Traffic Management in Urban Area

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Abstract : In recent years the ownership of private vehicles has increased many folds, which is causing difficulty in management of Traffic. Traffic management is the focus area for most urban dwellers and planners. Some of the main concerns for traffic management of big cities is traffic congestion and avoidance which mainly occurs near & at working zone, as these issues cause huge damages on both personal and environmental level**.** In India Traffic Management is rarely conducted during construction. It should be done to reduce numerous problems related to traffic and safety at working site. There are various methods available for traffic management such as video data analysis, infrared sensors, inductive loop detection, wireless sensor network, etc. All these methods are effective methods of smart traffic management. For that study of traffic volume, topography, accident study, time delay study & the study of safety provided at working area is mandatory to do. Implementation of metro rail projects paves way to the construction activities and in this process long term construction work zones are inevitable. Long term work zones on urban roads lead to many problems such as reduction in capacity , increase the travel time delays, queue length, fuel consumption, number of forced merges, and roadway accidents which lead to unaccounted economic losses. So it becomes necessary to study and quantify the impact of mass rapid transit system construction work zones on traffic environment which will further help in estimating the economic loss due to metro rail construction work zone. Through Route Diversion at the stretch of work zone with considering all the factors and its methodology, safety of human and environment van be achieved which enhance the level of comfort and convenience of road users. To achieve the objective of the topic very less fund is required as it require only the analytical studies and some traffic diversion sign boards which direct the road users to their alternate path to reach at destination.

Index Terms - Traffic Management, Traffic control, Route Diversion, Road safety at work zone, Traffic distribution, Traffic diversion.

I. INTRODUCTION

Traffic management is the arrangement, guidance and control of both stationary and moving traffic, including pedestrians, bicyclists and all types of vehicles. Its aim is to provide for the safe, orderly and efficient movement of persons and goods, and to protect and, where possible, enhance the quality of the local environment on and adjacent to traffic facilities. Generally in India Traffic Management is not carried out near or at work zone, but near work zone traffic management is mandatory to do to maintain the level of service of existing road, road safety & to provide comfort and convenience to the road user. Traffic refers to the movement of people, ships, trains, or aircraft between one place to another. Traffic also refers to the people and goods that are being transported. All these movements need appropriate management, to work effectively. Speed, Traffic Flow & Density is basic three parameters of Traffic which essential factor affecting traffic management.

Traffic on roads consists of road users including pedestrians, ridden or herded animals, vehicles, streetcars, buses &other conveyances, either singly or together, while using the public way for purposes of travel. Traffic laws are the laws which govern traffic and regulate vehicles, while rules of the road are both the laws and the informal rules that may have developed over time to facilitate the orderly and timely flow of traffic. Organized traffic generally has well-established priorities, lanes, right-of-way, and traffic control at intersections. Traffic is formally organized in many jurisdictions, with marked lanes, junctions, intersections, interchanges, traffic signals, or signs. Traffic is often classified by type: heavy motor vehicle (e.g., car, truck), other vehicle (e.g., moped, bicycle), and pedestrian. Different classes may share speed limits and easement, or may be segregated. Some jurisdictions may have very detailed and complex rules of the road while others rely more on drivers' common sense and willingness to cooperate. Organization typically produces a better combination of travel safety and efficiency. Events which disrupt the flow and may cause traffic to degenerate into a disorganized mess include road construction, collisions, and debris in the roadway. On particularly busy freeways, a minor disruption may persist in a phenomenon known as traffic waves.

Construction always has some impact on the users of the facility. The various activities required during construction normally cause some disruption to existing pedestrian, bicycle, and motor vehicle patterns. In all but a few instances, the public must have some form of access through or around the work site. The planning, design, and preparation of contract documents for modification of the normal traffic and pedestrian patterns during construction is commonly known as work zone traffic control. The frequency of crashes in work zones is disproportionately higher than at other locations. Therefore, the primary consideration in work zone traffic control is safety for pedestrians, bicyclists, motorists, and personnel on the worksite. Maintaining the full carrying capacity and accommodation for all users is usually not possible during construction. Existing walkways, bicycle accommodation, and motor vehicle travel lanes are narrowed, closed, or rerouted. Even when reductions, closures, and rerouting are not necessary, construction activity often reduces quality of service for roadway users because it can be distracting and cause temporary disruptions. Improving alternative routes of travel, providing temporary facilities, staging work to occur in off-peak

hours, and providing police officer control are ways to reduce the impact of construction on roadway operations. These strategies need to be used in such a way as to maintain the safety of facility users and work crews.

