



# Analysis of Pavement and Traffic Volume on Shoghi to Shimla NH-05 Highway

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**Abstract:** Traffic engineering mostly applies those engineering methods and tactics which help us to attain the safest and less time-consuming movement of people and goods on roadways. The safe and less time taking movement of the people and goods is totally reliant on Traffic flow, which is straightly linked to the traffic traits. Pedestrian and vehicles volume have grown remarkably in the last ten years because of the change of lifestyle of the middle-class families. The work done in the analysis shows traffic behavior in the city of Shimla at one analyzed stretch, which is also the most used stretch by the tourists during the tourist season. In this study importance was given to traffic volume study, finding the accidental spots, black spots and analyzing the pavement conditions of the observed stretch (Shimla-Shoghi) of the Shimla city. The traffic volume study was done with the help of the manual method. For quality study and exact position of the current status of vehicular flow of the stretch, traffic volume study was conducted. The data collected helped in recognizing the traffic flow pattern during different time intervals. Traffic maneuvering at the stretch was also dependent on the traffic volume traits. Hence the observations from the research conducted are helpful in managing the traffic at the crossings and also in giving some of the safety measures to enhance the traffic safety in the region. Safety measures like widening the road, installing traffic mirrors on the blind curves and the construction of pedestrian flyovers can be considered for the improvisation of the road conditions and public safety based on the results obtained.

**Keywords:** Traffic volume, Accidental spots, Pavement analysis, Black spots

## **Introduction**

Traffic volume study is one of the most important mean of getting information about the vehicles or the pavement on which it is being used[1]. All of the transportation planning is done on the basis of the data collected by this mean, Traffic maneuvering and finding out the roads which need upgradation regarding pavement condition and expansion are the primary questions to be dealt with [2]. For example if we want to construct a structure then we need to determine the load getting applied on the structure to calculate the amount of material which will be used to provide strength required giving it the proper type of reinforcement so that the structure stays strong and sturdy [3]. In this transportation stream traffic volume works in the same manner as the load does with the structures. For many of the transportation engineering works the first thing which is required is the traffic volume [1]. The traffic volume count is done by counting the number of vehicles passing from a road in a unit time. PCU is being calculated to attain the level of service of the road and some other preferences to be given to the problems like congestion, loading capacity, volume/capacity ratio, determining the peak hour and extended peak hour etc. [4]. As the particular stretch under study is a busy stretch, especially in the tourist season the method of obtaining traffic volume is the first preference for the congestion free flow of the traffic. There are mainly two methods of doing the traffic volume count. The methods are manual method and automatic method [5]. The most used and simple method to find the traffic volume is manual method that has been used in the study as the automatic method was costly because of ATC (Automatic traffic counter). The manual method involves a group of people or can be done alone but it consumes more time to record the vehicles which are passing through the observed location [5]. This method is also costly in terms of time taken and cost of the instruments used. In this study determination of the accidental spots and black spots were also done. A questionnaire was also prepared which had some pavement and necessary steps to be taken for the development of the stretch related to the research questions, which was filled by the locals. Most importantly during the study one sustainable goal was also met by introducing the idea of bicycle track on the stretch which was further linked to the smart city project, which the city of Shimla is undergoing.

## **Literature Review**

**T. F. Fwa and S. LF (1995)** observed that the study of survey data based on hourly traffic flow show that the movement was impacted by four variables: the functional class of the road, the number of traffic lanes, the total volume of directed traffic, and the amount of truck traffic. The impact of the hourly distribution pattern of traffic volume throughout the day must also be taken into consideration when the late-distribution characteristics are computed based on daily traffic-volume input [3].

**Ashpaq Majeed Naik and Rakesh Gupta (2008)** have suggested the flexible pavement conditions to identify and describe the different pavement failure types for the chosen roadway. The first task is the visual evaluation and inspection of existing flexible pavement conditions,

including the failures; the second is to identify and learn the true causes of these failures in the pavement; and the third is to choose the most efficient treatments and maintenance types. The study had two major and critical goals that were covered by taking into account the following these tasks. [6].

**Bassem Ali, Marwan Sadek and Isam Shahrou (2009)** while considering the slow traffic and minimal wheel wander draw the conclusion that rutting is a significant issue in urban locations. An effective method for repairing rutted urban pavements is to utilize high modulus asphalt, such as EME [7].

**Luis M. Martinez, Jose Manuel Viega and Elisabete A. Silva (2009)** provided a new zone delineation approach that addresses the process trade-offs that are currently present. To strengthen this approach, the following crucial step is required: Verifying the accuracy of the outcomes acquired using a different database in order to calculate how sensitive the outcomes are to various travel habits and land use distributions. It was not possible to evaluate Portugal's mobility surveys over the project's lifetime in order to compare the results with those from other case studies since Portugal lacks geo-coded mobility surveys[8].

**Qionghua DENG and Lin CHENG (2013)** have compared a few estimation techniques for the sub-network trip matrix based on static versus dynamic states. The application criteria for various models and algorithms are presented. All static approaches, including fix and elastic origin-destination estimates, use the maximum entropy concept to get the OD matrix. Zhou was the only person to propose a dynamic sub-network approach that could deliver a current time-dependent matrix for sub-network operations [9].

