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A Review on Area Traffic Management in Urban Area

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ABSTRACT: *Urban Traffic Management and Control (UTMC) Systems link together several different computer applications to improve traffic management. They are a development of existing urban traffic control systems (UTC) and will form the next generation of traffic systems. Within a UTMC framework several traffic management and control applications are able to exchange data freely by using a common specification for the storage and transfer of data. By integrating the technology a wide range of traffic management options will become possible. The following are examples of applications that could be integrated to form a UTMC system:*

❍ urban traffic control; ❍ public transport priority; ❍ pollution monitoring; ❍ real–time public transport and traffic information; ❍ enforcement measures monitoring; ❍ incident detection; ❍ active traffic restraint based on on–line data. ❍ variable message signs providing route diversions and car parking information; and ❍ vulnerable road users' priorit

I.INTRODUCTION

1.1 PROBLEM CONTEXT:

The rapid growth of urban population generates problems like congestion with increase in traffic, unbalanced land use pattern and its distribution under different land users, growth of slums in the core as well as at the peripheries of the urban areas and degradation of environment etc. in order to bring a balanced urban growth, a proper understanding of geographic characteristics, land use distribution and population levels predicted to a future date may help on urban planner to develop sound and rational planning methodologies for solving the urban problems.

What are the general issues on traffic in given area?

1.2 TRAFFIC:

- **Speed and congestion:**

Traffic speed:

Speed is one of the most important characteristics of traffic and its measurement is a frequent necessity in traffic engineering studies speed is the rate of moment of traffic of specified components of traffic. Spot speed is the instantaneous speed of a vehicle at a specified location.

For a geometric design of roads, it is necessary to have a realistic estimate of the speeds at which vehicles travels based on the speed studies, the design speed can be selected and other geometric elements of design such as horizontal curvature, vertical profile, sight distance and super elevation are be determined. For regulation and control of traffic operations, spot speed studies are needed. For analyzing the causes of accidents identifying any relation between speed and accidents.

Traffic congestion:

In all situations where capacity cannot be provided for big demands, waiting and delay are inevitable, in low traffic especially the peaking phenomenon is very pronounced giving rise to congestion is the impedance and delay imposed by one vehicle on another. For given road the larger the volume, the grater the chances of one vehicle delaying the other and hence greater is the congestion. Whenever congestion occurs the costs are affected delay to people, freight and vehicles is one component of the congestion cost.

- **Level of service:**

A term closely related to capacity and often confused with it is service volume. When capacity gives a quantitative measure of track, level of service of (LOS) tries to give a qualitative measure. A service volume is the maximum no of vehicles passengers or the like, which can be accommodated by a given facility or system under given condition at a given level of service.

- **Traffic flow/ Volume:**

Number of vehicles passing a particular point of road way during unit time. Traffic volume expressed as vehicle per hour or vehicle per day.

- **Daily volume:**
- Average daily traffic (ADT) consider day to day variation of traffic
- Annual average daily traffic (AADT) considers seasonal variation of daily traffic within a year.
- **Capacity of the road network:**

Capacity of a facility is defined as the maximum hourly rated which persons or vehicles can reasonably be expected to traverse a point or uniform section of a lane or roadway during a given time period under prevailing roadway, traffic control conditions.

- **Traffic demand:**

It is the application of strategies and policies to reduce travel demand or to re distribute demand in space or in time. In transport as in any network managing demand can be a cost effective alternative to increasing capacity.

1.3 Effects of traffic:

Traffic flow:

Speed limit lead to a decrease in the average speed of traffic. The largest decreases were observed in free flow situations. In congested situations, the decrease was very small and in some cases there was even a slight increase. For almost every location, the variation in travel times decreased. Again, the largest decreases were at free flow. Network effects were minimal. The future effects were the same for most of the locations.

Congestion:

Wasting time of motorists and passengers ("opportunity cost"). As a non-productive activity for most people, congestion reduces regional economic health. Delays, which may result in late arrival for employment, meetings, and education, resulting in lost business, disciplinary action or other personal losses. Emergencies: blocked traffic may interfere with the passage of emergency vehicles traveling to their destinations where they are urgently needed.

Traffic safety:

The number of accidents and victims decreased substantially (around 60 and 90%). The positive effects were caused by lower speeds and more homogeneous traffic flows because of route control. The effects for the other locations were estimated with knowledge based on empirical studies. On average, the total number of accidents decreased by 35% and the total number of injury accidents by 47%. In 2010 and 2015, the expected effects were less because of increasing intensity and congestion.

