

AN ASSESSMENT OF EXISTING ROAD STRETCH TOWARDS SUSTAINABLE TRANSPORTATION

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ABSTRACT

In recent years traffic congestion directed to major problem in the developed as well developing cities. Transportation systems are highly dynamic, complex and more disciplined in nature. Explicit consideration for the transportation system is most needed to solve the environmental issues. In order to overcome this issue, sustainable transportation will helpful to achieve the balanced integration of economic, social and environmental stability. The main objective of this project is to assess the existing road stretch to achieve sustainable transportation. The data has been collected through a realistic method of survey to assess the fuel consumption, traffic volume, pollution etc. and some possible suggestions have been given which will provide a sustainable transportation.

Keywords: Sustainability, Transportation, Traffic Volume, Fuel Consumption And Congestion.

I. INTRODUCTION

Mobility is a basic human need. Transportation fulfills these basic needs of humanity. The transportation systems influence the quality of life in numerous ways. Transportation planning should be done in such a way that it should meet both the current as well as future needs. It also plays a major role in the development of human civilization. The developing population of vehicles causes more number of ill effects for the environment as well as the human civilization and thereby proper system should be followed to achieve sustainable transportation.

Sustainable Transportation balances the current and future needs and it has low impact on the environment. This movement changed the lifestyle of people and travel. In developed and developing nations, Sustainable Transportation has been implemented and the changes have been seen. By the way transport also consumes a lot of resources like time, fuel, and land. In order to maintain the system, sustainable transportation can be implemented by providing separate lane roads for each vehicle with proper signal timings .Thereby reducing the traffic congestion and allows free movement of vehicles.

II. PREVIOUS WORK

Padma S, et al (2020) explained in the paper titled on “Traffic Impact Assessment for Sustainable Development in Urban Areas”, any development which is made in the peak hours should undergo traffic impact assessment, Traffic impact assessment has been talked in India before a decade only. It has been a mandatory one for the future purpose. In this paper author describes the two important case studies about the complex in New Delhi and the Information Technology Park in Madurai city.

Ahmad Feizi, et al (2020) stated in the paper titled “A pervasive framework toward sustainability and smart-growth: Assessing multifaceted transportation performance measures for smart cities”, the transport system has been changed due to the implementation of smart city across the world.This paper explains about the smart city development in the united states of america.This study gives preference to (TOPSIS) and (MCDA) method.

Dipanjan Nag, et al (2018) explained in the paper titled on “Sustainability assessment for the transportation environment of Darjeeling, India”, This paper explains about the important tourist spot Darjeeling and it is an important tourist place in West Bengal, India.These area have an severe problem in the transportation system especially in the peak hours.They also suffer from inadegaute public transport facilities.It was initially designed for a population of 10,000, but over the years, a rising population of both tourists and residents and intensifying motor vehicle usage. These factors threatening to transport system.

Svetlana Ershova, et al (2017) explained in the paper titled “Conceptual justification of town planning design standards for streets and roads in large cities for ensuring traffic safety”, this paper tells the street and road network in large cities should have the proper design standards for ensuring the safety of the living