**Manjunath K.R. and Lohith R.M. (2013)** analyzed the Bangalore's busiest intersections Havanur circle. The Outer Ring Road, Magadi Road, and Mysore Road can all be accessed from this juncture. The actions done to lessen traffic congestion are as follows: to reduce the congestion at specific times of the day, adjust the timing of the HAVANUR junction traffic lights and examine the traffic and pedestrian phases. Signal timings should be changed during off-peak hours [10].

**Marcelle D. Ribeiro, Ana M. Larrañaga and Helena B. Cybis (2014)** discovered that using GPS and the Trip Diary together to capture trip data broken down by mode of transportation produced the results which were satisfactory. Around 62% of the collected trip legs, the data gathered by the device could be connected to the data supplied by the participants. Because of the technological restrictions (19%) and incorrect respondent reporting (18%), certain trip legs are eliminated. As a result, 762 of the 1,225 leg trips gathered from 72 participants were deemed to be legitimate [11]

**Bhavneet Singh and Tripta Goyal (2015)** reached the following conclusions from the university study they conducted. According to the data gathered from the traffic volume research, it was discovered that Wednesday sees the highest number of cars arriving at the

campus, with 6940 from Gate 1 and 7181 from Gate 2, for a total of 14121 vehicles. A total of 13250 cars can be observed departing the campus, with 6808 leaving through Gate 1 and 6442 leaving through Gate 2. On Saturday, the least amount of traffic is seen; upon arrival 2606 cars entered through Gate 1 and 2687 vehicles entered through Gate 2, for a total of 5293 vehicles. While exiting the campus, Gate 1 is used by 2502 automobiles, and Gate 2 is used by 250 vehicles [1].

**Magdi M.E. Zumrawi (2015)** examine the pavement failures and provide a procedure for inspecting and assessing damaged pavement. The findings and recommendations are as follows. The research methodology was built using lessons learned from earlier projects. The emphasis is on creating a set of methodical, straightforward, and understandable rules that are adaptable enough to be used in a range of circumstances. The investigation technique for pavement failures created in this study might be a helpful manual for examining and assessing pavement failures [12].

**Shamil Ahmed and Flamarz Al-Arkawazi (2017)** have identified the following primary reasons of the highway's breakdowns and deteriorations. The pavement layer thickness of the chosen rural roadway was not designed with additional traffic volume or high axle loads, the drainage design or none at all. The pavement layer thickness was improperly calculated and the materials and a pavement mix design were incorrectly selected [13].

**Ballari Syed Omar, Pranab Kar and Mallikarjuna Chunchu (2020)** have observed that either individual PCEs or aggregate PCE can be used to transform the traffic stream into an equivalent base stream. The literature has a number of studies that calculated the individual PCE values of various types of moving automobiles on rural roadways (See Table 1). They utilized simulation models, empirical data, or a mix of the two. A trustworthy simulation model is necessary for researching the impact of various factors on PCE because the majority of studies employed individual PCEs [14].

**Debraj Pal, Saptarshi Sen, Sandip Chakraborty and Sudip Kumar Royd (2020)** hold that the two-lane rural roads might show the impact of PCU estimate methodologies on determining route capacity. These case study portions include the Howrah-Amta Road and the Kolkata-Basanti Highway. In close proximity to the cities of Kolkata and Howrah, both road segments are a part of two-lane, two-way state roads. To estimate the PCU values of the vehicles going throughout the case study sections, three different PCU estimating techniques were used: static PCU values from IRC 64 (1990), dynamic PCU concept by Chandra and Sinha (2001), and approach recommended in Indo-HCM (2017) [4].

**Jessica Marcomini Pinatt, Marcelo Luiz Chicati, Jesner Sereni Ildelfonso and Claudia Regina Gregio Darce Filetti (2020)** have applied both the subjective and objective methods of obtaining the PCI. There were no discernible oscillations from one rating to the next, and the similarity between the evaluations could be confirmed using Pearson's correlation coefficient, which was 0.95. As a result, it was discovered that using subjective ICP might help with street evaluation and maintenance decision-making [15].

**Abhishek Chaudhary and Amit Kumar (2020)** noted that one of Delhi's busiest crossings is in Noida Sector 15. The following actions are performed to lessen gridlock in the streets i.e. to reduce congestion at specific times of the day, adjust the junction traffic signal timings and assess the traffic and pedestrian phases. Signal timings should be changed during off-peak hours and the heavy commercial vehicle movement should be avoided during the day and permitted at night. Channelization of the intersection such as allowing... free left on both sides, increasing carriage width while decreasing footpath width and the development of an underpass should be allowed [16].

