TRAFFIC MANAGEMENT IN URBAN AREA

MORA MADHU
M Tech Student,
Mail:madhumora1991@gmail.com

Y VARUN KUMAR
M Tech Student,
Mail:varunchary12@gmail.com

DR. R. RAMESH REDDY
(Professor),
Mail:rameshlalitha@yahoo.com

ABSTRACT

Area traffic management is an essential prerequisite for the effective planning in urban area. Most of the traffic problems are caused by certain deficiencies in planning, engineering and management issues. The traffic congestion, vehicular delays, risk of accident, uneconomic travel and other psychological strains are the observed features in the urban area.

The development of built up areas is a reflection of land use change in urban activated areas. The road infrastructure density, its functionality, hierarchical connectivity should reciprocate to the demand profiles like trip length, trip interactions and trip densities. An approach for identification of urban longitudinal and transitional corridors through the development of primary road system is suggested in this study. This approach suggests the decongestion measures in mixed traffic conditions by identifying the operational routes for the external based trips. The relational patterns with traveler characteristics (which are a reflection of land use density) are used for developing a policy on corridor identification and cost optimization in travel. This will also promote a way for environment sustenance in mixed traffic, improper land use development and non-planned road network conditions.

A lead on user average trip lengths, trip orientation and trip intensity is obtained from the travel surveys and its successive analysis. The data used in the study is obtained by the comprehensive surveys like Traffic studies, Video graphic surveys, Road densities, road hierarchical connectivity and road functionality have been ascertained from the source of satellite data and the relevant field surveys. The analysis has given a lead for identifying the corridors needed for development in urban areas. The planning is made based on the concepts of user preferences, static analysis of land use , road length and distribution of access points, trip behavioral patterns, future travel demand , static – dynamic correlations and prioritization of routes.

This project envisages studying the various issues related to traffic congestion like level of service, speed, congestion, pedestrian, facility in a given local area. The study of including congestion survey to capture the traffic data in a corridor covering from TV tower to Kothapet on the NH-65 in Hyderabad.

From the survey data the level of service on the street was found out an indicates level of "D" indicating high congestion the facility for parking of vehicles were in adequate unauthorized parking at many location was identification proper walkways for pedestrians were absent and pedestrians crossings were also not provided. The observation to traffic due to unauthorized encroachment was observed.

Having identified the deficiencies from the analysis of the data from survey, recommendations area made to improve the condition by necessary intersection.

INTRODUCTION

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.

Traffic infrastructure:

1. Intersections:

An intersection is defined as the general area where two or more highways join or cross, within which are included the roadway and road side facilities for traffic movements in that area. An intersection leg is that part of any one of the roadways radiating from an intersection proper.

The importance of design of the intersection stems from the fact that efficiency of operation, safety, speed, cost of operation and capacity are directly governed by the design. Since an intersection involves conflicts between traffic in different direction, its scientific design can control accidents and delay and can lead to orderly movement of traffic. Intersection represents potentially dangerous location from point of view of traffic safety.

The following principles should be considered in a good design:

- The number of intersections should be kept at minimum. If necessary, some minor roads may be connected with each other before joining a major road.
- The geometric layout should be so selected that hazardous movements by drivers are eliminated. This can be achieved by various techniques such as channelizing and staggering.
- The design should permit the driver to discern quickly either from the layout or from traffic signs the path he should follow and the actions of merging and diverging. This can be achieved by good layout, traffic islands, signs and carriageway markings. Good visibility improves safety.
- The layout should follow the natural vehicle paths. Smoothness, in contrast to abrupt and sharp corners, should guide minor streams into stopping or slowing down positions.
- The number of conflict points should be minimized by separating some of the many cutting, merging or diverging movements.
- Vehicles that are forced to wait in order to cross a traffic stream should be provided with adequate space at the junctions.

