

# Truck Overloading Study on Ahmedabad Ring Road and Strategy to Minimize its Impact

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## Abstract

Most of the modern truck engines are capable of hauling much heavier loads than the legal upper limit. Therefore the truck owners and operators have a tendency to overload these trucks enabling them to get more returns for the same investment and manpower. One of the major factors affecting pavement life is the magnitude and frequency of the wheel load repetitions imposed on the pavement structure. In order to maintain the heavy gross vehicle weight and still stay within the legal axle load limits, the trucking industry has devised the multiple axle configurations, which include rear tandem axle trucks. It is observed from the study, that the percentage of overloading of commercial vehicles is very high, which result in greater extent of damage to the pavement, thus reducing the serviceable life of pavement. From analysis, it is observed that the rate of the growth of deterioration is less when enforcement is implied. It implies that there is necessary to strengthen the pavements much earlier with the present trend of overloading when compared with the enforcement situation, wherein the tandem axles / equivalent standard axle trucks are used to reduce the overloading effect. In the present study, Ahmedabad ring road about 76 km one of the major traffic corridors has been considered to assess the effect of overloading on the design and performance of pavement.

**Keywords:** Axle Load, Truck Overloading

## I. INTRODUCTION

### A. General

The road network plays an important in any country's transport and communications. Pavement condition is most important factor to assess the efficiency of road network. Commercial vehicles especially Trucks are the major consumers of the Road network, applying the heaviest loads to the pavement. Truck loads are transferred to the pavement through various combinations of axle configurations depending on the truck type. Overloading is restored to by transport operators to economize in the cost of operations, resulting in axle-loads generally much higher than the standard prescribed limits. Some damage characteristics of the road pavements are highlighted as below:

- Overloading
- Road design
- Road construction
- Road maintenance
- Natural disasters

### B. Objectives

- To observe the surface condition due to traffic overloading.
- To find the truck overloading by axle load survey.
- To collect information about previous maintenance cost of exiting study area of S.P. ring road Ahmedabad.
- To minimize the impact of truck overloading by different method.

### C. Aim of the Study

Aim of this project to study about truck overloading in Ahmedabad ring road and minimize its impact.

#### **D. Scope of the Study**

This research investigates the relationship between truck overloading and the condition of road damage Ahmadabad ring road is the case study for this research and the traffic data of ring road Ahmadabad will be analyses. Axle load will be used to calculate the ESAL to pavement; as a result it will be possible to determine actual pavement life. The actual service life of pavement under the effect of overload truck traffic can be used to analysis the economy loss in term of construction, maintenance and rehabilitation, as well as the social cost.

#### **E. Statement Problem**

Impact overload truck traffic include economic and social and environment losses. Many developing countries are conformed to this problem. Overloaded truck traffic induces extreme harm to the economy of an entire country, thus economic impact always is the major concert for government.

## **II. LITERATURE REVIEW**

Overloading truck traffic not only causes economic loss but also safety and environment problems. Overloaded truck traffic is a serious problem in many developing countries because it incurs huge cost in term of maintenance and rehabilitation of road damage network. Many African and Asian countries have been attempting to address this problem in recent years. This literature review examines the reasons, background and history of the occurrence of overloading in truck transport. This review is based on journal articles and relevant traffic reports around the world. Aman Kishore and Rod Klashinsky works on Asian and other countries in transition have encouraged dramatic road infrastructure development in order to promote and sustain continued economic growth. One of the main features of India's current fast-track economic development has been the equally rapid development of the inter-city and national highways. Since transfer of the development, operation and maintenance of highways to the private sector is taking place at a rapid pace, the majority of the projects are being proposed on the Build-Operate-Transfer (BOT) concept.

## **III. STUDY AREA AND METHODOLOGY**

#### **A. Study Area**

Depending on the different number of axle, overloading vehicles can be classified into five types, such as two-axle car, three-axle, four-axle, five-axle and six-axle, then studying for equivalent wheelbase and the axle load of each model.



