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## **Volume and Speed Studies at Poornakumbham Circle, Tirupati**

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### **ABSTRACT :**

The study on volume and speed at Poornakumbham Circle in Tirupati focused on evaluating the traffic flow characteristics and speed profiles at this specific location. By conducting thorough data collection and analysis, the research aimed to provide valuable insights into the traffic patterns and vehicle speeds within the vicinity of Poornakumbham Circle. The study involved monitoring the volume of vehicles passing through the circle at different times of the day to understand the traffic intensity and variations throughout the day. Additionally, the research team measured the speed of vehicles traversing the circle to assess the average speeds, peak speed periods, and any speed-related discrepancies that could impact traffic efficiency and safety. The findings of the study are crucial for urban planning, traffic management strategies, and infrastructure development in the Tirupati area, particularly around Poornakumbham Circle. By comprehensively analyzing both the volume and speed aspects of traffic at this specific location, the study aims to contribute essential data for decision-makers and stakeholders involved in enhancing the overall traffic flow, safety measures, and transportation infrastructure effectiveness in Tirupati. The insights derived from this study can serve as a basis for informed policy recommendations and improvements aimed at optimizing traffic operations and enhancing the overall commuting experience for residents and visitors alike.

Keywords: Volume, Speed, Poornakumbham circle, Transportation Infrastructure

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### **INTRODUCTION :**

Poornakumbham Circle in Tirupati serves as a crucial transportation hub, where traffic volume and speed dynamics play a significant role in the overall traffic management and commuter experience. Understanding the traffic characteristics at this location is essential for optimizing traffic flow and ensuring safety on the roads. The volume and speed studies conducted at Poornakumbham Circle are aimed at analyzing the traffic patterns, volume of vehicles passing through the circle, and speed profiles of vehicles to provide valuable insights for urban planning and traffic management strategies in Tirupati. By monitoring the traffic volume and speed at this key intersection, this study seeks to identify peak traffic periods, assess average vehicle speeds, and evaluate any speed-related issues that may impact traffic efficiency and safety measures in the area. Traffic engineering uses engineering methods and techniques to achieve the safe and time efficient movement of people and goods on roadways

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### **LITERATURE REVIEW :**

Yongi Ma et.al (2022), The volume and speed studies conducted at Poornakumbham Circle in Tirupati focus on analyzing traffic flow characteristics and speed profiles at this strategic location. The research aims to gather data on the volume of vehicles passing through the circle at different times of the day to understand traffic intensity fluctuations. Additionally, the study involves measuring vehicle speeds to assess average speeds, peak speed periods, and potential speed-related issues impacting traffic efficiency and safety. By comprehensively analyzing traffic volume and speed dynamics, the research aims to provide valuable insights for urban planning, traffic management, and infrastructure development in Tirupati, particularly around Poornakumbham Circle. The study's findings are anticipated to inform decision-makers on implementing effective traffic control measures, optimizing traffic operations, and enhancing overall commuter experience and safety in the area[1].

Er. Aman Sharma et.al (2022), The study conducted at Station Ghumarwin focused on identifying accident black spots along State Highway-19, a hilly area prone to road traffic accidents due to blind curves and black spots. Using the Weighted Severity Index (WSI) Method, the research aimed to pinpoint the most critical accident-prone areas. Over the past two years, an increase in road traffic accidents along the highway section between Ghumarwin to Kuthera prompted the study to investigate the root causes. Analysis revealed high accident density and rates in identified black spots, leading to recommendations for remedial measures such as installing light poles, speed breakers, fluorescent sign boards, convex mirrors, and warning signs to enhance road safety. The research's findings and proposed solutions are intended to mitigate the rising trend of accidents on State Highway-19, contributing to future accident prevention efforts. Furthermore, the study functions as a resource for other researchers interested in similar road safety issues, offering valuable insights and a framework for conducting their own investigations into accident-prone areas[2].

Dr. G. Sireesha et.all (2021), Transportation engineering focuses on ensuring the safe and efficient movement of people and goods on roadways, emphasizing timely travel. Various factors influence traffic flow, including volume, speed, and density, all of which impact the movement of vehicles. Conducting traffic volume studies is essential as they aid in traffic planning, management, and assessing the need for potential road expansions. A study conducted in Visakhapatnam at Andhra University College of Engineering examined traffic characteristics along the road connecting Maddilapalem road to Waltair road. Traffic flow data was collected manually, and analysis of traffic patterns across different time periods was carried out. The study aimed to predict peak hour traffic, understand vehicle composition, and estimate average daily traffic, providing valuable insights for traffic management and future planning in the region [3].