Pollution:

One of the most harmful effects of traffic its impact on the environment. Despite the growing number of hybrid vehicles on the road, cars stopped in traffic still produce a large volume of harmful carbon emissions. Besides contributing to global warming, these emissions can cause more short-term and localized problems, such as smog and increased respiratory problems in a community due to poor air quality.

1.4 TRAFFIC SYSTEM MANAGEMENT:

Traffic flow:

Traffic flow is the study of interactions between vehicles, drivers, and infrastructure (including highways, signage, and traffic control devices), with the aim of understanding and developing an optimal road network with efficient movement of traffic and minimum traffic congestion traffic problems.

The theory of traffic flow can be defined as a mathematical study of the movement of vehicles over road network. The subject is a mathematical approach to define characterizes and describes aspects of vehicular traffic. Road traffic inevitably causes congestion. Queuing and delay occur in all congested situation. Delay cause economic loss since time means money in the modern age. A study of queuing and delay is, therefore of great relevance to a traffic engineer.

Regulation:

The motor vehicle is a machine in charge of a human being and this makes it necessary for the formulation of suitable regulation for safe operation of traffic and enforcement of this regulation. The regulation should be framed so as to achieve safe and efficient movement of traffic and pedestrians, with out at the same time infringing unduly upon the individual rights of the road users.

The design of street facilities and the safe operation of traffic are vitally connected with the traffic regulations. Regulation of road user's deal with the rules regarding to pedestrians, cyclists and motor cyclists.

Parking base:

One of the problems created by road traffic is parking not only do vehicles require street space to move about, but also do they require space to park where the occupants can be loaded and unloaded

Problems:

Parking is the loss of street space and the attendant traffic congestion. The capacity of the street is reduced, the journey speed drops down and the journey time and delay increase. The man curves associates with parking and unparking are to cause accidents.

Traffic planning:

Rising trends in growth of population and traffic around cities and the steady growth of national productivity create a continuing demand for improvements in highway facilities.

To survey the traffic condition and infrastructure in a T.V tower to Kothapet T junction corridor in Hyderabad and suggest possible solutions to facilitate improved traffic conditions.

LITERATURE SURVEY

Area traffic management deals with the problems associated with the traffic and transportation issues related to the given area. The integration of all neighboring areas gives a solution to the problems in a given urban area.

Some of the works related to area traffic management are given below

2.1. HMDA REPORT:

The comprehensive traffic study conducted by HMDA (2014) indicates the following suggestive measure.

Signs and signals:

Suggesting the installation of signs and signals for effectively regulating and controlling the traffic flows for efficient and safe operations, identifying the places where traffic signals are to be installed and traffic signs and markings are to be posted to help the traffic control and regulation with least manual intervention. Also stand at the signal as a watch log to ensure the compliance by the road users. Identify corridor of major and longer movements and design signal coordination and synchronization for according priority to heavier flows.

Removal of damaged or broken down/abandoned vehicles:

Arranging the removal of damaged or broken down vehicles which are hindering the traffic flow. Coordinate with road owning agencies to get any disabled vehicle or materials causing physical obstruction to the traffic flows removed.

Local area traffic management:

The main objectives of a local management study are to address road safety issues, traffic speed and volume issues, parking problem and improve the residential environment. The process involves evolving appropriate circulation system for traffic both vehicles and pedestrians and extensive community consultation leading to the developed of a traffic management plan for the local areas.

Local area traffic management studies:

- Analyze existing traffic condition in a local area
- Aims to improve safety and residential environs
- Consider the impact of traffic on an area basis, and
- Involves the community in identifying issues, developing solutions and aims to achieve majority support.

Traffic management measures:

- Intersection improvement and traffic signals installations including the modern corridor traffic control system.
- Optimization of traffic signal, installation of traffic actuated signals, etc to improve traffic system capacity, quality and safety.
- Grade separation of major intersection where at grade improvement would be inadequate.
- At grade and grade separated pedestrian facilities particular in the vicinity of rail/mmts/metro station and transport terminals.
- Provision of protected raised footpath facilities on either side existing major road corridors.