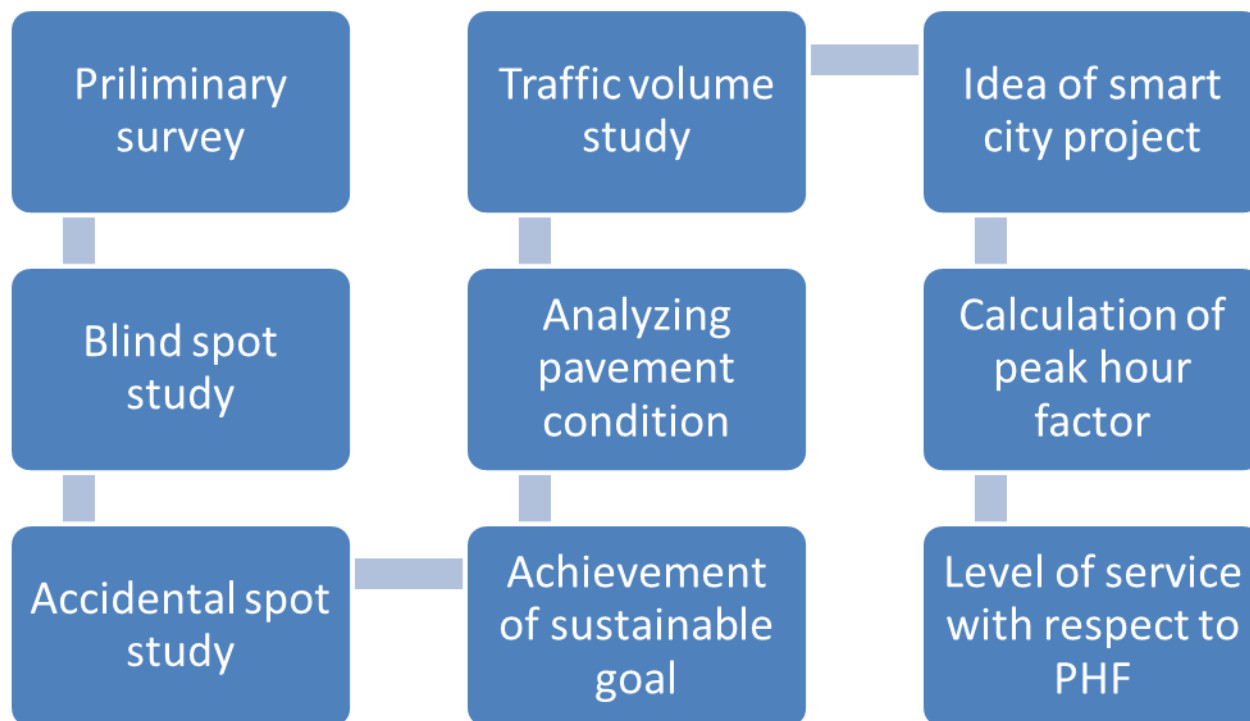
**Ryuichi Imai, Daizo Ikeda, Hiroyasu Shingai, Tomohiro Nagata and Koichi Shigetaka (2021)** have defined specifications for statistics that may be used in the field of urban mobility produced from operational data of a mobile network. The authors suggest a technique for calculating MSD that includes optimization, estimation and disclosure elimination stages based on the specifications. In order to boost dependability, the suggested technique multiplies the estimated number of OD trips by the age, gender, and residence locations of mobile phone users. [17].

**Yu Liu, PeifengSu, Miaomiao Li, Zhanping You and Mohan Zhao (2022)** comment that while Chinese roads were constructed using relatively modern technologies, developed country roads were constructed in the 1960s through the 1980s. The roads here need to be of higher quality than those in the industrialized nations. Although its planned life is between 20 and 40 years, the pavement's actual life is just about 15 years.

## **Methodology**

### **Preliminary Survey**

The report has been prepared on the Shoghi-Old Bus Stand Shimla stretch of 13.1 km. to identify the traffic volume, accidental spots, black spots, checking of the pavement condition and checking the major vehicular congestions. It is a two-lane highway road having congestions mostly on the weekends because of the entry of tourist vehicles and the pavement condition of the stretch is also not up to the mark.



**Figure 1** Methodology flow diagram

### **Traffic Volume Study consists of two methods**

1. Manual Method
2. Automatic Method

#### **Manual Method**

In the manual method field persons are required to count and categorize traffic flow at a distinguished point. Number of persons required to count the vehicles totally depends upon the number of lanes in the observed stretch on which count is to be taken. IRC advises capturing data individually for each direction of travel and placing observers in each direction. It is preferable to have literate enumerators with matriculation or middle school degrees [5]. Work is done in shifts to preserve accuracy and precision, and each surveyor is given enough time for the food and water breaks. Each congestion point has been visited by a member of our team who conducted a traffic study to examine various aspects of the flow of traffic, such as volume, speed, accidents, and other factors. Congestion zones have been studied on a regular schedule. Data has been gathered hourly, weekly, and monthly. The exercise was done in shifts to preserve accuracy and precision, and each surveyor was given enough time for relaxation and for food and water. Each congestion point was visited by a member of the team who conducted a traffic study to examine various aspects of the flow of traffic such as the volume, speed, accidents, and other factors. Congestion zones have been studied on a regular schedule. There are hourly, weekly, and monthly data collections [18]. Work plans were delivered to the group's participants, who executed them correctly on a regular basis. Data was gathered and monitored in accordance with

the needs [19]. The data was collected by making vertical lines, using ball pen and pencil paper through visual survey.