II. REVIEW CONTENT

B.H. Heutinck , M. van den Berg , J. Hellendoorn , L.H. Immers [2006] have performed a detailed case study on Dynamic Route Guidance During Road Maintenance Work. In this article we propose a dynamic traffic management measure which makes use of two different traffic management measures. The first measure is a ramp metering installation, in this case located at an off-ramp. By metering the flow leaving the freeway with a traffic signal, the traffic operation on the freeway is influenced. The result of the measure can be predicted very well, because of the obligated character of the traffic signal. The second measure is dynamic route guidance Dependent on the traffic situation on the freeway, the traffic will be given a route advice. This measure is less obligating than the ramp metering installation, because the road user can decide whether to comply to the advice or not. Currently ramp metering installations are used on on-ramps of the freeway network. In this configuration the flow entering the freeway is controlled via the metering rate. This metering rate is determined depending on the flow characteristics on the freeway. All in all in this research paper the effect of the use of dynamic route guidance during maintenance works is investigated. Dynamic route guidance can improve the traffic operation during maintenance works. A reconfiguration project which will be executed in the upcoming years in The Netherlands is used as a case study. A microscopic traffic simulation model is made of the area and two different possibilities of dynamic route guidance are compared.

Perco Paolo & Dean Sara [2012] did a research on Driving Speed Behavior Approaching Road Work Zone On Two Lane Rural Road. In this study analyses of the speed of vehicles approaching work zones aiming to understand the drivers' speed behaviour. This work shows that drivers do not obey the temporary speed limit and that they reduce speeds only when the lane width is reduced, resulting in high deceleration rates. These results should be taken into careful consideration when designing work zone sites. In this paper speed is one of the most significant factors in road accidents, this study analyzed the speed behaviour of drivers approaching eleven work zones on two-lane rural roads in the attempt to provide useful information for the design process of work zones, ultimately trying to improve the safety of motorists and workers. The results show that the actual speed at the beginning of the work zone is always higher than the temporary posted speed limit and that the difference usually exceeds 20 km/h. However, this difference is reduced if the work zone has a physical reduction of the carriageway width and a redirection of the normal path of travelling vehicles. On the other hand, the results also show that in this case the deceleration rate in the proximity of the work zone can be high. Therefore, both these aspects should be considered in the design process of the work zone. The results of this study seem to confirm that the presence of a physical reduction of the carriageway width can be useful in reducing speed, but consequences on accident occurrence should be studied in the near future.

Essam Radwan, Zaier Zaidi, and Rami Harb [2011] had evaluated behavior of variable speed limits in work zone while merging the dynamic lane. The main objective of Operational Evaluation of Dynamic Lane Merging in Work Zones with Variable Speed Limits is to evaluate the operational effectiveness of the proposed Dynamic Early Lane Merge (DLM) systems. In this research found, through the simulation of the above mentioned scenarios, that for low and medium volume levels (V500, V1000 and V1500) there is no significant difference between the MOT (Maintenance of Traffic) plans. For higher volume levels (V2000 and V2500), late SDLMS (Simplified Dynamic Lane Merge System) with and without VSL (Variable Speed Limit) produced higher mean throughputs for all compliance rates and truck percentages except when demand volume was 2500 vph and compliance of 60%, where it produced significantly lower mean throughputs. It can be inferred from the simulation results that integrated SDLMS and VSL systems have better performance in terms of traffic mobility than existing individual controls and also shows that this integration has more potential than each individual systems.

Spiliopoulou, M. kontorinaki, I. Papamichail, M. Papageorhiou [2014] did a research on Real Time Route Diversion Control At Congested Off-Ramp Areas. In which they used dynamic route diversion concept in order to avoid recurrent motorway congestion which is triggered by a saturated off-ramp. The analytical results shows that both proposed route succeed in maintaining the off-ramp queue length within the off-ramp bounds, thus improving the traffic conditions on the motorway mainstream substantially, compared to the case that no route diversion is required for off-ramp network.

Ravi Bhutani, Dr.Sewa Ram & Dr.Kayitha Ravinder [2016] have found out the Impact of Metro Rail Construction Work Zones on Traffic Environment and quantify the unaccounted direct and indirect economic loss. Systematic work zone scheduling and traffic management techniques are required to be implemented to reduce these impacts of work zone. Development of shockwaves should be checked and can be controlled by altering the traffic signal timings. Since the maximum percentage of economic losses is due to loss in time by bus passengers in the work zone therefore public transport should be given priority in the work zones. Restricting one or more types of vehicle in peak hours in the work zone area could be one of the traffic management schemes which can be adopted in work zones.