III. METHODOLOGY

3.1 METHODOLOGY FLOW CHART

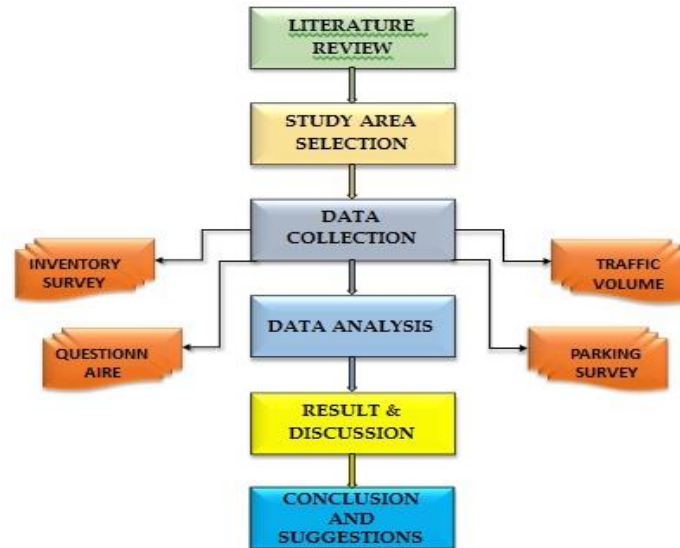


Fig 3.1 Methodology flow chart

3.2 INVENTORY SURVEY

Moolakulam junction is basically a narrow road which has a heavy traffic flow due to the presence of commercial building, industrial and Christ college of Engineering and Technology. Apart from this the road connects the city in East direction which has major commercial markets, textile and car showrooms and towards South the road contains prominent hospitals, schools and flyover. As well as this was the busiest road for vehicle movement and also for pedestrians. Parking is the major cause for traffic hazards. Improper parking is also the major reason for traffic. So, this road was taken for the case study and the traffic flow was observed to estimate the traffic density. The figure3.2 shows the sample photography of the study stretch.



Fig 3.2 Inventory survey of study stretch

3.3 TRAFFIC VOLUME COUNT SURVEY

The main objective of this survey is to calculate the no of vehicles passing. The Study area is subdivided into three stretches. The survey pattern used to collect date is weekly basis and the method is the manual method. Dividing the work among the team members, at a specific point in all the three stretches team members started to calculate number of vehicles passing for the next 2 hours from 7.30 - 9.30am and simultaneously started to enter the data for every 15 minutes in data sheet. The same process was circulated in the evening session from 16.30 - 18.30pm.

After completing all the 7 survey sessions (28 hours). It gave a good knowledge about the volume count survey and understood the biggest problem people face daily on this junction. Figure 3.5 are the sample photography for the traffic volume count taken in the peak hours.



Fig 3.3 Traffic volume count in peak hour

IV. ASSESSMENT

4.1 INVENTORY SURVEY

Inventory Survey is used to study the profile of the roads in the area of study features like road/Pavement widths, road pavement types, street lighting, luminosity, drain types, encroachments, presence of vendor's/street furniture, bus stops etc. The study stretch area consists of over traffic as shown in Fig 4.1



Fig 4.1 Photograph at Study stretch road

4.2 DATA OBTAINED FROM TRAFFIC VOLUME COUNT SURVEY

Data attached with this sheet are Passenger Car Unit (PCR) converted values. The Data's for morning for the stretch toward Pondicherry is shown in the Fig.4.2 and the total values are shown in Fig 4.3. The Data's for morning for the stretch toward Villianur is shown in the Fig.4.4 and the total values are shown in Fig 4.5. The Data's for morning for the stretch toward Perambai is shown in the Fig.4.6 and the total values are shown in Fig 4.7.

The Data's for evening for the stretch toward Pondicherry is shown in the Fig.4.8 and the total values are shown in Fig 4.9. The Data's for evening for the stretch toward Villianur is shown in the Fig.4.10 and the total values are shown in Fig 4.11. The Data's for evening for the stretch toward Perambai is shown in the Fig.4.12 and the total values are shown in Fig 4.13.