### **Automatic Method**

Large volumes of traffic data have been gathered using the automatic count method. For each 24-hour period, automatic counts were typically conducted at 1-hour intervals [20]. The data collection was made for a week, month, or year period [8]. The peak flow period was determined when counts were kept for each 24-hour period. The automatic method with pneumatic tubes, inductive loops, weight-in-motion sensors, and the video camera was used.

Traffic Engineering Studies Include:

- 1) Volume Study
- 2) Speed Study
- 3) Delay Study
- 4) Density Study
- 5) Accident Studies

### **Traffic Volume study**

The number of cars passing through a certain length of road in one unit of time at any given point in time is referred to as traffic volume. To gather information on the number of vehicles that pass through a place on a highway facility over the course of a certain time period the traffic volume studies are carried out. Unit is vehicles per minute, hour, and day [1].

### **Accidental spots study**

The accident spots research takes into account a number of variables, such as the curve's nature, the pavement's quality, the presence or absence of warning signs, any prior accidents that have occurred on that stretch of road, and the accident's kind. Accidents are divided into four categories, depending on the severity of the injuries they cause: fatal, grievous, minor, and non-injury accidents. There are several places on the road where collisions might happen because of blind bends or improper junctions [21].

### **Pavement Condition Survey**

In a pavement condition survey a visual inspection is done to look for potholes, damaged roadways, or runoff of pavement material as well as to determine whether the banking is correct or not [20].

### **Passenger Car unit PCU**

This vehicle unit is used to indicate the capacity of a highway. One vehicle is regarded as a single unit, while a bicycle or motorbike is regarded as one-half of a car [14]. Due to their size, buses and trucks are quite inconvenient and are compared to 3 cars or 3 PCU.

## Surveying origin and destination

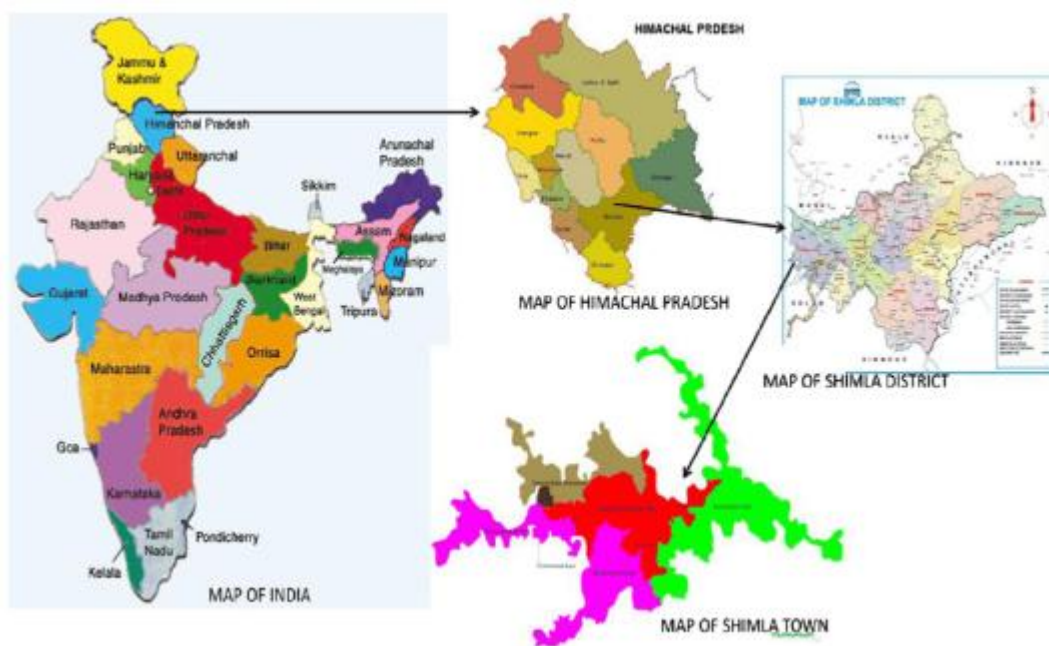
The survey consists of two points- the starting point, also known as origin, and the ending point, often known as destination [18]. During the survey, few questions are asked to the driver, like how often he travels on this road in a day, what is origin and destination, whether he will take any diversion, the data is collected and prepared accordingly[14].

## Questionnaire Survey

A small question-based survey was also done in this study. The survey incorporated the locals who use this particular stretch on a regular or non-regular basis and were asked some questions related to the pavement condition, accidental spots, blind spots and the idea of constructing cycle track on it. The idea of constructing cycle track would help to achieve the sustainable goal. This idea would also help the city Shimla to achieve its smart city goal.

