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A Project Report on

**“FACTORS AFFECTING THE CONGESTION AND ENCROACHMENTS
OF URBAN ROADS-CASE STUDY OF CHICKBALLAPUR CITY”**

Submitted in partial fulfilment of the requirements for the award of degree of

**BACHELOR OF ENGINEERING
IN
CIVIL ENGINEERING**

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2021

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CERTIFICATE

This is to certify that the project report entitled **“FACTORS AFFECTING THE CONGESTION AND ENCROACHMENTS OF URBAN ROAD - CASE STUDY OF CHICKBALLPUR CITY”** is carried out by SINDHU M (1SJ17CV070), SRISHA A R (1SJ17CV071), JAYARAMA M (1SJ18CV415), PAVAN KUMAR N V (1SJ18CV424). Student for the award of civil engineering in Visvesvaraya Technological University, Belgavi during the year 2020-21. It is certified that all correction / suggestion indicated for internal assessment have been in the report deposited in departmental library. The project report has been approved as it satisfies the academic requirements in respect of project work prescribed for the said degree.



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DECLARATION

We, SINDHU M (1SJ17CV070), SRISHA A R (1SJ17CV071), JAYARAMA M (1SJ18CV415), PAVAN KUMAR N V (1SJ18CV425), the students of 8th semester B E Civil Engineer, S J C Institute of Technology, here by declared that project work entitled **“FACTORS AFFECTING THE CONGESTION AND ENCROACHMENTS ON URBAN ROADS – CASE STUDY OF CHICKBALLAPUR CITY”** in partial fulfillment of the requirement for the award of Bachelor of Engineering from Visvesvaraya Technology University, Belagavi is an authentic record of our own work carried out Between 7th and 8th semester (2020-21) under the supervision of Mr. MANJUNATH N, Assistant professor, Department of Civil Engineering, S J C Institute of Technology, Chickballapur, the matter embodied in this report has not been submitted in any other University or Institute for the award of any degree.

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ABSTRACT

Traffic problems like as over congestion of vehicles on the roads, Pollution from the Motor vehicles and Encroachment on the major & minor roads by wrong parking of MV and NMV by the peoples is one of the important concerns for the Indian cities. In this research the survey-based attempt has been made to investigate the factors responsible for the traffic jams, congestions and encroachments by reducing the actual widths of the roads and put barriers on the flow of traffic smoothly. There are many factors which are the root cause for it that can be faulty road designs, not having proper traffic regulations, disordering in the maintenance, lack of proper roadside infrastructure and parking areas etc. Due to the continuously increase in urban population and rural to urban migration, the basic patterns and types of encroachment has changed. The haphazard growth of the hawkers in the cities (especially in the Metropolitan areas in India) has their vital role in the encroachment of Arterial roads, Sub-Arterial roads, Collector roads and on local street roads. The hawkers mainly encroached the road side areas and parking spaces by their vending activities and also the root cause of traffic problems like as reducing the space of carriage way for the mobility of vehicles, encroachment of the road side spaces along the urban pattern of roads and illegal temporary constructions or structures on the pavement of pedestrian path or walk able areas (reduce the area for pedestrian movements). The paper mainly studies the various ways to reduce the encroachments along the different patterns of roads and pedestrian paths. This study basically searching, reasoning and analyses the problems, which are behind the problems of encroachments and also provide their suitable solutions. There are many potentials are to be needed for the relocation and redevelopment on the roads for creating the proper space for mobility of the vehicles and make the roads accessible for the transportation as according to their compatible land use and urban road patterns and have some advantages to overcome the traffic problems.

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CHAPTER 1

INTRODUCTION

1.1 GENERAL

Traffic problems are the one of the major issues in the cities (especially in Metropolitan cities) of India. Many are the root causes of these issues such as faulty design of the different road patterns, irregular alimentionation of the roads, ignorance of traffic rules, traffic loads, and illegal encroachments on the roads etc. The encroachment is the main root cause of traffic problems, which is basically describe as holding of land illegally and without any authorization for self-motive or self-interest. The holding or occupying any of the footpath, two-wheeler moving path, any open space/ public space and government land is coming under the category of encroachment because in that case the illegal land holder not have any satisfactory authorization to use that particular piece of land for their self-interest and self-motive.

The illegally growth of slums or mushrooming development along the different pattern of roads and hawker activities along the pedestrian path, footpaths, main carriage way and roadside area are the most common types of urban encroachments in the cities. With the fastest increase of urbanization and population in India (especially in the Indian cities because of rural to urban migration), the new urban problems are taking birth like as illegally construction of ramps in front of houses (mainly on the street space), creation of structures along the drains, illegal mining and sand excavation from the rivers, illegal parking along the roads and on the main carriage way (especially in the commercial areas and streets).

As per the urban pattern of the roads and allocation of the spaces for hawkers, all Arterial & Sub Arterial roads are taken as under the category of no vending roads where the vehicular traffic is very fast, so these roads are not taken as for vending zone roads because there had being not any parking provision on these roads. The Express roads also kept under the category of No vending roads. Turning points on Arterial roads, Sub Arterial roads and Collector roads are also strictly use as No vending Zone.

The Collector roads are taken as Restricted roads, where there are mainly had the shopping complexes and markets along with these roads, so vending is allowed on these roads but there are Zone restriction should be applied on these roads, so that the vending is allowed with some restrictions on these roads. On these roads mainly the specific areas & sites are to be considering as restricted areas, where the proper boundary for vending and proper time for vending could be selected for the vendors.

The local streets roads are fully taken as vending zone roads because there is parking provision along with these roads and peoples also use the facility & services by the vendors at neighborhood level easily& by this way the vending site would be provided at vicinity of residential areas. But these vending spaces should be in proper planned way, so that illegal encroachments especially on the collector roads and local street roads could be control or reduce for the proper mobility. Planned progress and improvement is the imperative zone that collide equity between the urgency of large-scale urbanization and individual building.