V. RESULT

5.1 Values for Stretch towards Pondicherry

TOTAL TRAFFIC VOLUME SURVEY												
Intersection : MGR statue Moolakulam						Shift : Morning						
Direction : Towards Pondicherry						Weather : Sunny			Sheet No : 1/1			
Time	No. of Fast Moving Vehicles						No. of Slow Moving Vehicles				Total Peak	Hourly Peak
	Buses	Trucks & Delivery Vans, Lorry	Container Trailers	Car, Jeep, Vans	Auto Rickshaw	Motor Cycle, Scooter, Mopeds	Cycles	Cycle Rickshaw	BD/HD Carts			
07:30 to 07:45	328.5	28	0	375	119	1177.77	22.4	0	0	2050.67		
07:45 to 08:00	362.25	19.25	0	437	119	1218.69	21.6	0	0	2177.79		
08:00 to 08:15	263.25	36.75	0	569	200	1742.4	29	0	0	2840.4		
08:15 to 08:30	261	14	0	515	193	2091.54	48.6	0	0	3123.14	10192	
08:30 to 08:45	288	22.75	0	509	187	2457.18	41.8	0	0	3505.73	11647.06	
08:45 to 09:00	285.75	26.25	0	468	158	2612.94	29.2	0	0	967.2	10436.47	
09:00 to 09:15	234	24.5	0	553	203	2462.13	15.8	0	0	3492.43	11088.5	
09:15 to 09:30	281.25	31.5	0	703	152	2391.84	22	0	0	3581.59	11546.95	

Fig 5.1 Traffic Volume Count for morning

Peak Hour (07:45 to 08:45)	Buses	Trucks & Delivery Vans, Lorry	Container Trailers	Car, Jeep, Vans	Auto Rickshaw	Motor Cycle, Scooter, mopels	Cycles	Cycle Rickshaw	BD/HD Carts
Total	1175	93	0	2030	699	7510	141	0	0

Fig 5.2 Total Traffic Volume Count for morning

TOTAL TRAFFIC VOLUME SURVEY											
Intersection : MGR statue Moolakulam						Shift : Evening					
Direction : Towards Pondicherry						Weather : Sunny			Sheet No : 1/1		
Time	No. of Fast Moving Vehicles						No. of Slow Moving Vehicles			Total Peak	Hourly Peak
	Buses	Trucks & Delivery Vans, Lorry	Container Trailers	Car, Jeep, Vans	Auto Rickshaw	Motor Cycle, Scooter, Mopeds	Cycles	Cycle Rickshaw	BD/HD Carts		
16:30 to 16:45	288	22.75	0	659	130	1235.19	11.6	0	0	2346.54	
16:45 to 17:00	222.75	19.25	0	687	81	1168.2	12	0	0	2190.2	
17:00 to 17:15	209.25	15.75	0	649	103	1338.48	12.4	0	0	2327.88	
17:15 to 17:30	342	10.5	0	774	119	872.52	17.4	0	0	2135.42	9000.04
17:30 to 17:45	351	14	0	739	112	1376.43	12.2	0	0	2604.63	9258.13
17:45 to 18:00	245.25	19.25	0	609	97	1253.67	16.8	0	0	2240.97	9308.9
18:00 to 18:15	281.25	8.75	0	563	92	1380.39	16	0	0	2341.39	9322.41
18:15 to 18:30	459	33.25	0	688	90	1399.2	17.2	0	0	2686.65	9873.64

Fig 5.3 Traffic Volume Count for evening

Peak Hour (17:30 to 18:30)	Buses	Trucks & Delivery Vans, Lorry	Container Trailers	Car, Jeep, Vans	Auto Rickshaw	Motor Cycle, Scooter, mopels	Cycles	Cycle Rickshaw	BD/HD Carts
Total	1337	75	0	2599	391	5410	62	0	0