Traffic management:

Scope of the traffic management measures:

Many of the urban streets carry traffic volumes for which they were simply not designed. The inevitable result is delay, congestion and accidents. The resultant ills can be get over to some extent by controlling the traffic, imposing regulatory measures and enforcing management techniques, so as to make the most economic use of the streets. Traffic control measures include traffic signals and these have been already considered. Regulatory measures include restriction on speed, parking, and size of vehicle and so on, and these also have been discussed separately.

The fundamental approach in traffic management measures is to retain as much as possible existing pattern of streets but to alter the pattern of traffic movement on these, so that the most efficient use is made

to the system. In doing so, minor alternations to traffic lanes, islands, curbs etc. are inevitable, and are part of the management measures. The general aim is to reorient the traffic pattern on the existing streets so that the conflict between vehicles and pedestrians is reduced.

Some of the well-known traffic management measures are:

- Restrictions on turning movements
- One-way street
- Tidal-flow operations
- Exclusive bus-lanes
- Closing side-streets.

Travel demand management:

Travel demand management techniques are aimed at reducing the traffic flows, especially during the peak hours. Some of the techniques commonly adopted are:

- Car pooling and other ride-sharing programs
- Peripheral parking schemes
- Chartered buses (institutional buses) to serve areas of trip origins to common work place
- Staggering of office hours and flexible time of work
- Internal shuttle service in the CBD
- Parking restraint
- Road pricing
- Entry fee
- Priority for buses in traffic
- Restriction on entry of trucks during day-time.

Area traffic management:

Area traffic control can be defined as a technique which provides for a centralized control of numerous signal installations distributed throughout an urban area, such that there is a planned coordination between signals at different junctions. The technique invariably employs digital computers for achieving the desired objective.

The objectives in an area control system are one or more of the following:

- Minimizing journey time for vehicles
- Minimizing vehicular stops, resulting in less noise, less pollution and less consumption of fuel
- Reducing accidents
- Discouraging use if certain areas
- Minimizing person-time.

Bus bays:

A bus turnout, bus pullout, bus bay, bus lay-by (UK),[1] or off-line bus stop is a special zone on the side of the main roadway (or bus/tram lane) for primarily buses to stop for a designated bus stop in order to pick up and drop off passengers. It is an indented stopping area for buses

Pedestrian ways:

A pedestrian a person traveling on foot in the street, whether walking or running. In some communities, those traveling using tiny wheels such as roller skates, skateboards, and scooters, as well as wheel chair user also included as pedestrians. In modern times, the term mostly refers to someone walking on a road or footpath, but this was not the Pedestrian ways is a place or space for pedestrian activity and functional activity as pedestrian circulation space that is separate from circulation of

other vehicles. Pedestrian ways should convenience for people.

PROBLEMS CAUSE DUE TO PARKING:

Congestion:

Parking is the loss of street space and the attendant traffic congestion. The capacity of the street is reduced, the journey speed down and the journey time and delay increase.

Accidents:

The sharp curves associated with parking and unpacking are known to cause road accidents. Careless opening of the doors of parked vehicles, moving out of a parked position and bringing a car to the parking location from main stream of traffic are some of the common cause of parking accidents.

OBJECTIVE:

The objective of the present study is to identify the traffic problems in a given corridor and to find the solutions.

The parameters considered are

- Traffic flows
- Congestion levels
- Pedestrian facility
- Parking problems
- Bus bays also stops

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

Some of the publication in IRC journals through list on solution to some of traffic problems:

1. Satish Chandra &Raja Restage (2012-vol: 73) explain the mixed traffic analysis of roundabout.

- Traffic circle is a channelized intersection where traffic moves around a central island
- Asimple method is proposed on the present study to determine entry capacity of a roundabout which consider only the circulating flow
- It can be then be used for making quick estimate of entry capacity by traffic engineer is while evaluating the alternate plans of traffic management and capacity augmentation.

2. M.V.L.R. Anjaneyules & N.Nagaraju (2009-vol: 70-1) explain modeling congestion on urban roads using speed profile date.