1.2 OBJECTIVES OF PRESENT STUDY

- To find the problems relating to Encroachments and congestion.
- To prepare the maps and layouts using Surveying.
- To suggest the remedial measures for relocation of elements and reducing of congestion on roads and visualize by 3D modelling.

CHAPTER 2

LITURATURE REVIEW

2.1 LITURATURE SURVEY

1. “Factors contributing to traffic flow Congestion in Heterogeneous Traffic conditions”

A study is done by **John Mahon, Cuthbert Mhilu, Joseph Kihedu, Hannibal Bwire** in the year [2019]. Most of the urban roadways do experience traffic flow congestion at various road sections called critical traffic points, which is partly contributed by the presence of various factors on the roadways. A number of studies have used travel time indices to determine congested links of the road networks. The travel time-delay based indices have found less application in the identification and quantification of congestion levels in the road networks.

2. “Factors affecting the Congestion and Encroachments on urban roads”

A study is done by **Harcharan Singh, Jalandhar, Er. Gurwinder Kaur** in the year [2018]. The problems of Traffic Congestion are Emerging due to Haphazard Growth of the Hawker Encroaches the different Pattern of the Roads. Vender took Parking Space & is Placed at the Turning Point of the Road Leading to Congestion. They are many factors which are the root cause for it that can be faulty road designs, not having proper traffic regulations, disordering in the maintenance, lack of proper roadside infrastructure and parking area etc.

3. “Research on road traffic congestion index based on comprehensive parameters.”

A study is done by **Wan-Xiang Wang, Rui-Jun Guo, Jing Yu** in the year [2018]. Traffic congestion index reflects the state of traffic flow. The detection and analysis on traffic congestion index can be used to estimate the operation status of roads, to plan and organize road traffic for traffic managers, and to make the reasonable decisions of travelers to travel. The traffic conditions of several evaluation indexes were analyzed.

The sequence steps targeted traffic facilities or the traffic management measures. Traffic congestion can be divided into road congestion and intersection congestion. The traffic congestion index by saturation has a big deviation to reflect the field traffic status.

4. “Reducing Encroachment problems on roads to Reduce Traffic Congestion instead of widening road.”

A study is done by **Gaurav S Chauhan, Prabhangini Varshney, Avani Saraswat** in the year [2017]. The paper studies the ways through which the problem of encroachments on the roads can be reduced. It Analyses the problems behind the Encroachments and also provides the solution through which the problem of Encroachment can be reduced.

Many factors are responsible for it such as improper design of the road, unorganized maintenance of the roads, unfollowed traffic rules, traffic loads, encroachments on the roads etc. The word encroachment commonly means illegal use of resources. In the case of road/land, encroachment is occupying the government/private land/footpath illegally.

5. “Enhancement of congestion control of Constrained Application Protocol/ Congestion Control/Advanced for Internet of Things environment.”

A study is done by **Jung June Lee, Kyung Tae Kim, Hee Yong youn** in the year [2016]. With the wide spread of Internet of Things, efficient communication between the nodes is getting more important. Constrained Application Protocol was developed to accommodate the resource-constrained nodes and low-power communication links. Being an Internet protocol, Constrained Application Protocol must adhere to congestion control, primarily to keep the backbone network stable.

In this article, we propose a new round trip time–based adaptive congestion control scheme, which further improves Congestion Control/ Advanced by utilizing the retransmission count in estimating the retransmission timeout value and the lower bound in round trip time variation. It reveals that the proposed scheme significantly increases the throughput and rate of successful transactions in comparison with the other schemes.

6. “Traffic Congestion-Causes and solutions.”

A study is done by **Shekar. K. Rahane, Prof. U. R. Saharkar** in the year [2014]. Traffic congestion is a major urban transport problem. Due to traffic congestion, there is possibility of accidents because of poor traffic management. To eliminate road accidents and to save precious human life it is essential to find proper solution for traffic congestion. In this paper traffic congestion problem is identified and studied for finding out the causes and proposed solution of it.

Congestion also has a range of Indirect Impact Including the Marginal Environmental and Resource Impact of Congestion, Impact on Quality of Life, Stress, Safety as well as Impact on Non-Vehicular Road Space users such as the users of Sidewalks & Road Frontage Properties. Different Lanes for Different types of Vehicles should be Marked on the Roads.

i.e., Financial Maintains of the Lane Discipline.

7. “Research on Urban Road Traffic Congestion Charging Based on Sustainable Development”

A study is done by **Sun Ye** in the year [2011]. Traffic congestion is a major problem which bothers our urban traffic sustainable development at present. Congestion charging is an effective measure to alleviate urban traffic congestion. The paper first probes into several key issues such as the goal, the pricing, the scope, the method and the redistribution of congestion charging from theoretical angle. Traffic congestion charge will promote citizen to use public transportation. Therefore, it must take full development of public transportation as the premise. Firstly, the network of public transportation must be able to satisfy people’s request for transportation accessibility, conveniences and comfort.

2.2 LITERATURE SUMMARY

Many Researches have studied on the factors affecting the congestion and encroachments of urban road – case study of chickballapur city. In view of the literature, till so far, the conceptual of public space and community spaces as well as the report of public space and social interaction in order to make a theoretical frame works for knowledge and understand the problems of social interaction in modern world, especially in the high-rise building, the most common construction in urban area.

