am and the highest traffic volume is found at 10 am to 11am on the Saturday.

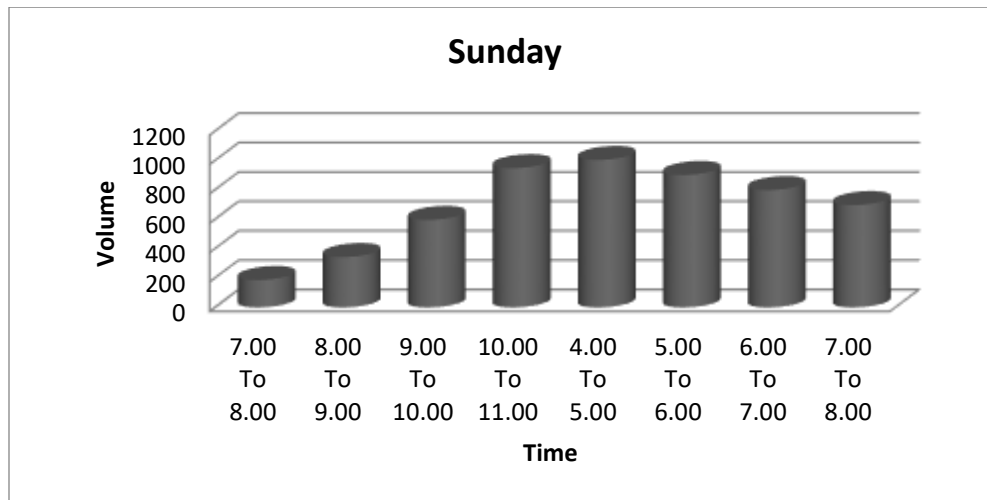


Figure 4. The average traffic volume on Sunday.

In the above given figure the lowest traffic volume is found at the 7am to 8 am and the highest traffic volume is found at 4 pm to 5pm on the Sunday.

### 3.2 Spot speed survey

The results of spot speed survey are explained with help of figure number from 5, 6 and 7 for working day, Saturday and Sunday respectively.

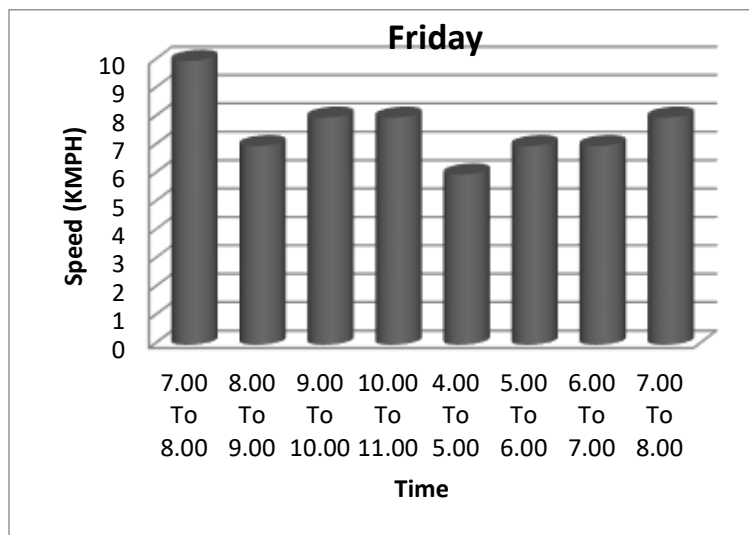


Figure 5. The average spot speed on working day.

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In the above given figure the lowest speed is found at the 4 pm to 5pm and the highest speed is found at 7am to 8am on the working day.

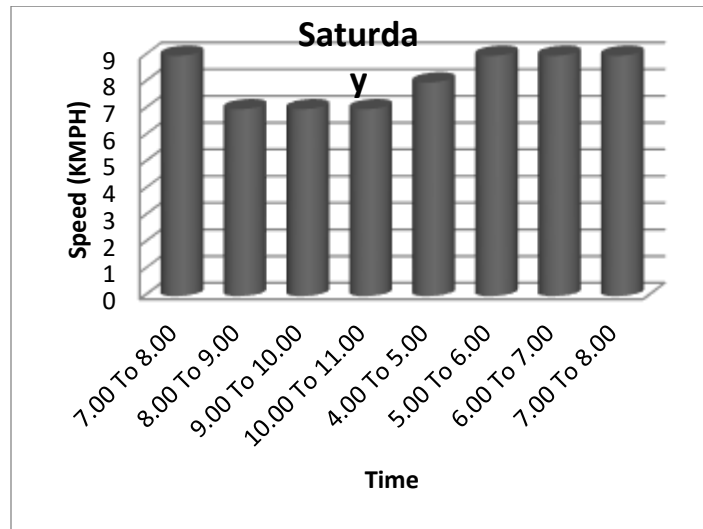


Figure 6. The average spot speed on Saturday.