- Traffic congestion on urban and suburban area has ground from mere annoyance to a severe problem
- Congestion is explain in two percentage congestion and co efficient of variation speed
- For each of these levels of service, the demarcation limits in terms of three parameters percentage congestion, coefficient of variation of speed and mean velocity.

3. V.THAMIZH & K.KRISHNAMURTHY (2008-vol: 69-2) explain study of the effect of traffic volume and roads width on PCU value of vehicle using microscopic simulation

- The information on traffic volume is on important input required for planning analysis ,design and operation of road way system
- The results of the simulation experiment to study the effect of road width on PCU values indicates that for any vehicle types in heterogeneous traffic ,the PCU value increase with increase in the width of road .
- -There is reason to treat PCU value of a vehicle types as a dynamic quantity rather than treating it as a constant

Highway research number 39(March-2009):

Study of traffic impacts of construction work zones using simulation.

- To study the effect of speed of length, width and surface characteristic of work zones due to lane closure.
- To study the traffic flow characteristic of work zone and develop speed-flow, speed-occupancy model criteria for work zones during different stages of highway widening under mixed traffic condition.
- To determine the delay road user costs of work zone
- To determine the reduction in volume due to work zones and quantity delay associated to speed reduction in work zones corresponding to lane closure, length and percentage of heavy vehicles during different stage of construction.

Dr.RAMACHANDRA REDDY (2008) in his Ph.D thesis explain the effect of on-street parking:

On-street parking:

On-street parking/curb parking can be unrestricted type or restricted type. Restricted parking may be controlled by the police/local guard by parking meters for free collection based on time limit.

Basic method of on-street parking are three types, based on the arrangement of vehicles with reference to road curb, where vehicle owners themselves can park independently.

- Parallel parking: the vehicles are arranged in a line with the front bumper of one car facing the back bumper of an adjacent one and all of them are parallel and adjacent to the road curb
- Perpendicular parking: the vehicles are arranged side to side perpendicular to the road curb. This arrangement provides facility to park more number of cars, but it occupies more width of road.
- Angle parking: vehicles are arranged at an angle to the curb in the direction of approach at different angles varying from 22.5,30,45 and 60 etc., based on road width and number of cars to be accommodated. It is an easy and quicker type of parking and women prefer it.

Study area description and surveys conducted

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 Moosarambagh Gaddinnaram 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

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.

T.V tower junction

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.

Gaddiannram junction

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.

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 vendors beside 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.

3.2 Traffic surveys conducted:

General:

The fundamental approach in area traffic management measure is to retain as much as possible the existing pattern of street but to after the pattern of the traffic movement on these so that the most efficient is made of the system. In doing so minor alteration to traffic lanes, islands, curbs etc., are inevitable and are parts of traffic management measure.

Keeping this in view the following surveys were carried out on the corridor so as to obtain required data for analysis and to evolve short term solution and traffic to the existing problem.

1. Physical inventory survey
2. Traffic volume survey
3. Traffic speed survey
4. Parking survey
5. Traffic signal survey

Physical inventory survey:

Before undertaking any improvement programmed precise information on the physical inventory of the road midblock and intersection are essential. the inventory of the corridor includes measurement of carriage way widths, sidewalks and shoulder width at every 100m interval location of raised median, bus stop location, parking spaces, pavement marking, street light system, intersection details, adjacent land use and length of each link and wherever any significant change on the roadway was noticed all the necessary data was collected. In this corridor only one bus bay at dilsukhnagar and bus stops in the corridor is ten.

Traffic volume survey:

Traffic volume survey is essentially a counting process involving the quantity

movement during a specified period. The traffic volume information is extremely important in traffic planning, design operation and research. in present study information regarding intersection and midblock peak hour in obtained with a view to obtained volume variation on the roads a detailed field survey programmed was organized for 6hrs, the duration was from morning peak hours is 8am to 11am and 5pm to 8pm in the evening.