CHAPTER 3

STUDY AREA

The location of chickballapur city is as under:

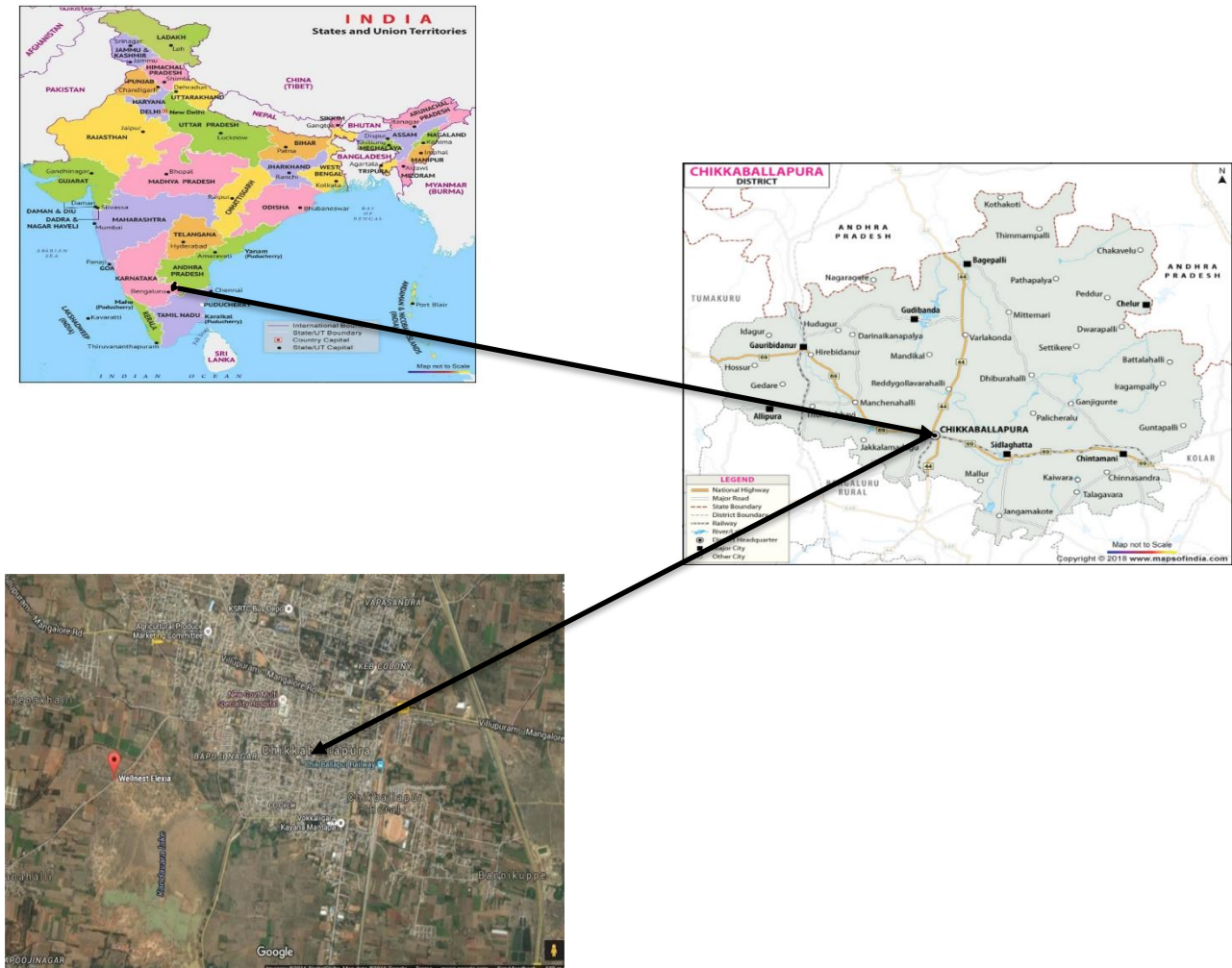


Fig 1. Location of Chickballapur City

3.1 SCOPE OF STUDY

The main scope of this research is to control and reduce the encroachments in the urban high density population area or city by reducing the haphazard growth of the hawkers and on street illegal parking's etc. By clear the spaces for pedestrian's movement, two-wheeler vehicles and proposed separate theme based informal markets on the periphery region of the city to reducing the congestion from the core urban

3.2 ENCROACHMENT PROBLEMS

- The problem of traffic congestion is emerging due to hazard growth of the hawkers encroaches the different pattern of the roads.
- In the main commercial areas like as APMC market, Bazar Road and BB road, the shopkeepers mainly display many of their stuffs outside the shop on the illegally encroached ramp or pedestrian path, which create problems in the movement of pedestrians, due to which the pedestrians use to walk on the carriage way of the roads, which create the problem of traffic congestion in the Commercial markets.
- Encroachment basically affects badly the trees planting along the roads and the green buffer presents on the both sides of the Arterial & Sub-Arterial roads. Encroachment badly affects the landscape infrastructure and other amenities along the road. Encroachments reduce the space of traffic mobility on the carriage way, which causes traffic congestion. Encroachments due to uneven of footpaths.
- Encroachments reduce the space of traffic mobility on the carriage way, which causes traffic congestion.
- Increase the conflicts between the pedestrians and vehicular movements due to encroachment of the pedestrian path and pavements.

3.3 NORMAL AND STANDARDS

Table 1: Row and Design Speed of Road Source:

Classification	ROW (meters)	Design Speed (km/hr.)
Arterial	50-60	80
Sub-arterial	30-40	60
Collector Street	20-30	50
Local Street	10-20	30

Source: L.R Kadiyal

- For access roads to residential areas, a lower lane width of 3 m is permissible.
- Minimum width of a kerbed urban road is 5.5 m including allowance for a stalled vehicle.

Table 2: Norms of Carriageway Width

Description	Width (meters)
Single lane without kerbs	3.50
2- lane without kerbs	7.00
2-lane with kerbs	7.50
3- lane with or without kerbs	10.5/11.0
4- lane with or without kerbs	14.0

Source: L.R Kadiyal

- Minimum width of footpath should be 1.5 meters.
- Width should be increased by 1 meter in business and shopping areas to allow for dead width.
- Footpaths adjoining shopping frontages should be at least 3.5 m and a minimum of 4.5 m is desirable adjoining longer shopping frontages.
- When on slopes or in the case of ramps, the capacity should be suitably reduced.