### 3. EXPERIMENTAL INVESTIGATIONS

Volume studies in transportation engineering are essential for understanding the flow of traffic on roadways and assessing transportation needs accurately. These studies involve collecting data on the number of vehicles passing through a specific location over a set period of time. By analyzing traffic volumes, engineers can make informed decisions about road design, capacity improvements, traffic management strategies, and transportation planning

#### Collecting data of vehicles passing daily at Bus stand road

Fig: 1 Towards Leela mahal road



Fig: 2 Towards Railway station road

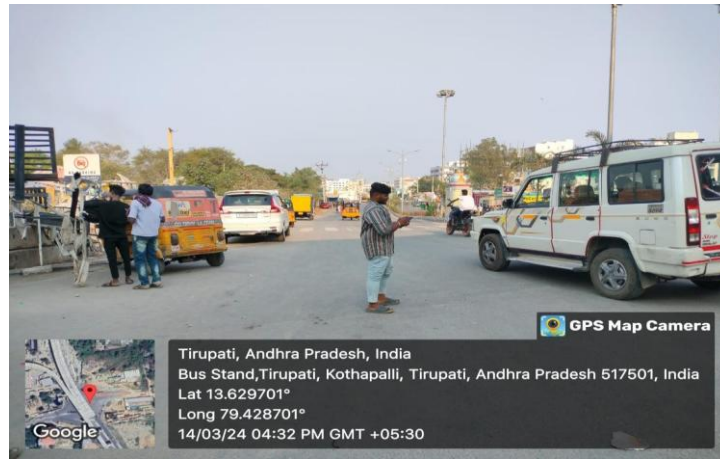


Fig:3 Towards Guest line road

Number of vehicles passing at peak hours, Poornakumbham circle near the bus Stand towards leela mahal road.

Table 1 For Leela mahal road

TIME	NUMBER OF COLLECTION OF VEHICLES						
	DAY 1	DAY2	DAY3	DAY4	DAY 5	DAY 6	DAY 7
08.30-9.30 AM	2889	3113	3228	3116	3007	3354	2758

04.30-05.30 PM	2724	2704	2602	2708	2546	2683	2665
<b>TOTAL VOLUME</b>	5613	5817	5830	5824	5553	6037	5423

Table 2 For Guest line road

TIME	NUMBER OF VEHICLES						
	DAY 1	DAY2	DAY3	DAY4	DAY 5	DAY 6	DAY 7
08.30-9.30 AM	561	674	600	632	694	593	612
04.30-05.30 PM	246	485	561	497	528	435	529
<b>TOTAL VOLUME</b>	807	1159	1164	1129	1222	1028	1141

Table 3 Railway station road

	NUMBER OF VEHICLES						
	DAY 1	DAY2	DAY3	DAY4	DAY 5	DAY 6	DAY 7
08.30-9.30 AM	2140	2169	2163	2041	2145	2241	2154
04.30-05.30 PM	1994	1998	2037	2314	1901	2016	2038
<b>TOTAL VOLUME</b>	4134	4167	4200	4355	4193	4257	4192

Table 4 Tiruchanur road

TIME	NUMBER OF VEHICLES						
	DAY 1	DAY2	DAY3	DAY4	DAY 5	DAY 6	DAY 7
08.30-9.30 AM	2516	2347	2138	2334	2238	2427	2700
04.30-05.30 PM	1937	2011	2074	2037	1971	2046	2149
<b>TOTAL VOLUME</b>	4453	4358	4212	4371	4217	4473	4849

**TURNING MOVEMENTS**

Turning movements in traffic engineering refer to the specific movements vehicles make at intersections when changing directions. Understanding turning movements is crucial for traffic engineers to design efficient and safe intersections, manage traffic flow effectively, and enhance overall transportation operations. Key aspects of turning movements include left turns, right turns, through movements, and U-turns, each of which requires careful planning to ensure smooth traffic flow. Traffic engineers analyze turning movements to determine the optimal layout of lanes, traffic signal timings, and signage to facilitate safe and efficient movement of vehicles. By studying turning movements, engineers can identify potential conflicts between vehicles, pedestrians, and cyclists at intersections and implement measures to reduce the likelihood of accidents. Factors such as turning radii, signal phasing, sight lines, and pedestrian crossings are taken into consideration when designing intersections based on turning movement data.