- Full grade separated railway crossing for vehicular traffic.
- Grade separated railway crossing for pedestrian traffic to minimize pedestrian free passing across rail corridors or at high intensity pedestrian corridors and major roads.
- Demand management measures to secure maximum social value from network use.
- Improving the enforcement efficiency and improvement management capability.
- Parking policy in general

Proposed cycle tracks:

A wide variety of vehicle types (including bicycles, pedestrians and animal drawn vehicle) share the same road space in HMA. This is no specific law to segregate the non-motorized and motorized modes. All modes of transport move under sub-optional condition in the absence of separate facilities for NMVS. These disrupt the smooth flow of traffic in all lanes and make bicycling more hazardous. Therefore, providing a separate bicycle track would make more space available for motorizes modes and make bicycling less hazardous. It is also obvious that in the absence of segregated NMVS lanes on arterial roads, it is not possible to provide designated lanes for buses. Though separate bicycle lanes are not necessary on all the roads, the consideration is on speed and congestion on roadways. If the motor vehicles operating speeds are higher than 40 km/hr, it is advisable to have a special bicycle lane depending upon the volume of cycle traffic to avoid hazard.

III.Study area description and surveys conducted

3.1 Description of the corridor:

For the present study, selected the corridor from TV tower to Kothapet junction in Hyderabad. The corridor is having wide roads with three T-Junction namely MoosarambaghGaddinnaram and Kothapet. It is observed that all intersections mentioned above are overloaded with heavy traffic moving along the corridor.All intersection are provided with traffic signals each intersection the signals are having three phases. The corridor of NH-65 passing through Hyderabad and is one of the main roads in the Hyderabad city serving the traffic coming from Nalgonda cross roads and travelling towards Moosarambagh and Dilsukhnagar etc. The traffic at intersection is saturated in all phases. The condition of the roads is found to be good along the corridor, having the median at the centre.

The following table gives the details of the study corridor:

S.No	Name of the road	Length(m)
1	Moosarmbagh to Dilsuknagar	1100m
2	Dilsuknagar to Chaitanyapuri	800m
3	Chaitanyapuri to Kothapet	800m

Table 3.1: details of corridor

Intersection:

As far as the study, the corridor from TV TOWER to KOTHAPET in Hyderabad is selected. The three stretches of the intersection which are selected along the corridor, are

(i) T V tower junction
(ii) Gaddainarram junction
(iii) Kothapet junction

(i) T V tower junction:

In this junction the traffic comes from Nalgonda cross roads, Amberpet and Dilsuknagar. There is a lot of congestions in this junction. In this junction three bus stops is there just aside the road, this causes the traffic interruption.

Fig.3.1: T.V tower junction

(ii) Gaddinnaram junction:

This junction have the traffic flow emerges from Saroornagar, Dilsuknagar and Nalgonda cross road. In this stretch is narrow at the junction due to the temple is there just aside the road and no parking place is there. So this causes traffic problems.

Fig.3.2: Gaddiannram junction

(iii) Kothapet junction:

This stretch has the flow from L.B nagar, Huda complex and Dilsuknagar. In this stretch we have two bus stops aside the road, these causes the traffic problems.

Fig.3.3: Kothapet junction

General habitation i.e., shops, fruit markets and shopping malls:

- In this corridor there is a central fruit market at Kothapet. In the middle of the road there is a temple and it is causing traffic congestion.
- In the morning the huge vehicles coming from and into the fruit market and there is no parking for the vehicle for unloading.
- The vehicles are standing in queue in the road for the entry of the fruit market,causing a lot of traffic congestion in the morning hours.
- In Kothapet, a temple is existing in the middle of the road at Omni hospital causing the traffic congestion.
- At Chaitanyapuri bus stop there is drainage passing by the side of the road causing the traffic congestion due to occupation of road space the narrow road.
- At Dilsuknagar traffic signal, there is a graveyard in the middle of the road and it is causing the traffic congestion at signals.
- There is no proper road crossing for the pedestrians at Dilsuknagar.
- At Dilsuknagar there are footpath vendorsbeside of the main road causing the traffic problem.
- At the shopping malls there are no proper parking for the customers. Therefore the customers are parking at the curb side of the road and this is causing traffic congestion.

Service road:

A service road is a local road running parallel to a main carriage way with limited access road. A service road is often used to provide access to private driveways, shops, houses, industries or farms, Where parallel high-

speeds roads are provided as part of major highway, these area also known as local-express lanes.

A service road is a paved path this is used for the transportation and travel is local areas from one street to another. Service lanes closely related to the service road are common in metropolitan area and in small rural towns.

Service lanes are technically not classified as roads due to their purpose as a bridge from one road to another and due to the architectural standard that they are not as wide as standard road. There is also some disadvantage of using service road.