Table 3: Norms of Pedestrian or Footpath

Number of persons per Hour		Required width of Footpath (meter)
One Direction	Both Direction	
1200	800	1.5
2400	1600	2.0
3600	2400	2.5
4800	3200	3.0
6000	4000	4.0

Source: L.R Kadiyal

3.4 TYPES OF ENCROACHMENTS ON ROADS

According to the encroachments on the different hierarchy of road patterns are of various types explain as under

A. Illegal Constructions Along the Roads:

The illegal construction which includes the structures which are temporary built structures by the hawkers by encroaching the roadside like shops and also the plants, trees which are grown, on the footpath and the two-wheeler passing spaces. It also includes the unauthorized development of slums on the roadside areas like as open spaces and on green buffer areas by built up their temporary structures called Jhuggis.

B. Encroachment by Religious Structures:

We normally believe in God by our religious culture and we respect all the Gods. There are some religious structures on every area of the road. The peoples visit temples in a particular time and due to such activities, the traffic will be more in peak hour and by this the congestion takes place on the roads.

C. Encroachment due to Temperature:

Temperature will change the road ability and strength of the roads. The roads will have the seasonal changes in it like contraction and expansion. when heavy vehicles pass by the surface of road it gives the pressure on the surface by this the roads get damaged like the pressure which is given by the vehicles it creates a crack or else like a pot holes on the surface where the wheels are passed. By these undulations on the road is created and due to congestion more traffic takes place.

D. Unauthorized and Illegal Parking Provisions:

The illegal parking of vehicles on roads are more and problems caused due to traffic movement on the carriage way due to the unauthorized standing motorized vehicles and non-motorized vehicles which causes congestion and it takes less time for pedestrian movement. It reduces the vehicle spaces on the carriage way.

E. Encroachment by Hawkers/Vendors:

They use the spaces which are free spaces and areas for the vending activities, which will affect the pedestrians and they also occupy some space on carriage way and due to such activity congestion will occur.

F. Encroachment by Shopkeepers:

In the main is commercial streets, mostly the shopkeepers use to encroach the road space are by putting their stuff on the roads for advertisements, which results in reducing the road.

Example: This below given commercial street is wide enough for vehicular movement as per traffic density but the site has 40% of its area encroached by the shopkeepers. Illegal parking of motorized vehicles and non-motorized vehicles and only 5.5m of space (carriage way) is left for the moving of the vehicles, which is the root cause of congestion problems and traffic jam during the movement.

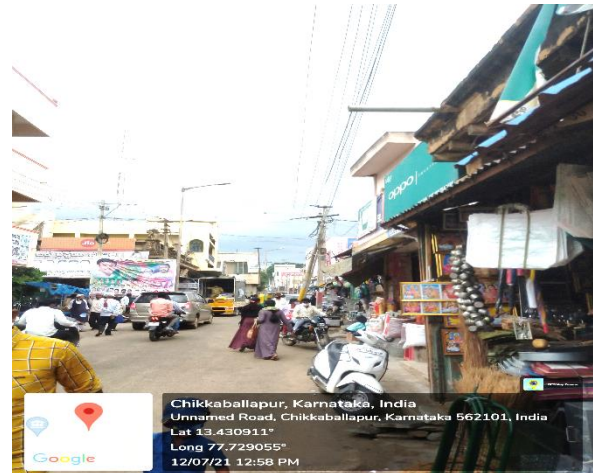


Fig 2: Encroachment affects badly the carriage of the Road in Commercial Street.

CHAPTER 4

METHODOLOGY

The study is basically concerned with the broad understanding of the topic with proper norms and standards of the Road designs, pedestrian paths and carriage way widths along with the understanding that how to integrate them in the process of urban development in Chickballapur Area.

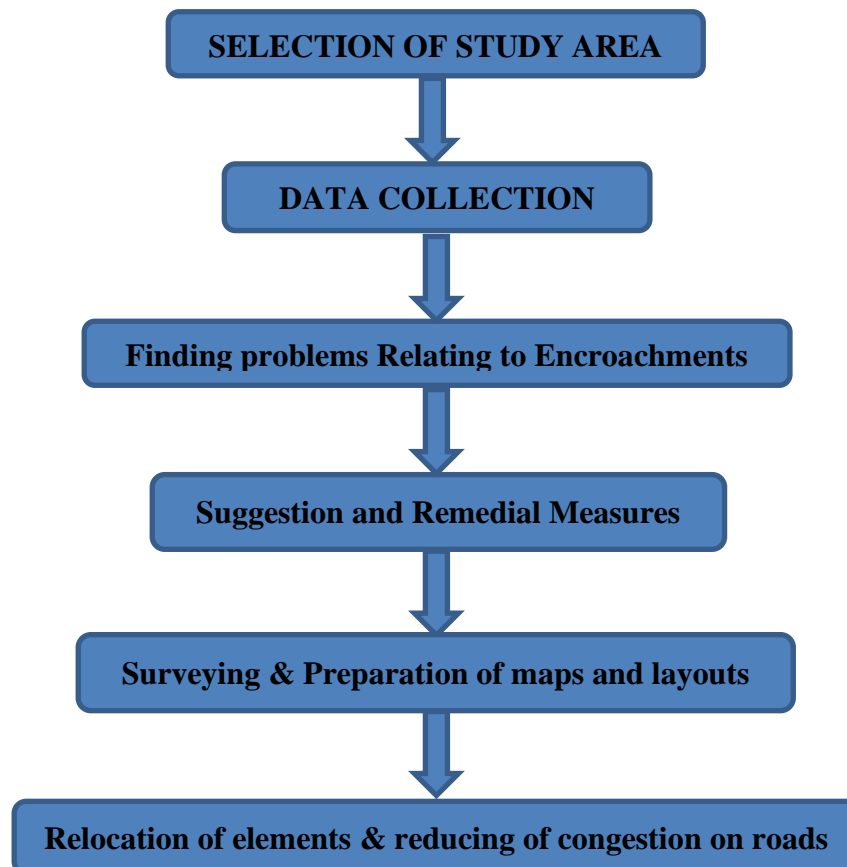


Fig.3 Methodology table

The well-known locations of problematic sites were identified through transect walks and focus group discussions. The detailed primary survey intended to identify the encroachment points, root causes with threats, typology and potential opportunities. The task of findings, presenting, elaborating and analysis of the problems of encroachments by preparation of the plans, which was divided into types as indoor activities and outdoor activities. Finding the solutions on the basis of Norms and Standards along with the relocation of elements like as hawkers and reducing the congestion on the roads. Figure 3 shows the flowchart of the methodology for reducing the problem of encroachments on the road and providing space for traffic movement.

