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Study on time space management in work zones from Tambaram to Chengalpet in NH45

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ABSTRACT

Time Space Management is the management of the flow of traffic with respect to the time duration in the work zones along the highway. Time space management is highly important as it enables in easy understanding of the highway and allowing easy movement of traffic along work zones without traffic jams and loss of precious time. Model analysis is done to prioritize the major risk factors involved in the practices carried out in the work zones. The various risk involved in the road repair process is properly studied with the help of the results collected from the various road contractors and engineers. Based on the findings the average by the mean, mode and the range. The various factors which were found out were formulated with the social sciences method. The tool is highly reliable and enables us in prioritize the various risk based factors and finding out a suitable solution for carrying out of road repair in the work zone. The traffic inflow into the NH45 was carried out in the basis of the classification of time periods as traffic varies with time. The findings comprises of the various high risk factors and a model is formulated for the easier carrying out of work in work zone.

KEY WORDS: Time space management, model analysis, traffic flow pattern and social sciences method

1. INTRODUCTION

The city of Chennai has nearly about 34260 identified companies in its 15 zones of which totally 5196 have a capital paid of more than 50 lakhs, 16459 have a capital paid of between 10 to 20 lakhs and 2304 have a capital paid of less than 10 lakhs (2011-2012) and still companies coming up. This tends to increase the vehicle movement in and out of Chennai by a larger scale. The main feeder road is the NH45 which picks up heavy traffic along the section from Chengalpattu Toll booth to Tambaram. There is also another record of Chennai being in the top place for the most number of accidents occurred in 10 years. The recent file report of the Tamil Nadu Traffic Police states that about 9710 accidents were recorded in Chennai involving 9947 persons out of which 1247 have died (2012-13 report of State Transport Authority of Tamil Nadu). This study purpose is to make sure that when a work zone is formed to repair the road section along this section how easy it can be done and the problems which can be faced when the work is carried out in the section.

The traffic is a nonlinear and complex one as it is dependent on each and every driver, the human instincts are not governed by any law of mechanics as each and every one tends to be different. The traffic flow a particular area can be studied by considering the number of vehicles present in a km of a lane. In case of a normal lane without any traffic for a km there should be only about 18 to 15 vehicles. In case of traffic jam there are about 140 to 150 vehicles per lane, which is very high (Constantinos Antonioua, 2011). Night work/off-peak work involves scheduling work at periods of lower traffic volumes, to reduce traffic disruption, as well as worker exposure to traffic and driver exposure to work zones. Positive protection can reduce the risk to workers and travelers with the use of devices that contain and redirect vehicles, reducing the risk of vehicle intrusion into the workspace (Weng, 2012).

Effective time space traffic management includes assessing work zone impacts and documenting strategies for mitigating the impacts in a transportation management plan. Time space traffic management strategies should be identified based on the project constraints, construction phasing/staging plan, type of work zone, and anticipated work zone impacts. Once these strategies are implemented, they need to be monitored to ensure they effectively manage work zone impacts (Ramezani, 2011).

Aim of study: The aim of the study is to find a proper way to enable the proper study of the traffic condition in the considered section and find out the various issues regarding the work zone on the roads.

Objectives of the study:

The specific objectives are: To study the amount of vehicular passage in the area to be under surveillance, to prepare the questionnaire for the receiving of required data from the road construction companies and to space out the time of operation of the work based on the movement of the vehicle.

Scope of project: The project focuses on improving the efficiency and proper step by step planning of project implementation. Proper utilization of the workforce which is to be utilized without wastage of men material and machinery. Using the information from other work zones to use for the current situation on NH45.

2. METHODOLOGY

The first approach, a literature review was done to extract the various factors involved in traffic in work zones and the traffic related study in the highways. The second approach is to completely study the traffic along the

highway section which is considered. The third approach is to prepare the questionnaire based on the traffic pattern and the problems that are found in work zones. Distribute the questionnaire to the companies. The fourth approach is to collect the relevant data's for the needed for the process and then collect the questionnaires from the companies. The fifth approach is to analyze, evaluate and rank the collected questionnaires with the help of SPSS for statistical analysis. The sixth approach is to form a frame work and ways to overcome the problems.

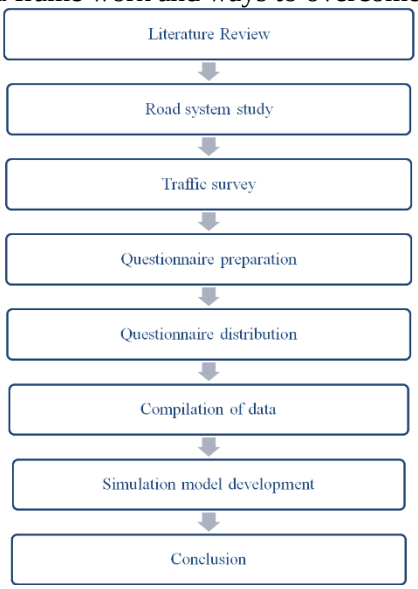

Figure.1. Methodology

Vehicle density: The three critical points being considered for the traffic density are Perungulathur, Vandaloor and Guduvanchery. The traffic density was collected for two weeks during the peak hours for the study of the pattern. The peak hours are three time intervals 7am to 8am, 12pm to 1pm and 4pm to 5pm. These timings are based on the commuter traffic and the schools, college's student movement.