Fig 5.4 Total Traffic Volume Count for evening

5.2 Values for Stretch towards Villianur

TOTAL TRAFFIC VOLUME SURVEY											
Intersection : MGR statue Moolakulam						Shift : Morning					
Direction : Towards Villianur						Weather : Sunny			Sheet No : 1/1		
Time	No. of Fast Moving Vehicles						No. of Slow Moving Vehicles			Total Peak	Hourly Peak
	Buses	Trucks & Delivery Vans, Lorry	Container Trailers	Car, Jeep, Vans	Auto Rickshaw	Motor Cycle, Scooter, Mopeds	Cycles	Cycle Rickshaw	BD/HD Carts		
07:30 to 07:45	454.5	87.5	1.75	403	72	724.68	5.6	0	0	1749.03	
07:45 to 08:00	497.25	108.5	0	557	72	835.89	6.4	0	0	2077.04	
08:00 to 08:15	184.5	89.25	1.75	578	113	962.28	5.8	0	0	1934.58	
08:15 to 08:30	162	89.25	0	570	97	1162.26	7.4	0	0	2087.91	7848.56
08:30 to 08:45	121.5	94.5	0	435	37	1089.66	4	0	0	1781.66	7881.19
08:45 to 09:00	164.25	98	0	491	88	1074.81	2.8	0	0	1918.86	7723.01
09:00 to 09:15	141.75	210	0	449	67	812.13	4.2	0	0	1684.08	7472.51
09:15 to 09:30	114.75	134.75	0	528	80	871.53	8.4	0	0	1737.43	7122.03

Fig 5.5 Traffic Volume Count for morning

Peak Hour (07:45 to 08:45)	Buses	Trucks & Delivery Vans, Lorry	Container Trailers	Car, Jeep, Vans	Auto Rickshaw	Motor Cycle, Scooter, mopels	Cycles	Cycle Rickshaw	BD/HD Carts
Total	965	382	2	2140	319	4050	24	0	0

Fig 5.6 Total Traffic Volume Count for morning

TOTAL TRAFFIC VOLUME SURVEY											
Intersection : MGR statue Moolakulam						Shift : Evening					
Direction : Towards Villianur						Weather : Sunny			Sheet No : 1/1		
Time	No. of Fast Moving Vehicles						No. of Slow Moving Vehicles			Total Peak	Hourly Peak
	Buses	Trucks & Delivery Vans, Lorry	Container Trailers	Car, Jeep, Vans	Auto Rickshaw	Motor Cycle, Scooter, Mopeds	Cycles	Cycle Rickshaw	BD/HD Carts		
16:30 to 16:45	99	60.8125	1.75	459	80	746.46	4.4	0	0	1451.423	
16:45 to 17:00	76.5	78.75	1.75	393	68	697.95	4.8	0	0	1320.75	
17:00 to 17:15	114.75	124.25	0	399	88	797.28	4.8	0	0	1528.08	
17:15 to 17:30	110.25	101.5	0	436	60	801.24	6	0	0	1514.99	4287.163
17:30 to 17:45	112.5	52.5	0	326	46	843.48	6	0	0	1386.48	5750.3
17:45 to 18:00	141.75	68.25	4.25	353	58	957.99	8	0	0	1591.24	6020.79
18:00 to 18:15	99	108.5	0	388	62	1184.7	6.6	0	0	1848.8	6341.51
18:15 to 18:30	126	70	0	382	38	1152.03	7.8	0	0	1775.83	6602.35

Fig 5.7 Traffic Volume Count for evening

Peak Hour (17:30 to 18:30)	Buses	Trucks & Delivery Vans, Lorry	Container Trailers	Car, Jeep, Vans	Auto Rickshaw	Motor Cycle, Scooter, mopels	Cycles	Cycle Rickshaw	BD/HD Carts
Total	479	299	4	1449	204	4138	28	0	0

Fig 5.8 Total Traffic Volume Count for evening

5.3 Values for Stretch towards Perambai

TOTAL TRAFFIC VOLUME SURVEY											
Intersection : MGR statue Moolakulam						Shift : Morning					
Direction : Towards Perambai						Weather : Sunny			Sheet No : 1/1		
Time	No. of Fast Moving Vehicles						No. of Slow Moving Vehicles			Total Peak	Hourly Peak
	Buses	Trucks & Delivery Vans, Lorry	Container Trailers	Car, Jeep, Vans	Auto Rickshaw	Motor Cycle, Scooter, Mopeds	Cycles	Cycle Rickshaw	BD/HD Carts		
07:30 to 07:45	31.5	62.5625	0	96	44	217.14	3.6	0	0	454.8025	
07:45 to 08:00	56.25	69.125	0	86	68	323.4	7.4	0	0	610.175	
08:00 to 08:15	94.5	39.8125	0	131	54	343.86	8.6	0	0	671.7725	
08:15 to 08:30	90	59.5	0	100	68	312.84	5.8	0	0	636.14	2372.89
08:30 to 08:45	47.25	63.875	0	135	56	314.16	4.8	0	0	621.085	2539.1725
08:45 to 09:00	24.75	46.8125	0	83	37	209.88	5.6	0	0	407.0425	2336.04
09:00 to 09:15	27	69.5625	1.75	109	46	264.99	3.8	0	0	522.1025	2186.37
09:15 to 09:30	29.25	75.6875	0	96	54	302.94	4.4	0	0	562.2775	2112.5075