CHAPTER 5

ANALYSIS OF STUDY

The method used in this study is based on study area where data collection was made in step-by-step approach followed by analysis of Travel Time-Delay data by translating into Travel Time-Delay Transition Index and congestion index (CI). The identified study area was made from suitable routes in Chickballapur that includes substantial sections of both arterial and sub arterial roads and which are often wrought with recurring congestion.

Types of encroachments on BB road

i. Illegal construction along road

The illegal construction includes the structures which are temporarily built by the hawkers by encroaching the roadside like shops and also the plants, trees which are grown, on the footpath and the two-wheeler passing spaces.



ii. Encroachment by Electricity supply along road

Electrical poles and transformers which occupy space on the footpath so that the pedestrians are occupying the road space and this lead to traffic congestion on the road.

iii. Encroachment by religious structures

In INDIA as we know everyone believes in God by our religious culture and we respect all the Gods. There are some religious structures on this road so the people visit here in particular time and due to this the traffic will be more in peak hour and by this the congestion takes place on the road.



iv. Encroachment by reconstruction of drainage pipes

In BB road near to the temple the drainage pipe reconstruction is going on, next to the turning spot due to reconstructing, the vehicles have less space to move and get congested while moving. And the road is also not maintained properly it contains more undulations, by this even accident can occur frequently.

v. Encroachment due to climatic behavior

As we know the bituminous roads has the ability to adsorb water easily and frequently. when it adsorbs water, cracks will form and then it damages the surface of road and create undulations when heavy vehicles pass by the surface of road and this destroy complete road pattern and design of the road. By these undulations along the road more traffic congestion takes place.



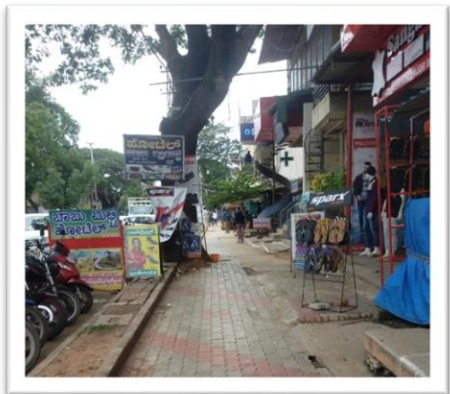
vi. Unauthorized and illegal parking provisions

In this road the illegal parking of vehicles are more and problems caused due to traffic movement on the carriage way due to the unauthorized standing motorized vehicles and non-motorized vehicles which causes congestion and it takes less time for pedestrian movement.

Most of the road accidents are occurring just because of pedestrian movement on the carriage way. It reduces the vehicle spaces on the carriage way.

vii. Encroachment by hawkers/vendors

These hawkers mainly use the public spaces and roadside areas for the vending activities, which will affect badly for the pedestrians and they also occupy carriage way and due to this congestion takes place.



viii. Encroachment by shopkeepers

In the main is commercial streets, mostly the shopkeepers use to encroach the road space are by putting their stuff on the roads for advertisements, which results in reducing of ROW of the roads.