**Table 5 Towards Leela Mahal Road**

TURN	NUMBER OF VEHICLES						
	DAY 1	DAY2	DAY3	DAY4	DAY 5	DAY 6	DAY 7
RIGHT TURN	NIL	NIL	NIL	NIL	NIL	NIL	NIL
STRIGHT LINE	2906	2933	2919	2794	2598	2896	2635
LEFT TURN	1540	1312	1594	1467	1387	1451	1470
U-TURN	1167	1572	1317	1563	1568	1690	1318

**Table 6 Towards Guest Line Road**

TURN	NUMBER OF VEHICLES						
	DAY 1	DAY2	DAY3	DAY4	DAY 5	DAY 6	DAY 7
RIGHT TURN	807	1159	1164	1129	1221	1028	1141
STRIGHT LINE	IL	NIL	NIL	NIL	NIL	NIL	NIL
LEFT TURN	NIL	NIL	NIL	NIL	NIL	NIL	NIL
U-TURN	NIL	NIL	NIL	NIL	NIL	NIL	NIL

TURN	NUMBER OF VEHICLES						
	DAY 1	DAY2	DAY3	DAY4	DAY 5	DAY 6	DAY 7
RIGHT TURN	2007	2073	2369	2410	2278	2167	2045
STRIGHT LINE	NIL	NIL	NIL	NIL	NIL	NIL	NIL
LEFT TURN	1833	1774	1663	1752	1768	1821	1873

U-TURN	294	320	168	193	147	269	274
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Table 7 Towards Rail Way Station Road

Table 8 Towards Tiruchanur Road

TURN	NUMBER OF VEHICLES						
	DAY 1	DAY2	DAY3	DAY4	DAY 5	DAY 6	DAY 7
RIGHT TURN	3068	3208	2640	3127	2775	2880	3182
STRAIGHT LINE	NIL	NIL	NIL	NIL	NIL	NIL	NIL
LEFT TURN	1358	1072	1478	1170	1360	1519	1569
U-TURN	27	78	94	74	82	74	98

### ***SPEED STUDIES***

Speed studies in traffic engineering are conducted to assess the speed of vehicles traveling on roadways, which is crucial for ensuring safety, efficiency, and compliance with regulations. These studies involve measuring the speed of vehicles using various methods and analyzing the data to understand traffic behavior and make informed decisions about road design and traffic management strategies. There are different types of speed studies, including spot speed studies, which involve recording the speed of vehicles at a specific location and time, and speed zone studies, which analyze speed data over a designated area. Speed studies help identify speed patterns, determine average speeds, assess compliance with speed limits, and evaluate the effectiveness of speed control measures.

### ***TOWARDS LEELA MAHAL ROAD***

Table 9 Speed Studies recorded Towards Leela Mahal Road

VEHICLE FOR 0.05 KILO METERS	Time taken by the vehicles-DAY1					AVERAGE Time(sec)	SPEED {KMPH}
	vehicle1 (sec)	vehicle2 (sec)	vehicle3 (sec)	vehicle4 (sec)	vehicle5 (sec)		
TWO WHEELERS {BIKES}	5.84	6.67	6.88	7.23	4.56	6.25	29.41
THREE WHEELERS {AUTOS}	12.72	10.91	9.71	9.01	8.61	5.09	18.51
FOUR WHEELERS	11.17	10.17	8.98	8.95	6.67	9.18	20.00
OTHERS	7.04	8.42	12.32	9.34	11.34	9.69	19.23

### ***TOWARDS GUEST LINE ROAD***

Table 10 Speed Studies recorded for Day 1 in Towards Guest Line Road

Time taken by the vehicles-DAY1							
VEHICLE FOR 0.05 KILO METERS	vehicle1 (sec)	vehicle2 (sec)	vehicle3 (sec)	vehicle4 (sec)	vehicle5 (sec)	AVERAGE (sec)	SPEED {KMPH}
TWO WHEELERS {BIKES}	4.77	7.00	7.28	8.43	7.03	6.90	27.77
THREE WHEELERS [AUTOS]	6.89	6.14	7.08	7.50	8.03	7.12	26.19
FOUR WHEELERS	6.83	6.0	6.8	7.3	6.72	6.73	26.15
OTHERS	11.02	11.93	12.05	9.70	10.52	11.04	16.66