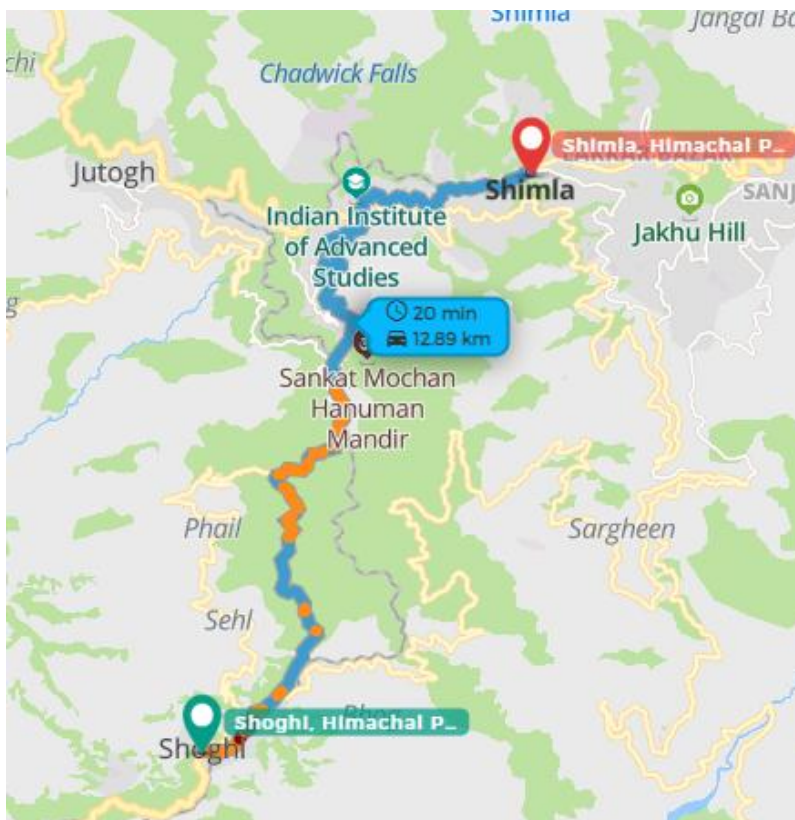
## Area under observation

The area under observation is a 13 Km stretch situated in district Shimla of state Himachal Pradesh. In this stretch there are many black spots and accidental spots, because of which the locals are suffering problems in travelling. Through this stretch many tourist vehicles pass mostly on the weekends because Shimla is a tourist place. The overall pavement condition of the stretch is also not up to the mark. The fig below shows the area under observation.



**Figure 2** Location map of studied area





**Figure 3:** Area under observation

[https://www.google.com/search?q=google+maps&rlz=1C1SQJL\\_hiN804IN804&oq=google+maps+&aqs=chrome..69i57j0i131i433i512l3j0i131i433j0i512j0i131i433j0i131i433i512l2j0i512.688j0j7&sourceid=chrome&ie=UTF-8](https://www.google.com/search?q=google+maps&rlz=1C1SQJL_hiN804IN804&oq=google+maps+&aqs=chrome..69i57j0i131i433i512l3j0i131i433j0i512j0i131i433j0i131i433i512l2j0i512.688j0j7&sourceid=chrome&ie=UTF-8)

### **Tools used**

### **Hardware**

1. First of all a pen and paper will be required to note down the number of vehicles that are passing through the area under observation with the help of tally counting method.
2. A smart phone is very necessary while carrying out these types of researches to capture video or photo or to take someone's interview and also to use calculator [20].

### **Software**

While carrying out our survey google maps will help us to find the diversions and it will help us to find the traffic congestion also. It will also tell us about the approximate time to travel through our observed area.

### **Testing Technology**

1. Use of artificial intelligence is necessary to carry out these types of surveys from the Google Map to check the traffic congestion.

2. Manual methods use field personnel to count and classify traffic flowing past a fixed point (Section). Number of enumerators needed to count the vehicle depends upon the number of lanes in highway on which count is to be taken and the type and accuracy of information desired [5]. IRC advises capturing data individually for each direction of travel and placing observers in each direction. It is preferable to have literate enumerators with matriculation or middle school degree [5]. Work is done in shifts to preserve accuracy and precision, and each surveyor is provided enough time for relaxation as well as food and water. Each congestion point was visited by a member of our team who conducted a traffic study to examine various aspects of the flow of traffic, such as volume, speed, accidents, and other factors. Congestion zones were studied on a regular schedule. Data was gathered on hourly, weekly, and monthly basis. Work was done in shifts to preserve accuracy and precision [5]. Work plans were distributed among the members of the group who carried out the task in a proper way and on regular basis. Data was collected and observed as per the requirements. The data collection was done by drawing tables and the data was entered after rough readings by calculating the PCU [4]. Road side interviews and filling of the questionnaire forms also helped in carrying forward the research. Several questions were asked from the people travelling through the observed area and few from the locals.

### Peak hour factor

In assessing capacity and other factors, traffic engineers concentrate on peak-hour traffic volume since it is the most crucial period [22]. The significant short-term changes often happen during the time frame fixed for the study. The measurement of level of service is based on peak rates of flow happening during the peak hour [22]. Utilizing a peak 15-minute rate of flow is the standard procedure. Instead of vehicles every 15 minutes, flow rates are often reported in vehicles per hour.