Existing situation of encroachment problems on BB road

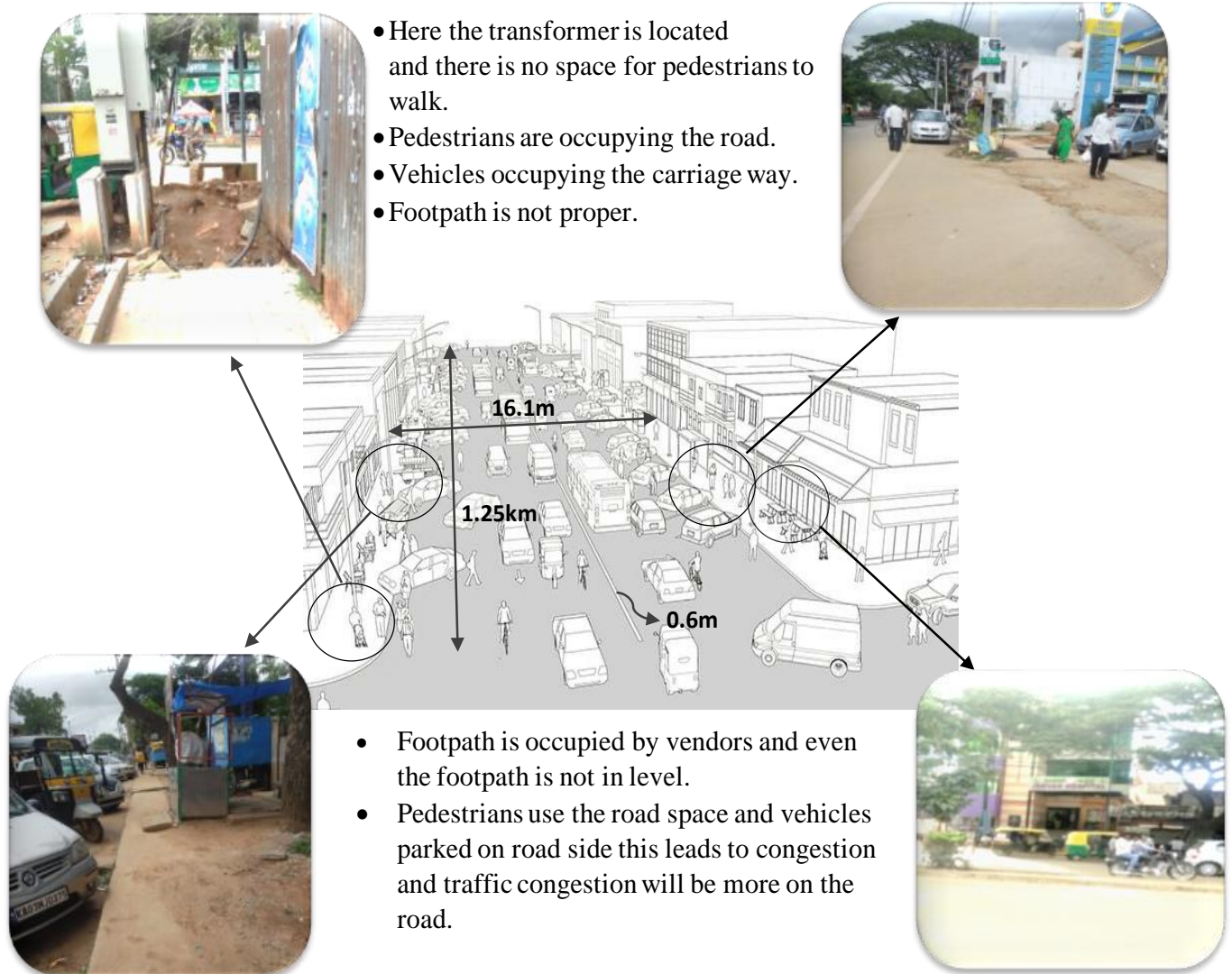


Fig.5.1 Encroachment problems on BB road

1. BB road has been included only because it is the only one that joins several peripheries towards the CBD together with those coming from the BANGALORE & BAGEPALLI HIGHWAY.
2. A reconnaissance survey on the study area were carried out at the selected road sections to identify and locate the critical traffic points (CTPs). A point where large traffic flow pattern variations was noticed translating to slow traffic flow movement and thus prompting the occurrence of recurring traffic congestion at the particular place and time. To identify and locate these locations, physical observations conducted on daily basis using public, private and motorcycles by driving through all chosen road networks.

3. When there is existence of congestion or not. While conducting this exercise it was important to identify the peak periods (time slots).
4. It should be the availability of multi-parking space near the main commercial streets and tourist places (main religious places) for the parking of large number of vehicles for reducing the traffic jams and congestion especially in Commercial streets.
5. Hawkers should not be allowed to be standing along the turning points of the major roads and minor roads to reducing the encroachment especially on the turning points of the roads and road intersections because it is the main root cause of accidents on the turning points.
6. Most of the data of this work were collected from primary source. Nevertheless, a significant amount of information regarding the work were also collected from secondary sources. However, for primary data relating to traffic survey, the following were emphasized: Identification of urban road network to be studied; Identification of critical traffic points on all selected urban road networks and their associated vehicle flow impeding factors affecting congestion, Travel time-delay (TD) and Link length. Data collection primarily involved traffic parameter observation of factors at various road network locations.

5.1 Existing situation of encroachment problems on BB road:

First on the major road of BB road in front of Junior college, where the hawkers along the BB road create problems in the free flow of traffic because the people use to park their vehicles along these roads for purchasing the items from the hawkers and also students who come through vehicles for college, which cause problem in the traffic mobility as shown in fig and the footpath which is encroached by the hawkers by their vending activities.

ENCROACHMENT SITUATION AT BB ROAD



5.2 Collector Roads:

These roads mainly said to be the distributor roads to Sub-arterial roads. The speed limits should be near to 30km/h on these roads.

It mainly taken the traffic from Local access roads and further distribute to Sub-Arterial roads and Arterial roads in the city. These roads are mainly 12-30m wide.

Existing situation of encroachment problems at turning point of baazar road**Fig. 5.2.1 Encroachment problems at turning point of bazaar road**

- Vendors took all the parking space and is placed at turning point to bazaar road leading to congestion.
- This leads to various traffic problems.
- Vending activity on the footpath and on road obstruct the pedestrian traffic as well as vehicular traffic situations.
- Due to people tend to stop near these vending carts resulting traffic jams.
- These vendors occupy all the free space on roads, footpath, and

CONGENCTION AND ENCROACHMENT ON SIDLAGATTA CIRCLE TO A.P.M.C MARKET. (GAURIBIDANUR ROAD).

ENCROACHMENT PROBLEMS ON GAURIBIDANUR ROAD:

These are the various problems of encroachment in the road:

- The problem of traffic congestion is emerging due to haphazard growth of the hawkers encroaches the different pattern of the roads.
- Encroachment basically affects badly the trees planting along the roads and the green buffer presents on the both sides of the Arterial & Sub-Arterial roads. Encroachment badly affects the landscape infrastructure and other amenities along the road.
- In the main commercial areas like as in front of private bus stop opposite and APMC market in Gauribidanuru road, the shopkeepers mainly display many of their items outside the shop on the illegally encroached ramp or pedestrian path, which create problems in the movement of pedestrians, due to which the pedestrians use to walk on the carriage way of the roads, which create the problem of traffic congestion in the Commercial markets.
- Encroachments reduce the space of traffic mobility on the carriage way, which causes traffic congestion.
- Increase the conflicts between the pedestrians and vehicular movements due to encroachment of the pedestrian path and pavements.



5.3 Existing situation of encroachment problems on gauribidanur road.

Fig.5.3.1

- The garbage waste has been dumped on the footpath side & the pedestrians have no space to walk.
- Pedestrians use the road space and vehicles parked on road side this leads to congestion and traffic congestion will be more on the road when the vehicles, pedestrians move at a time.