When service roads are used without controlling the access to main road, at every intersection an intersecting road runs from one side to another the number of comfits points increase one fold for each service road. This is because each service road is itself another intersection.

Parking vehicles in service road is compelling local traffic line non motorized vehicles and slow moving vehicles are shifting to the main corridor, creating congestion.

TRAFFIC FLOWS

Kothapet junction:

S.No	Time	Buses	3-wheeler	2-wheeler
1	Moring peak 8am-11am	333	1594	1551
2	Evening peak 5pm-8pm	273	838	1347

Table.3.2: Kothapet to Dsnr (straight)

S.No	Time	Buses	3-wheeler	2-wheeler
1	Moring peak 8am-11am	13	143	366
2	Evening peak 5pm-8pm	4	143	239

Table.3.3: Kothapet to Huda complex (left)

S.No	Time	Buses	3-wheeler	2-wheeler
1	Moring peak 8am-11am	15	725	861
2	Evening peak 5pm-8pm	10	967	772

Table.3.4: Huda complex to Dsnr (left)

S.No	Time	Buses	3-wheeler	2-wheeler
1	Moring peak 8am-11am	9	638	1218
2	Evening peak 5pm-8pm	12	1127	1736

Table.3.5: Huda complex to LBnagar (right)

TRAFFIC FLOWS

S.No	Time	Buses	3-wheeler	2-wheeler
1	Moring peak 8am-11am	952	4476	3968
2	Evening peak 5pm-8pm	836	3922	3737

Table.3.6: Dsnr to LBnagar (straight)

S.No	Time	Buses	3-wheeler	2-wheeler
1	Moring peak 8am-11am	16	1900	1332
2	Evening peak 5pm-8pm	16	1718	1263

Table.3.7: Dsnr to Huda complex (right)

Gaddiannaram junction:

S.No	Time	Buses	3-wheeler	2-wheeler
1	Moring peak 8am-11am	209	1229	2859
2	Evening peak 5pm-8pm	181	1165	2731

Table.3.8: Dsnr to Koti (straight)

S.No	Time	Buses	3-wheeler	2-wheeler
1	Moring peak 8am-11am	0	44	123
2	Evening peak 5pm-8pm	0	46	116

Table.3.9: Dsnr to Ganga theatre (left)

S.No	Time	Buses	3-wheeler	2-wheeler
1	Moring peak 8am-11am	18	881	3290
2	Evening peak 5pm-8pm	32	848	3141

Table.3.10: Ganga theatre to Koti (left)

Dsnr to maruthinagar				
TIME	**BUSES**	**CARS**	**2 WHELLER**	**PCU**
8:00 to 8:20	0	21	48	45
8:20 to 8:40	0	24	47	48
8:40 to 9:00	1	21	45	47
9:00 to 9:20	0	22	49	47
9:20 to 9:40	0	23	42	44
9:40 to 10:00	1	25	48	51
10:00 to 10:20	0	26	47	50
10:20 to 10:40	1	21	45	47
10:40 to 11:00	1	23	41	47
TOTAL	**4**	**180**	**412**	**476**

Dsnr to maruthinagar				
TIME	**BUSES**	**CARS**	**2 WHELLER**	**PCU**
17:00 to 17:20	0	22	41	43
17:20 to 17:40	0	21	42	42
17:40 to 18:00	1	20	43	47
18:00 to 18:20	0	19	41	41
18:20 to 18:40	1	18	39	38
18:40 to 19:00	0	13	38	32
19:00 to 19:20	1	18	41	42
19:20 to 19:40	0	19	41	40
19:40 to 20:00	0	20	42	41
TOTAL	**3**	**152**	**368**	**366**

Survey data on traffic volume

Maruthinagar to Kothapet				
TIME	**BUSES**	**CARS**	**2 WHELLER**	**PCU**
8:00 to 8:20	1	25	41	46
8:20 to 8:40	1	24	42	45
8:40 to 9:00	0	26	43	48
9:00 to 9:20	0	24	39	44
9:20 to 9:40	0	25	38	43
9:40 to 10:00	0	26	37	45
10:00 to 10:20	0	24	41	45
10:20 to 10:40	1	25	40	45
10:40 to 11:00	0	25	39	45
TOTAL	**3**	**224**	**360**	**406**

ANALYSIS & RESULTS

4.1 Traffic flow:

In mathematical and civil engineering traffic flow is study of interaction between vehicle, drivers, and infrastructure (including high ways, signage and traffic control devices) with aim of understanding and developing an optimal road network with efficient movement of traffic and minimal traffic congestion.