In the above given figure the lowest speed is found at the 8am to 11pm and the highest speed is found at 7am to 8am and 5pm to 8pm on the working day.

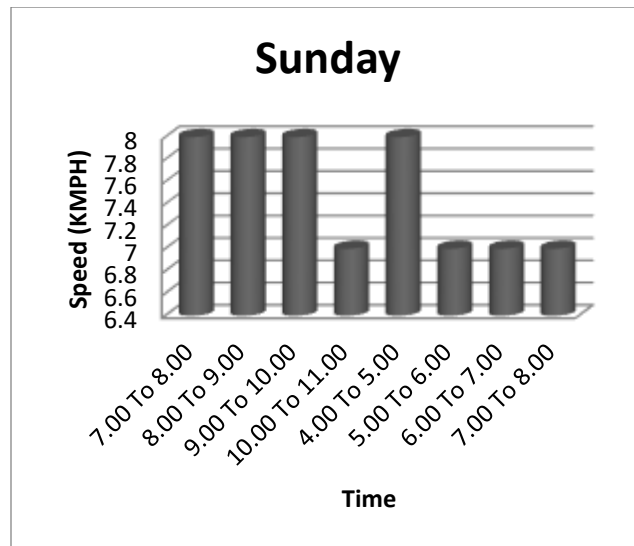


Figure 7. The average spot speed on Sunday.

In the above given figure the lowest speed is found at the 10 pm to 11pm and 5pm to 8pm the highest speed is found at 7am to 10am and 4pm to 5pm on the working day.

### 3.3 Travel time survey

The results of travel time survey are tabulated below for working day.

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							Journey : North bound	
Run number	Journey Time (Minutes)	Stopped Time (Minutes)	Vehicles met with in the opposing direction				Vehicles in the same direction	
			CAR	BUS	TRUCK	TWO WHEELER	Over taking Vehicles	Over taken Vehicales
1	4.4	0.25	20	1	1	29	12	31
2	7.35	1	95	4	7	254	19	114
3	9.25	0.96	90	8	3	151	53	54
4	7.5	1.57	92	9	6	128	53	77
5	12.38	2.01	167	8	2	177	18	121
6	13.23	4.45	154	3	2	210	73	133
Total	54.11	10.24	618	33	21	949	228	530
Average	9.02	1.70	103	6	4	159	38	89

On working day highest delay and journey time was found to be 4.45mins and 13.23 minutes resistively average running time was found to be 7.31mins for north bound traffic.

#### 4 Conclusions

As per the classified volume survey it is concluded that on Friday morning peak hour was found to be between 10 to 11 am, similarly for Saturday and Sunday it was between 10 to 11 am and 4 to 5 pm respectively. As per sport speed studies conducted it is concluded that the average speed on selected stretch was found to be between 6 KMPH to 10 KMPH. The least speed observed on Monday at 4 pm to 5 pm that is 6kmph and highest was found to be 10kmph between 7 to 8 am. From moving car observer method following conclusion where drawn. A) On working day highest delay and journey time was found to be 4.45mins and 13.23mins resistively average running time was found to be 7.31mins for north bound traffic, B) Similarly on same working day for south bound traffic the highest delay time was found to be 7.21min and 13.05 min respectively average running time was found to be 18.63mins, C) On half working day highest delay and journey time was found to be 8.1mins and 12mins resistively average running time was found to be 7.7mins for north bound traffic, D) Similarly on same half working day for south bound traffic the highest delay time was found to be 7.15min and 14.43 min respectively average running time was found to be 8.1mins, E) On holiday highest delay and journey time was found to be 4.58mins and 6mins resistively average running time was found to be 4.23mins for north bound traffic and F) Similarly on same holiday for south bound traffic the highest delay time was found to be 6.20min and 7.05 min respectively average running time was found to be 5.82mins.





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