Fig.5.3.2



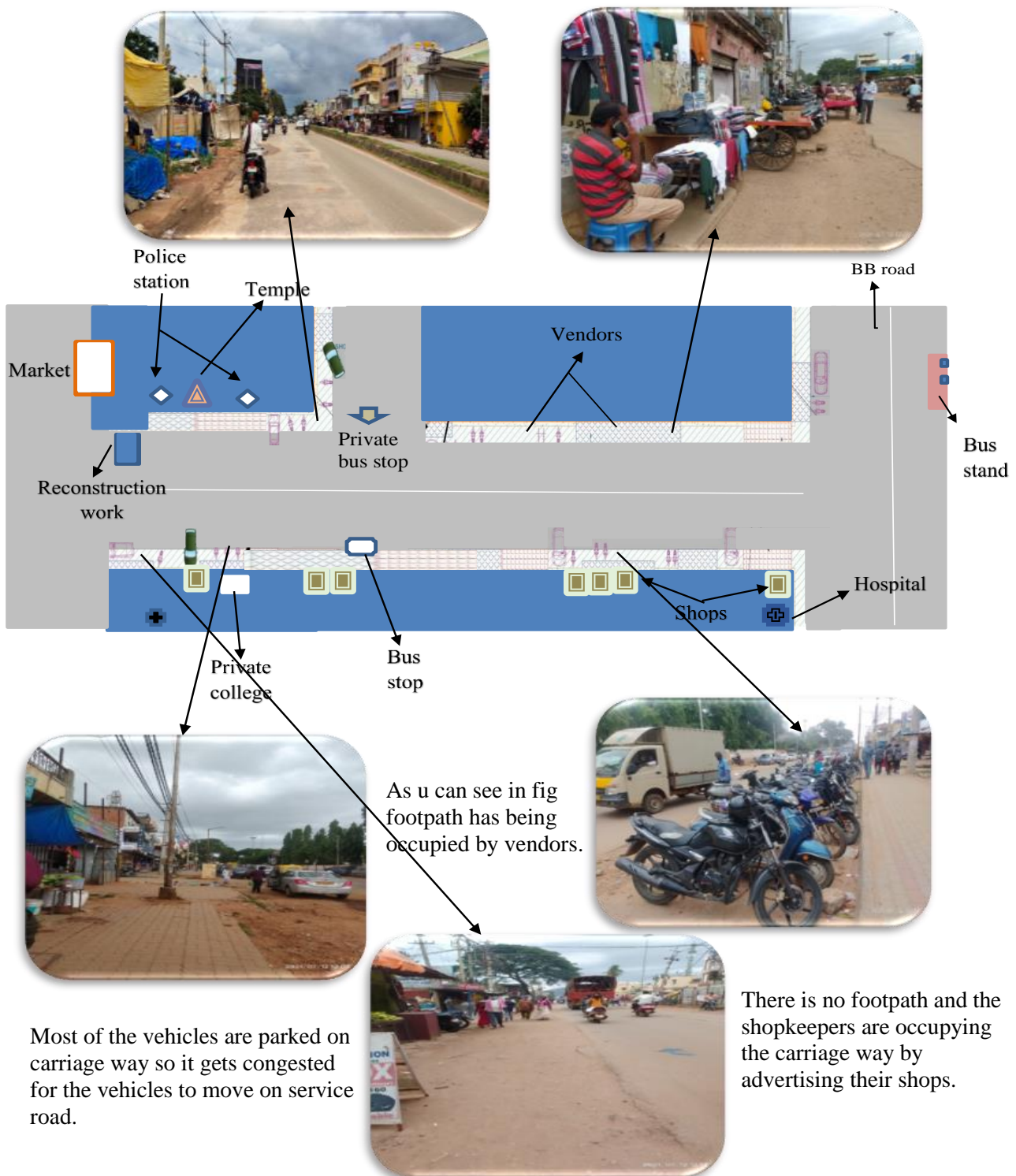
Fig.5.3.3

- Here the transformer is located and there is less space for pedestrians to walk.
- Vehicles occupying the carriage way.
- Shopkeepers occupying the footpath.



Fig.5.3.4

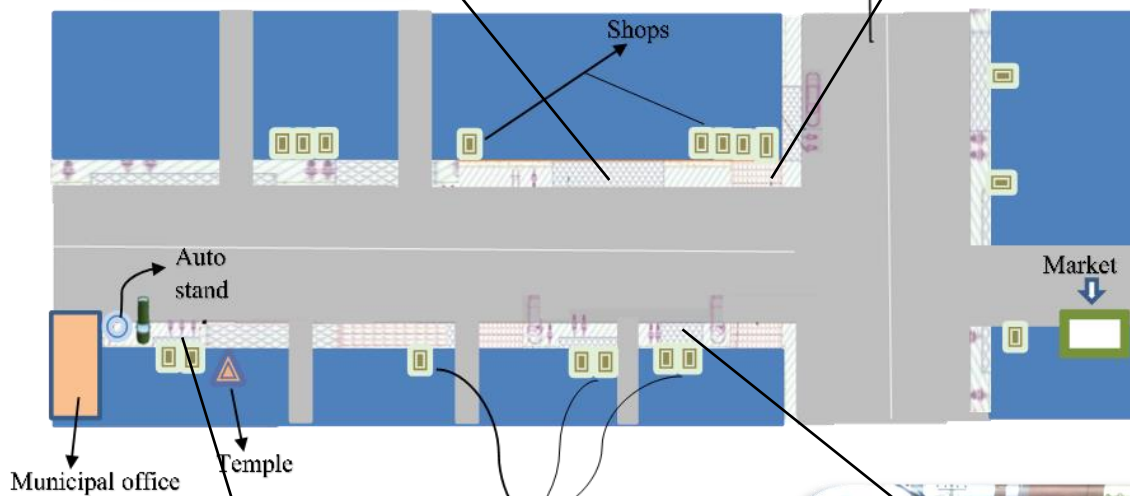
Existing situation encroachment problems on gauribidanur road.



Existing situation encroachment problems at Sir MV Road



- Vehicles are parked at the turning point to BB road due to this congestion takes place.
- Vendors are occupying the carriage way.
- And the people purchasing those items from vendors are creating congestion on the road.



- Footpath has been occupied by the vendors.
- The vehicles are parked on either side of the road.