Vehicle density at Perungalathur: The below table shows the vehicle density at Perungalathur which is compiled for the two weeks of data collected.

Table.1. Vehicular Density at Perungalathur

Two Wheeler	Three Wheeler	Four Wheelers (Cars)	Four Wheelers (Heavy Vehicles)
190	44	240	174
158	60	206	160
174	55	232	184

Vehicle density at Vandaloor: The below table shows the vehicle density at Vandaloor which is compiled for the two weeks of data collected.

Table.2. Vehicular density at Vandaloor

Two Wheeler	Three Wheeler	Four Wheelers (Cars)	Four Wheelers (Heavy Vehicles)
258	47	240	143
302	67	187	207
235	55	224	183

Vehicle density at Guduvanchery: The below table shows the vehicle density at Guduvanchery which is compiled for the two weeks of data collected.

Table.3. Vehicular density at Guduvanchery

Two Wheeler	Three Wheeler	Four Wheelers (Cars)	Four Wheelers (Heavy Vehicles)
200	38	209	235
185	46	245	198
179	58	227	211

Discussion on finding: The traffic values as we see in the above tables are very high and this much traffic handling in these roads is difficult when a work zone is set in the particular points. The traffic management for the normal peak hours itself was found to be a highly tough task.

Study analysis

Questionnaire responses: The study comprises professionals in consulting, contractors, engineers and project managers who are involved in the road construction. This resulted in total of 50 questionnaires being distributed and about 35 were returned and the analysis was being done.

Table.4. No. of respondents

Questionnaire	No	Percent
Total Distributed	50	100
Total Returned	35	70
Not Returned	15	30

Questionnaire analysis

Various numbers of authorities when approached helped in proper understanding of the various problems involved in the construction and repair of the roads. The questionnaires collected from the companies are analyzed using SPSS statistical analysis program. The various issues are being dealt accordingly. The road repair is a highly risky issue and proper management is not carried out among the labor force. The problems even though known are not sorted out. Out of the 50 questionnaires distributed 35 were returned and the analysis has been done.

Table.5. Summary of SPSS and rank of various issues have been listed

S.No	Description	Mean	Rank
1	Traffic density study	3.524	1
2	Effect of rain in work zone	3.143	2
3	Level of risk at U-junction	3.048	3
4	Effect of rain in work zone	2.762	4
5	Level of risk in T-junction	2.667	5
6	Effect on people due to the carrying out of repair work on the work zone	2.524	6
7	Requirement of traffic diversion	2.524	7
8	Risk of fatalities	2.048	8

Table.6. Risk scale for analysis

1	Very high risk
2	High risk
3	Medium risk
4	Low risk
5	Very low risk

Problems Formulated: The analysis of the questionnaires has helped in formulating the various problems which occur and in the road repair. The various reasons have been found out and the proper remedies have been formulated for the need

Problems Faced: The various problems which were studied in the questionnaires are given as follows:

- Non calculation of the vehicle density prior to the work commencement.
- Rain causes high hardships in carrying out of work.
- Speed restriction not being followed in the work zone area is highly problem causing.
- The U junctions are the most highly prone zones in case of road repairs.
- The regular road users are effected by the works being carried out in the roads.

Solution for the various problems: Lack of information about the traffic intensity

- Camera's should be installed in advance along the roads to collect traffic intensity.
- The traffic study should be carried out for a period of one month in order to properly understand the current scenario of the traffic.

- The timing of the information collection is classified to 7am to 8am, 11am to 12pm, 4pm to 5pm and 9pm to 10pm.
- Rain related issues
- The season of work being carried out should be considered during the summer or dry period in order to avoid rain related problems.
- In order to tackle the rain related problem proper construction of culverts are to be done to drain of excess water.
- Speed limitation along the work zone should be limited to about 20km/hr.
- The minimum work zone length should be at least 500m and the maximum work zone size should be 5km.

3. CONCLUSION

The time space along which the work zone work should be carried is to be done in timings other than the peak hours. The other major point to be considered is to carry out the work during the proper season and avoiding the rainy season too. The proper space should be allocated between the work zones in case of multiple points. The speed limitation should be properly monitored with the help of sign boards and personel holding or showing red flag for the traffic control.

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