**TOWARDS RAIL WAY STATION ROAD**

Time taken by the vehicles-DAY1							
VEHICLE FOR 0.05 KILO METERS	vehicle1 (sec)	vehicle2 (sec)	vehicle3 (sec)	vehicle4 (sec)	vehicle5 (sec)	AVERAGE (sec)	SPEED {KMPH}
TWO WHEELERS {BIKES}	8.10	5.23	7.74	6.04	6.54	6.73	26.15
THREE WHEELERS [AUTOS]	7.058	8.42	8.20	6.15	10.08	8.0	23.09
FOUR WHEELERS	9.10	5.59	6.95	9.78	8.56	7.99	21.39
OTHERS	5.62	8.18	9.25	7.84	9.98	8.17	22.27

Table 11 Speed Studies recorded for Day 1 in Towards Tiruchanur Road

**TO WARDS TIRUCHANUR ROAD**

Table 12 Speed Studies recorded for Day 1 in Towards Tiruchanur Road

Time taken by the vehicles-DAY1							
VEHICLE FOR 0.05 KILO METERS	vehicle1 (sec)	vehicle2 (sec)	vehicle3 (sec)	vehicle4 (sec)	vehicle5 (sec)	AVERAGE (sec)	SPEED {KMPH}

TWO WHEELERS {BIKES}	6.67	6.91	7.23	6.34	8.45	7.12	26.15
THREE WHEELERS [AUTOS]	8.48	7.38	8.52	7.92	7.20	7.90	28.09
FOUR WHEELERS	9.19	8.54	10.43	12.02	11.34	10.30	17.57
OTHERS	9.19	8.54	10.43	12.02	11.34	10.30	17.57

Table 20 Speed Studies recorded for Day 3 in Towards Tiruchanur

#### 4. ANALYSIS OF RESULTS

##### VOLUME STUDIES

Table 21 Analysis of Data of Volume Studies

ROADS	HIGHEST TOTAL VALUE
TOWARDS LEELA MAHAL ROAD	6037
TOWARDS GUEST LINE ROAD	1222
TOWARDS RAILWAY STATION	4849
TOWARDS TIRUCHANURU ROAD	4355

##### TURNING MOVEMENTS

Table 22 Analysis of Data on Turning Movements

ROAD STRAIGHT	PEAK MOMENT DIRECTION
TOWARDS LEELA MAHAL ROAD	STRAIGHT LINE [2933]
TOWARDS GUEST LINE ROAD	RIGHT TURN [12221]
TOWARDS RAILWAY STATION	STRAIGHT LINE [2410]
TOWARDS TIRUCHANURU ROAD	SRAIGHT LINE [3208]

#### 5. CONCLUSIONS

##### BY VOLUME STUDIES

The number of vehicles passing at Bus stand road from morning 8.30-9.30 am and evening 4.30-5.30 pm in a peak period

Total number of vehicles passing in a peak at Leela mahal road = 34,674 vehicles Total number of vehicles passing in a week at Guest line road = 7650

vehicles

Total number of vehicles passing in a peak at Rail way station road = 29,498 vehicles Total number of vehicles passing in a week at Tiruchanur road = 30,933 vehicles

Average vehicles passing daily at above road in peak hours =5729 Vehicles / days Average vehicles passing daily at above road in peak hours =1093 Vehicles / days Average vehicles passing daily at above road in peak hours =4214 Vehicles / days Average vehicles passing daily at above road in peak hours =4419 Vehicles / days

### **BY SPEED STUDIES**

Calculating Speed of the vehicle to pass 50 meter distance using time taking in seconds .

#### **LEELA MAHAL ROAD**

The average speed of the two wheeler vehicle = 25.06 KM/HRS

The average speed of Three wheeler vehicles =20.83 KM/HRS

The average speed of Four wheeler vehicles =24.09 KM/HRS

The average speed of other wheelers =17.41 KM/HRS

#### **GUEST LINE ROAD**

The average speed of the two wheeler vehicle = 29.47 KM/HRS

The average speed of Three wheeler vehicles =24.87 KM/HRS

The average speed of Four wheeler vehicles =26.30 KM/HRS

The average speed of other wheelers =16.66 KM/HRS

#### **RAIL WAY STATION ROAD**

The average speed of the two wheeler vehicle = 26.15 KM/ HRS

The average speed of Three wheeler vehicles = 22.81 KM/HRS

The average speed of Four wheeler vehicles =22.88KM /HRS

The average speed of other wheelers =20.52 KM/HRS

#### **TIRUCHANUR ROAD**

The average speed of the two wheeler vehicle = 25.39 KM/ HRS

The average speed of Three wheeler vehicles =24.21 KM/HRS

The average speed of Four wheeler vehicles =18.38 KM /HRS

The average speed of other wheelers =17.77 KM /HR

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