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 Lb nagar	1653
Dsnr to Lb. nagar	8805

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

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
Koti to Amberpet	322
Amberpet to Dsnr	3371
Amberpet to Koti	1654

Average PCU value at TV tower junction

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:

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

Signal time at TV tower junction

Gaddinnaram junction:

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

Signal times at Gaddiannaram junction

Kothapet junction:

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

Signal times at Kothapet junction

Level of service:

Level of service is qualitative measure used to relate the quality of traffic service. Los is used to analysis high by categorizing traffic flow and assigning quality level of traffic based on performance measure like speed, den city.

Los for signalized and signalized interaction as a function of the average vehicle control delay. Los may be calculated per movement or per approach for any interaction configuration, but Los defined as signalized and all way stop configurations. Los of vehicle are passing road and capacity of the road that is v/c of ratio of Los.

The level of service in the segments of study area is analyzed and presented below:

LOS at Kothapet junction: The number of vehicle passing through junction that is concerted to PCU values.

Lane width: 15m Average speed: 20kmph

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

LOS at Kothapet junction

LOS at Gaddiannaram junction:

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

Lane width: 15m Average speed: 20 kmph

WAY	AVERAGE PCU	LOS
Dsnr towards Koti Dsnr to koti Ganga theater to koti	4131	0.93
Dsnr towards Ganga theater	1890	0.85

Dsnr to ganga theater Koti to Ganga theater		
Koti towards Dsnr Koti to Dsnr Ganga theater to Dsnr	4016	0.91

LOS at Gaddiannaram junction

LOS at TV tower junction:

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

Lane width: 15m Average speed: 20kmph

WAY	AVRERAGE PCU	LOS
Dsnr towards koti Dsnr to koti Amberpet to koti	4170	0.93
Dsnr towards amberpet Dsnr to amberpet Malakpet to amberpet	3928	0.89
Koti towards Dsnr Koti to Dsnr Amberpet to Dsnr	4141	0.94

LOS at TV tower junction

CONCLUCTION & RECOMMANDATION

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.

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.

Bus bays & bus stops:

In this corridor only one bus bay is exists at DSNR at and other places only bus stops available on carriage way, due to this ,at buses are stopped an carriage way and the road is congested.

To avoid the above problems

- Provide sufficient space for city bus bays.

- If possible provide the more area for district buses at Dilskunagar bus stand.
- The number of RTC buses stops shall be organized properly to facilitate boarding of passengers are safely

Public transportations facilities:

In this corridor number of people traveled to offices, colleges, industries….etc, the public transportation facility is not sufficient and number of buses arrive at the same time at same bus stop and create the traffic problems. To avoid this timing between bus to bus be scheduled properly and regulated.

Metro temporary phase:

In this study corridor the traffic problem is caused temporarily due to metro rail construction occupying some carriage way. proper traffic management measures necessary to reduce congestion and improve safety of the road users.

Pedestrian facilities:

In these corridor pedestrians facilities are not sufficient. There must be proper pedestrian crossings, preferably with PELICAN signals at mid blocks to ensure pedestrian safety as well relieving traffic obstruction from pedestrians.

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.

REFERENCES

1. HMDA Report 2014
2. IRC Journals
- Satish chandra &raja restage (2012-vol: 73)
- M.v.l.r. anjaneyules & n.nagaraju (2009-vol: 70-1)
- V.thamizh & k.krishnamurthy (2008-vol: 69-2)

3. JOURNALS OF THE INDIAN HIGHWAYS
- deepakasgupta & r.c taneja (2007-vol: 35-4

4. Highway Research Number 39(march-2009)
5. Dr. Ramachandra reddy in his Ph.d thsis
6. "Traffi Engineering and Transport Planning" by Dr .L.R. Kadiyali
7. Wikipedia
8. Civilengineeringhub.com a web portal for civil engineering.