Existing problems at Sir MV Road

Existing situation of encroachment problems on Sir M V Road



- The shopkeepers had occupied the footpath by their items so the pedestrians as to walk on the service road if this happens the road gets congested by both pedestrians and the vehicles.
- As it's a small road the congestion will even more compared to normal roads.



- On the other side of the footpath, it has been occupied by the vegetable vendors and even the footpath is not in level.



- Due to this people move on to the carriage way & this leads to congestion.
- Vehicles are parked on road side this also leads to congestion.



- In Sir MV Road there is no divider also so that incoming and outgoing vehicles plus pedestrians will get merged and form traffic jams.



CHAPTER 6

PROPOSALS

6.1 FINDING PROBLEMS RELATING TO ENCROACHMENTS

1. Problems for pedestrian: Street vendors that include commercial system of stalls of tea shops, fast food hawkers, encroaches the road pavements and creates problem for the pedestrians.
2. Pedestrians cannot use the pavements which are exclusively made for them, they are bound to use the roads for walking. As now the roads are being used by pedestrians, the movement of vehicles gradually becomes slower, resulting in congestion on roads. Thereafter increasing road accidents.
3. Hawkers encroach upon the roads and leads to immense traffic congestion.
4. Shopkeepers display most of their items outside the shops which sweep away some portion of roads like utensils shop, mannequins on display.
5. No proper Parking for vehicles, it becomes difficult in the areas where the roads are encroached.
6. Loss of amenities, including the planting of trees as well as pleasantness, coherence and harmony of the street space caused by encroachment.
7. Public common law right of unimpeded movement and access to property is violated.
8. Safe and efficient functioning of roads is effected and movement of pedestrian and vehicles is affected.
9. Public assets of road turning point due to encroachment.
10. Encroachment also results in obstruction of views and results in the appearance of the place to be in excessively built form.

6.2 SOLUTIONS

These are the basic proposals for reducing Encroachments of the Roads: -

- a. The meaningful point is that to relocate the hawkers mainly along Arterial Roads and Sub-Arterial roads because according to the transportation norms of the L.R Kadiyali, Book of Transportation Engineering and Planning that these roads should have the free Movement/flow of the vehicular traffic according to their hierarchy of urban roads.
- b. It should be the availability of multi-parking space near the main commercial streets and tourist places (main religious places) for the parking of large number of vehicles for reducing the traffic jams and congestion especially in Commercial streets.
- c. The theme-based markets should be proposed for the hawker market in the vicinity of residential areas in open spaces and vacant land along the local street roads and collector roads, which should more than 4 meters in ROW with separate parking spaces, so that vehicle could be park in safer spaces near to theme based hawker market.
- d. Separate NMV (Non-Motorized Vehicles) and Auto Rikshaw/E-Rikshaw terminals should be proposed near to Bus terminals and Railway terminals, to promote the local transportation in the city from door-to-door service and to reduce the congestion on the roads by reducing the encroachment of NMV's and MV's (public vehicles) on the roads.
- e. Hawker's should not be allowed to be standing along the turning points of the major roads and minor roads to reducing the encroachment especially on the turning points of the roads and road intersections because it is the main root cause of accidents on the turning points.
- f. Firstly, the network of public transportation must be able to satisfy people's request for transportation accessibility, conveniences and comfort.
- g. Secondly public transportation should be entrusted with some management priority, such as free of congestion charging, establishment public transportation exclusive lane, transiting part of charge fund to public transportation invest and so on in order to attract more people to take public transportation instead of own vehicle journey to reduce traffic congestion.

- h. Road widening is often advocated as ways to reduce traffic congestion. Roads of the city are narrow in different places hotels, hospitals, religious places, banks and movie theaters etc. there are several reasons like Hawkers on the footpath and some portion and illegal possession on the road or illegal structures.

CHAPTER 7

CONCLUSION

- Traffic and Transportation problems like as encroachments on the road, congestion problem and traffic jams are need to be reduced in the cities (especially in the Metropolitan cities) by taking the solutions of their major root causes due to which, it creates barriers in smooth traffic mobility in the city.
- The Metropolitan city like as Ludhiana has their core commercial areas/streets and business centers, where the traffic jams and congestion has more like as Bazar, BB road, APMC market, MG road and Sir. M V road etc. Because 30%-40% of the roads are encroached by the shopkeepers, hawkers and illegal parking of vehicles.
- Hawkers also create problem by doing encroachment of the parking areas and parking bays near the realm commercial centers and business centers areas by doing their vending activities along their carts and temporary built-up structures due to which, people use to park their vehicles on the road and cause congestion by reducing the widening of the road.
- These traffic problems also badly affect the economy of the city. The main effects of traffic congestion and jams on the roads are wastage of precious time (Especially during peak hours), lag in movements, brutal accidents, Inefficiency or Incompetence during emergency, over consumption of fuel, noise and air pollution etc.
- There are many efficient solutions are emerged from the case study like as construction of dual carriageway of the roads up to collector roads, provide the proper space for parking of vehicles especially near urban core centers (commercial areas & business centers), provide special or adequate training to traffic police for removing or reducing the root causes of traffic jams and congestions with proper coordination in hotspot areas.
- Proper planning for the informal commercial sector along the roads and controlling their roadside activities by reducing their interference in the flow of traffic mobility on the different hierarchy of urban roads.

CHAPTER 8

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CERTIFICATE

This is to certify that the project report entitled "**FACTORS AFFECTING THE CONGESTION AND ENCROACHMENTS OF URBAN ROAD - CASE STUDY OF CHICKBALLAPUR CITY**" is carried out by SINDHU M (ISJ17CV070), SRISHA A R (ISJ17CV071), JAYARAMA M (ISJ18CV415), PAVAN KUMAR N V (ISJ18CV424). Student for the award of civil engineering in Visvesvaraya Technological University, Belgavi during the year 2020-21. It is certified that all correction / suggestion indicated for internal assessment have been in the report deposited in departmental library. The project report has been approved as it satisfies the academic requirements in respect of project work prescribed for the said degree.



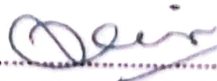
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