Ninad Lanke & Sheetal Koul [2013] have proposed A Radio Frequency Identification (RFID) system consists of RFID controller and RFID tag for Smart Traffic Management System. The RFID controller consists of RFID interrogator. This interrogator is used for the communication with the RFID tag. RFID tags are wireless devices which make use of radio frequency electromagnetic fields to transfer data, which is used for identifying and tracking of the objects. Tags information can be stored in a non-volatile memory. Tag consists of a Radio Frequency transmitter and receiver. Each tag can be assigned a unique serial number. They suggested a speed detector device, Automatic detection of speed limit Violation & automatic billing toll charges

system to detect those vehicles that travel beyond the design speed and get punished them by fining them. The proposed system aims at effective management of traffic congestion. It is also cost effective than the existing system.

Robert L. Bertini & Ahmed M. El Geneidy [2006] have research on Advanced Traffic Management System, in which initially they went through the implementation of Intelligent Transportation System for system management purpose. For that they kept data which is collected for ITS and elaborate those data for Advanced Traffic Management System (ATMS). Ten ITS systems will be introduced with some examples of how archived data have been used to provide evidence for the effectiveness of these systems & those are as follows: Freeway management, Incident management, Transit management, Arterial management, Emergency management, Electronic payment, Traveler information, Crash prevention and safety, Operations and maintenance, Road weather management. After studying all the ten system it was concluded that each system is not capable to stand alone to manage whole transportation system.

Ross Baseman, Jason Wasson, Darcy Bullock worked on Real-Time Measurement of Travel Time Delay in Work Zones and Evaluation Metrics Using Bluetooth Probe Tracking. The research describes the collection and use of 1.4 million travel time records that were collected over a 12-week period in 2009 to evaluate and communicate quantifiable travel mobility metrics for a rural interstate highway work zone along I-65 in north-western Indiana. The effort involved the automated collection and processing of Bluetooth probe data from multiple field collection sites, communicating travel delay times to the motoring public, assessing driver diversion rates, and developing proposed metrics for a state transportation agency to evaluate work zone mobility performance. Collected travel time profiles were compared with traditionally measured hourly flows in both incident and non incident conditions. Through the 12-week period over which work zone performance was measured, the work zone had 422 h of congested conditions in which travel time delay was greater than 10 min. Despite the display of real-time delay measurements to the motoring public through portable dynamic message signs, a negligible percentage of the travel probes were observed to divert in advance of the congested work zone through self-guidance. Implementation of a targeted alternate route starting the weekend of July 24 resulted in an increase of observed probes diverting along the trail-blazed route from none to more than 30%. The paper concludes by suggesting that acquisition of work zone travel time data provides a mechanism for assessing the relationship between crashes and work zone queuing. Real-time monitoring of these travel time data may also enable future contracts to include innovative travel time reliability clauses.

Sina Hooshdar and Hojjat Adeli researched on variable sign used to regulate the traffic near workzone. The research work is entitled as “Toward Intelligent Variable Message Signs in Freeway Work Zones: Neural Network Model”. An increasingly popular method of managing freeway traffic is to use variable message signs (VMS). A neural network model is presented for real-time control of a VMS system in freeway work zones. The neural network is trained to detect the start of a queue in a work zone and provide a message in the freeway upstream. The travelers are informed about the congestion in a work zone when a queue starts to form. The intelligent VMS system can be trained with data for different periods within a day, such as morning and evening rush hours, non rush hours during the day, and night, for a more detailed traffic flow prediction over the period of one day. Two different neural network training rules are used: the simple back propagation (BP) and the Leven berg–Marquardt BP algorithms. The network is trained using data adapted from the measured data. Based on different numerical experiments it is observed that the convergence speed of the Leven berg–Marquardt BP algorithm is at least one order of magnitude faster than the simple BP algorithm for the work zone traffic queue detection problem.

Wendy Weijermars & Henk Spittje [2008] did a detailed investigation on Analysis Of Traffic Safety At Road works. It is cleared from the investigation that more crashes occurred at road works in due to heavy traffic of heavy vehicles. Especially on rural roads, road works crashes are relatively often rear-end crashes, crashes with parked vehicles and crashes with objects. To improve traffic safety at work zones in the Netherlands, measures are recommended to stimulate and improve the application of the CROW guidelines for safe road works. To be able to do this effectively, it should be investigated why the guidelines are not applied correctly. Possible measures include informing and educating road workers and other involved parties, and increasing the enforcement of the application of the guidelines. Also, it is recommended to pay more attention to cyclists. To prevent unsafe behavior as much as possible, cyclists should be guided past work zones as much as possible.

III. ACKNOWLEDGMENT

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