**Table 1** LOS with respect to PHF

Peak hour factor	Level of service
0.7 or less	A
0.8 or less	B
0.85 or less	C
0.9 or less	D
0.95 or less	E
>1 or less	F

The following equation (from Authority, 2003) illustrates how the Peak Hour Factor (PHF) relates to the maximum 15-minute flow rate and to the total hourly volume. Urban areas often have Peak Hour Factors between 0.80 and 0.98 [22]. Peak-Hour Factors above 0.95 are

frequently a sign of heavy traffic. Peak Hour Factor (PHF) was calculated using the formula: (Hourly Volume ÷ (4\* Volume count at highest 15 [22]).

For calculating the peak hour factor and finding the level of service, two days were taken from which, one day was a normal traffic day which was 07/12/22, a Wednesday [22]. The second day which was taken was the tourist movement day which was 31/12/22, a Saturday.

**Table 2**\_values of different types of vehicles

Categories	PCU
Passenger car	1.00
Light Good vehicle	1.00
Bus	3.00
Truck	3.00
Auto rickshaw/Motorcycle	0.75
Rickshaw/ Van	2.00
Bicycle	0.5

## Results and Discussions

Calculation of the LOS with respect to the peak hour factor on 7<sup>th</sup> December 2022 was a Wednesday and it was a normal traffic day.

**Table 3:** LOS of normal traffic day with respect to PHF

Time	Direction	Peak hour factor	LOS	Average LOS
<b>10:00-11:00</b>	Shimla to Shoghi	<b>0.83</b>	<b>C</b>	
	Shoghi to Shimla	<b>0.87</b>	<b>D</b>	
<b>11:00-12:00</b>	Shimla to Shoghi	<b>0.81</b>	<b>C</b>	
	Shoghi to Shimla	<b>0.83</b>	<b>C</b>	
<b>12:00-1:00</b>	Shimla to Shoghi	<b>0.80</b>	<b>B</b>	
	Shoghi to Shimla	<b>0.82</b>	<b>C</b>	
<b>1:00-2:00</b>	Shimla to Shoghi	<b>0.81</b>	<b>C</b>	
	Shoghi to Shimla	<b>0.82</b>	<b>C</b>	<b>C</b>
<b>2:00-3:00</b>	Shimla to Shoghi	<b>0.82</b>	<b>C</b>	
	Shoghi to Shimla	<b>0.84</b>	<b>C</b>	
<b>4:00-5:00</b>	Shimla to Shoghi	<b>0.83</b>	<b>C</b>	
	Shoghi to Shimla		<b>C</b>	

	Shoghi to Shimla	<b>0.85</b>	<b>C</b>
<b>5:00-6:00</b>	Shimla to Shoghi	<b>0.81</b>	<b>C</b>
	Shoghi to Shimla	<b>0.83</b>	<b>C</b>
<b>6:00-7:00</b>	Shimla to Shoghi	<b>0.83</b>	<b>C</b>
	Shoghi to Shimla	<b>0.87</b>	<b>D</b>

Calculation of the LOS with respect to the peak hour factor on the busiest day of the month, which was a Saturday (weekend), 31<sup>st</sup> December 2022, a new year eve.

**Table 4** LOS on the busiest day of the month on the basis of peak hour factor

<b>Time</b>	<b>Direction</b>	<b>Peak hour factor</b>	<b>LOS</b>	<b>Average LOS</b>
<b>10:00-11:00</b>	Shimla to Shoghi	<b>0.83</b>	<b>C</b>	
	Shoghi to Shimla	<b>0.86</b>	<b>D</b>	
<b>11:00-12:00</b>	Shimla to Shoghi	<b>0.86</b>	<b>D</b>	
	Shoghi to Shimla	<b>0.88</b>	<b>D</b>	
<b>12:00-1:00</b>	Shimla to Shoghi	<b>0.83</b>	<b>C</b>	
	Shoghi to Shimla	<b>0.86</b>	<b>D</b>	
<b>1:00-2:00</b>	Shimla to Shoghi	<b>0.84</b>	<b>C</b>	
	Shoghi to Shimla	<b>0.87</b>	<b>D</b>	<b>D</b>
<b>2:00-3:00</b>	Shimla to Shoghi	<b>0.83</b>	<b>C</b>	
	<b>4:00-5:00</b>	Shoghi to Shimla	<b>0.88</b>	<b>D</b>
Shimla to Shoghi		<b>0.86</b>	<b>D</b>	
<b>5:00-6:00</b>	Shoghi to Shimla	<b>0.88</b>	<b>D</b>	
	Shimla to Shoghi	<b>0.84</b>	<b>C</b>	
<b>6:00-7:00</b>	Shoghi to Shimla	<b>0.87</b>	<b>D</b>	
	Shimla to Shoghi	<b>0.83</b>	<b>C</b>	
	Shoghi to Shimla	<b>0.89</b>	<b>D</b>	