Traffic flow is the study of the movement of individual drivers and vehicle between two points and interaction they make with one another. Traffic flow in vehicle per hour in PCU converts the no of vehicle passing in particular road network they car, bus, 2 wheeler different types of vehicle passing that to convert by PCU of traffic flow.

The PCU is a metric used in transportation engineering to assess traffic flow rate on a high way .a passenger car equivalent is essentially the impact a mode of transport has a traffic variable (such as head way, speed, den city) compared to a signal car typical values of PCU .

- Private car: 1
- Motor c cycle : 0.5
- Bicycle: 0.2
- Bus, tractor, truck:3

In kothapet junction:

The number of vehicle passing through junction that is concerted to PCU values.

WAY	AVERAGE PCU
L B. Nagar to Dsnr	2886
Huda to Dsnr	1294
Dsnr to Huda complex	2504
Huda complex to Lbnagar	1653
Dsnr to Lb. nagar	8805

Table.4.1: Average PCU value at kothapet junction

In gaddiannaram junction:

The number of vehicle passing through junction that are concerted to PCU values.

WAY	AVERAGE PCU
Dsnr to Koti	3181
Dsnr to Ganga theater	107
Ganga theater to Koti	2553
Ganga theater to Dsnr	1008
Koti to Ganga theater	1008
Koti to Dsnr	2508

Table.4.2: Average PCU value at gaddiannaram junction

In TV tower junction:

The number of vehicle passing through junction that is converted to PCU values.

WAY	AVRERAGE PCU
Dsnr to koti	6811
Dsnr to Amberpet	3606
Koti to Dsnr	2391
Kotito Amberpet	322
Amberpet to Dsnr	3371
Amberpet to Koti	1654

Table.4.3: Average PCU value at TV tower junction

4.2 Intersection details:

As far as our study there are interactions

(i) TV. Tower junction

(ii) Gaddinnaram junction

(iii) Kothapet junction

Signal timing:

The analysis of data on signal timing is given as follows:

(i) TV. Tower junction:

Way	Green(Sec)	Red(Sec)	Amber(Sec)
Koti to Dsnr	60	30	5
Amber pet to Koti	30	60	5
Dsnr to Amber pet	30	70	5

Table.4.4: Signal time at TV tower junction

(ii) Gaddinnaram junction:

Way	Green(Sec)	Red(Sec)	Amber(Sec)
DsnrtoKkoti	60	60	5
Ganga theater to Dsnr	35	70	5
Koti to Ganga theater	35	70	5

Table.4.5: Signal times at Gaddiannaram junction

(iii) Kothapet junction:

Way	Green(Sec)	Red(Sec)	Amber(Sec)
LBnagar to Dsnr	40	70	4
Dsnr to Huda complex	30	60	4
Huda complex to Lb. nagar	20	70	4

Table.4.6: Signal times at Kothapet junction

4.3 Level of service:

Lane width: 15m Average speed: 20kmph

WAY	AVERAGE PCU	LOS
L B. Nagar towardsDsnr L.bnagar to Dsnr Huda to Dsnr	4180	0.95
Dsnr towardsHuda Dsnr to Huda L.bnagar to Huda	2971	0.88
Dsnr towards Lb. nagar Dsnr to Lb. nagar Huda to Lbnagar	3955	0.89

Table.4.7: LOS atKothapet junction

V.CONCLUCTION & RECOMMANDATION

5.1 . Level of service:

Where the critical v/c ratio is less than 1.0 but some lane groups have v/c ratios greater than 1.0 the green time is generally not appropriately apportioned, and a retiming using the existing phasing should be attempted.

- The LOS of the corridor is found to be "D" class.
- The road was constructed to serve as an urban road, but it is a part of N.H 65.
- An urban road preferable should have "B" class, therefore congestion is Sean.
- To increase the LOS necessary steps should be taken to prevent the entrance of NMV, stop road side parking, organize proper pedestrian crossings; introduce optimum traffic signal system.
- Construct foot over bridges at necessary point for pedestrian crossing.

5.2. Flows:

In this corridor vehicle average speed less it creates the more congestion if average speed and capacity of road network in more it's give more level of service.

Further scope of work

Due to constraint of time, work on facilities of off-street parking cold not be done in this project. Future study may explore the possibility of creating off-street parking at places liable VM home, fruit market and Malakpet quarters to release traffic congestion.

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