Fig 5.9 Traffic Volume Count for morning

Peak Hour (07:45 to 08:45)	Buses	Trucks & Delivery Vans, Lorry	Container Trailers	Car, Jeep, Vans	Auto Rickshaw	Motor Cycle, Scooter, mopels	Cycles	Peak Hour (07:45 to 08:45)	Buses
Total	288	232	0	452	246	1294	27	0	0

Fig 5.10 Total Traffic Volume Count for morning

TOTAL TRAFFIC VOLUME SURVEY											
Intersection : MGR statue Moolakulam						Shift : Evening					
Direction : Towards Perambai						Weather : Sunny			Sheet No : 1/1		
Time	No. of Fast Moving Vehicles						No. of Slow Moving Vehicles			Total Peak	Hourly Peak
	Buses	Trucks & Delivery Vans, Lorry	Container Trailers	Car, Jeep, Vans	Auto Rickshaw	Motor Cycle, Scooter, Mopeds	Cycles	Cycle Rickshaw	BD/HD Carts		
16:30 to 16:45	24.75	19.25	0	163	45	251.79	4	0	0	507.79	
16:45 to 17:00	36	36.75	0	160	43	236.94	2.2	0	0	514.89	
17:00 to 17:15	56.25	26.25	0	154	36	254.1	2.2	0	0	528.8	
17:15 to 17:30	67.5	19.25	0	122	35	303.6	2.6	0	0	549.95	2101.43
17:30 to 17:45	60.75	21	0	114	30	274.56	2.4	0	0	502.71	2096.35
17:45 to 18:00	31.5	14	0	129	43	418.44	5	0	0	640.94	2222.4
18:00 to 18:15	18	22.75	0	116	15	363.99	5.8	0	0	541.54	2235.14
18:15 to 18:30	27	35	0	190	37	401.94	4.2	0	0	695.14	2380.33

Fig 5.11 Traffic Volume Count for evening

Peak Hour (17:30 to 18:30)	Buses	Trucks & Delivery Vans, Lorry	Container Trailers	Car, Jeep, Vans	Auto Rickshaw	Motor Cycle, Scooter, mopels	Cycles	Cycle Rickshaw	BD/HD Carts
Total	137	93	0	549	125	1459	17	0	0

Fig 5.12 Total Traffic Volume Count for evening

VI. CONCLUSION

Findings of Inventory Survey-These are the major drawbacks/defects are found during inventory survey.

- Improper road markings
- Heavy traffic congestion

- Improper pavement
- No sign boards
- No stop lines
- On street parking
- Absence of signal

Findings of Traffic Volume Count Survey-The Data obtained from Traffic Volume Count Survey have been used to find the Peak Hour for each stretch.

- The major cause of blockage in this junction is due to two wheelers.
- On an average for every 15 minutes around 400 two wheelers pass a single stretch.
- After all the analysis on traffic volume count clogging of vehicles happens between a time frame of 7.45-8.45 am and this is the peak hour in morning and in evening 17.30-18.30 pm was recorded as peak hour.
- In this specific junction major obstruction is caused by two wheelers (65%), four wheelers (17.4%) followed by buses (10%) in morning and in evening major part of the road is covered by two wheelers (54%), four wheelers (26%) followed by buses (13.5%).

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