### Directional distribution of vehicle on the basis of LOS

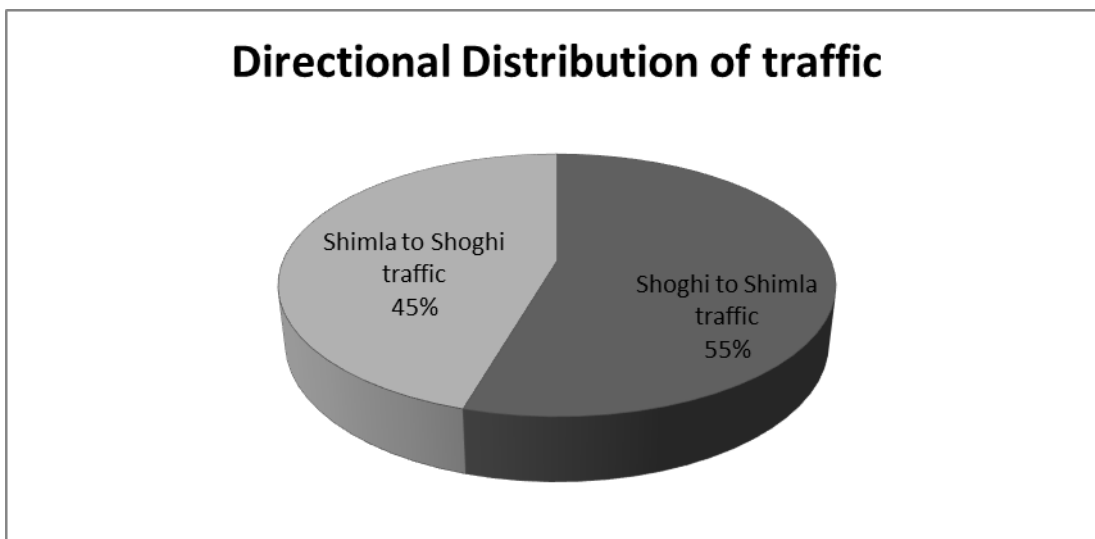


Figure 4 Directional distribution of vehicle on the basis of LOS

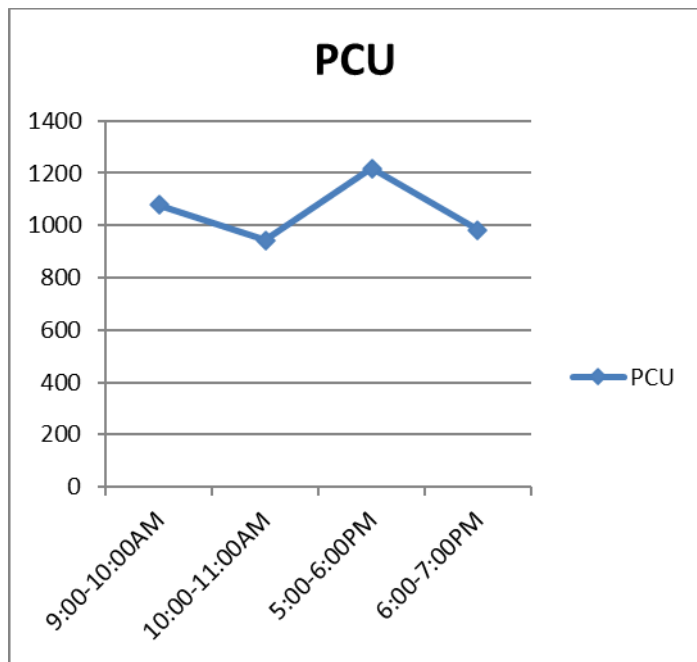


Figure 5 Average PCU vs Peak hour (Shoghi to Shimla)

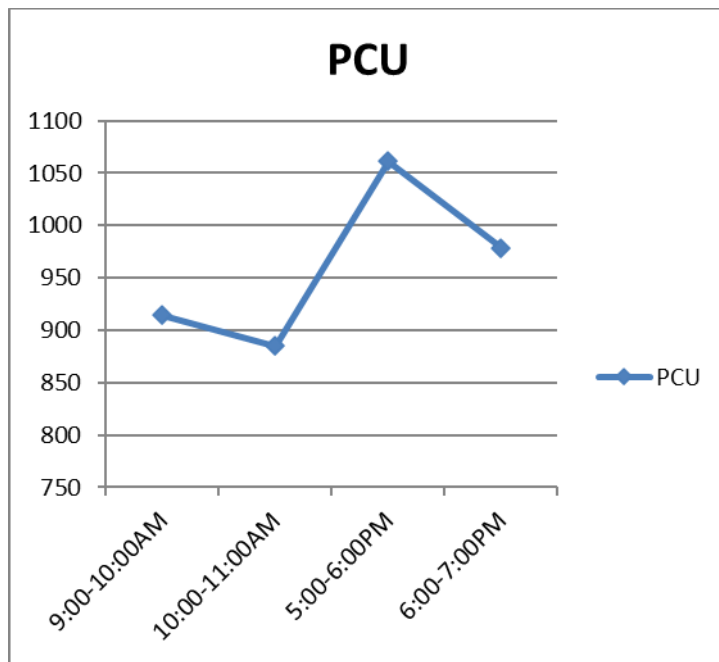


Figure 6 Average PCU vs Peak hour (Shimla to Shoghi)

**Questionnaire survey**

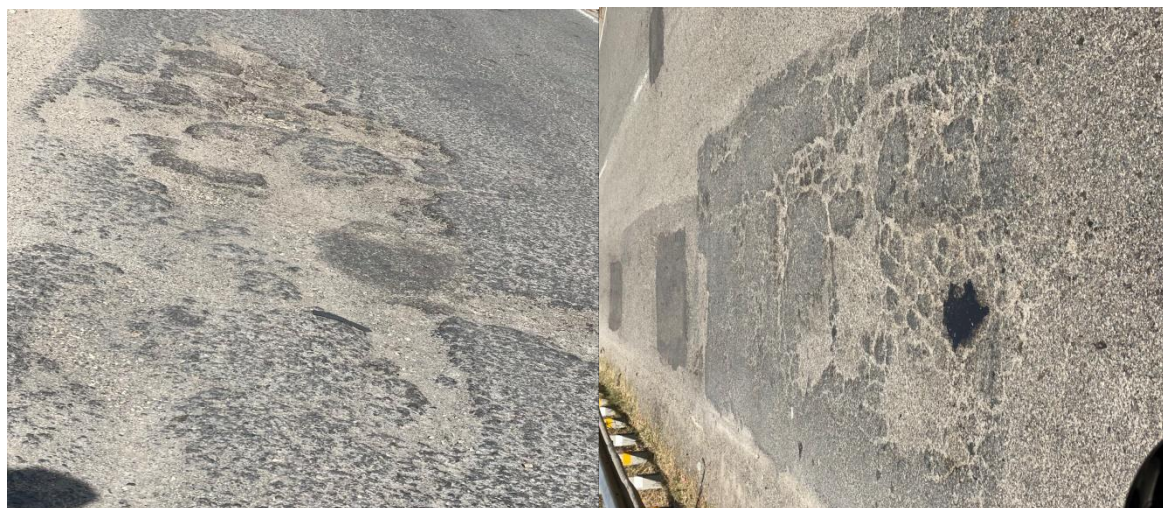
<b>Questions asked from people</b>	<b>Response</b>			<b>Total Responses</b>
	<b>Yes</b>	<b>No</b>	<b>May be</b>	
Is there any need of traffic mirrors on the blind curves?	<b>88</b>	<b>12</b>		<b>100</b>
Do you think there are accidental spots on the stretch?	<b>80</b>	<b>10</b>	<b>10</b>	<b>100</b>
Does the diversions of this stretch causes any type of problem for the drivers?	<b>67</b>	<b>20</b>	<b>13</b>	<b>100</b>
If cycle track is constructed on this stretch, what is the possibility that people would start using cycles for commuting?	<b>69</b>	<b>31</b>	<b>-</b>	<b>100</b>
Are you satisfied with the pavement condition of the stretch?	<b>34</b>	<b>66</b>	<b>-</b>	<b>100</b>
Do you think that the vehicles parked alongside the road is bothering the smooth flow of the traffic?	<b>86</b>	<b>14</b>	<b>-</b>	<b>100</b>
Do you think the traffic should be diverted through alternative routes during the tourist season?	<b>82</b>	<b>18</b>	<b>-</b>	<b>100</b>
Do you think the existing number of traffic police officials are able to ensure congestion free flow of traffic?	<b>35</b>	<b>65</b>	<b>-</b>	<b>100</b>
Do you think the tourists without any advance hotel booking should be allowed to enter the main city with their personal vehicles?	<b>47</b>	<b>53</b>	<b>-</b>	<b>100</b>

Do you think there is need of more pedestrian flyovers on this stretch? **83**                      **17**                      -                      **100**

**Table 5** Questionnaire Survey

### **Pavement condition**

In pavement condition survey, visual survey was done i.e. checking for potholes, damaged roads or pavement material runoff and also if banking is proper or not. The pavement condition of the observed area is not up to the mark because the traffic flow on this stretch is quite high because this is the main route to visit Shimla from Delhi, Punjab, Haryana and Chandigarh.



**Figure 5** Pavement condition of the observed stretch

### **CONCLUSION**

1. The paper presents about the traffic volume of the vehicles on the pavement, blind spots, accidental spots, calculation of LOS with respect to PHF, conditions of the pavement and safety analysis.
2. The paper consists of various data collected from different studies and results were made on the basis of data.
3. It is concluded that according to the LOS obtained through the traffic volume study the route need to be widened accordingly as it is not sufficient for the smooth flow of traffic during the peak hours.
4. The blind curves are the only accidental spots so they are also supposed to be widened or

traffic mirrors should be installed on urgent basis.

5. The pavement of the observed stretch is also not up to the mark as the observed city is also a tourist place and requires a better road condition urgently.
6. According to the field survey done people want the tourist traffic to be diverted through the alternate routes as the stretch is not sufficient for both the tourist and the local traffic.
7. It is also recommended that the people should use the road very carefully as many accidents occur due to the carelessness and over speeding on blind curves. Intersection safety must be improved by providing adequate signals.

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