Fig. 3.1: Ahmadabad ring road

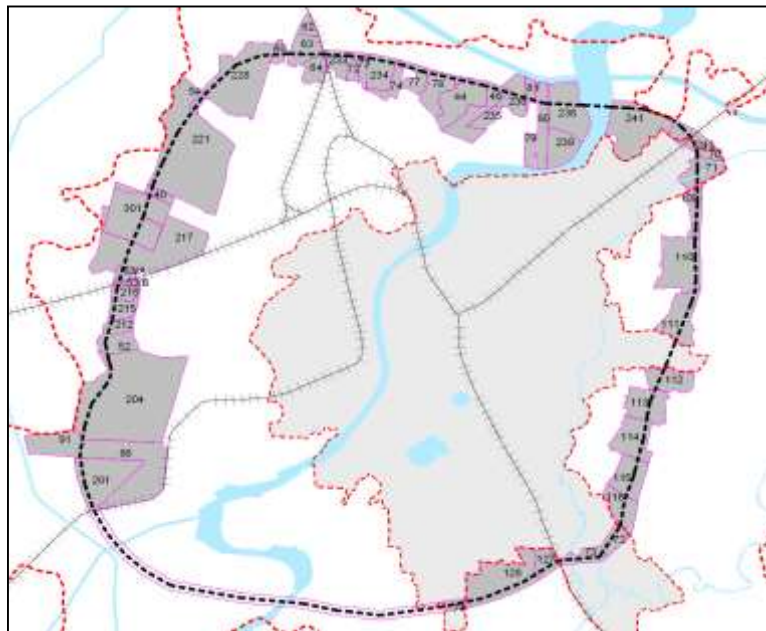


Fig. 3.2: 76 km ring road 46 town planning

The proposed widening from intermediate 2 lane ring road section 76.30 km long will provide the safe movement of heavy iron bearing traffic moving from mines situated. At present, the truck movement was using narrow road section of 6 m wide, with frequent traffic blockade due to bad condition and accident-prone locations.

### B. Road Selection

In the overloading traffic survey road corridor selected to the investigation. The road selection is based on the location of commercial and industrial cities. Ahmadabad ring road toll booth located at asalai circle to Dastan farm 19.3km. Developments of road network and economy have an inter-relationship. Volume of commercial vehicle and its growth rate represent the development status of an area. The traffic data from this area are reliable and typical.

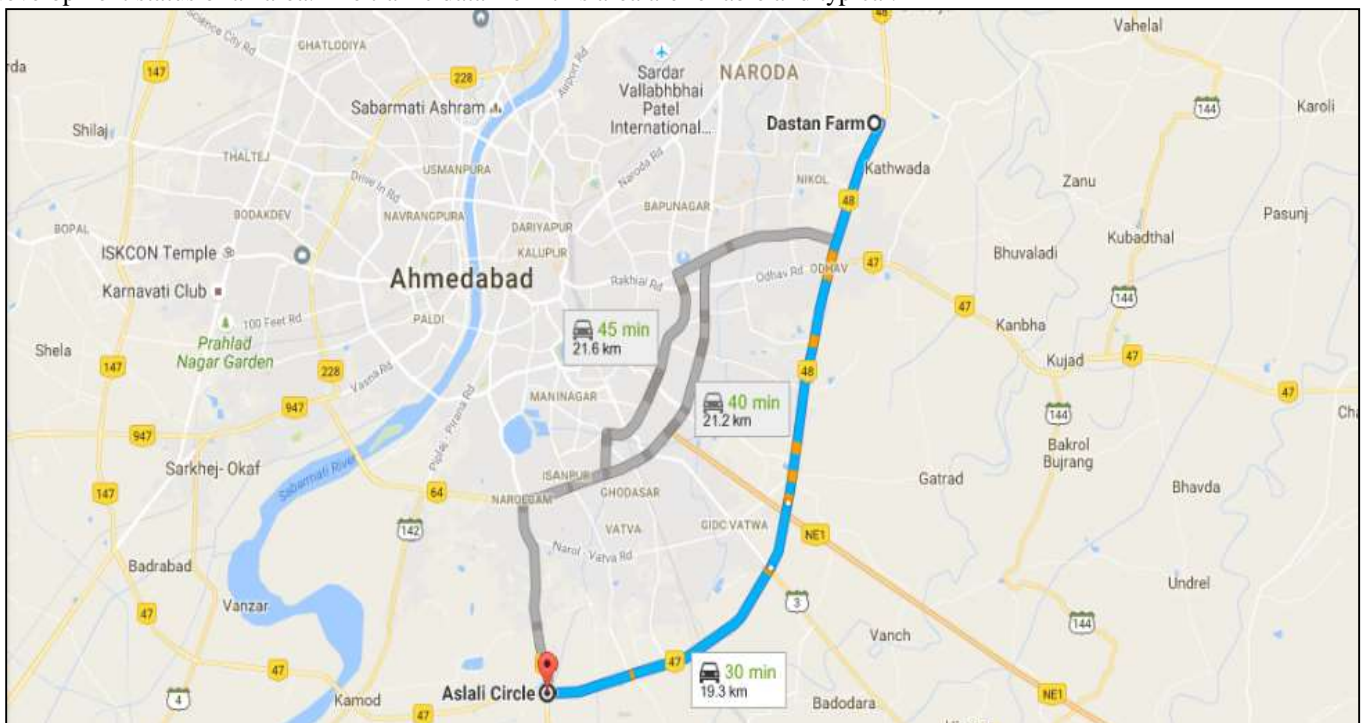


Fig. 3.3: Aslali circle to Dastan farm

#### IV. METHODOLOGY

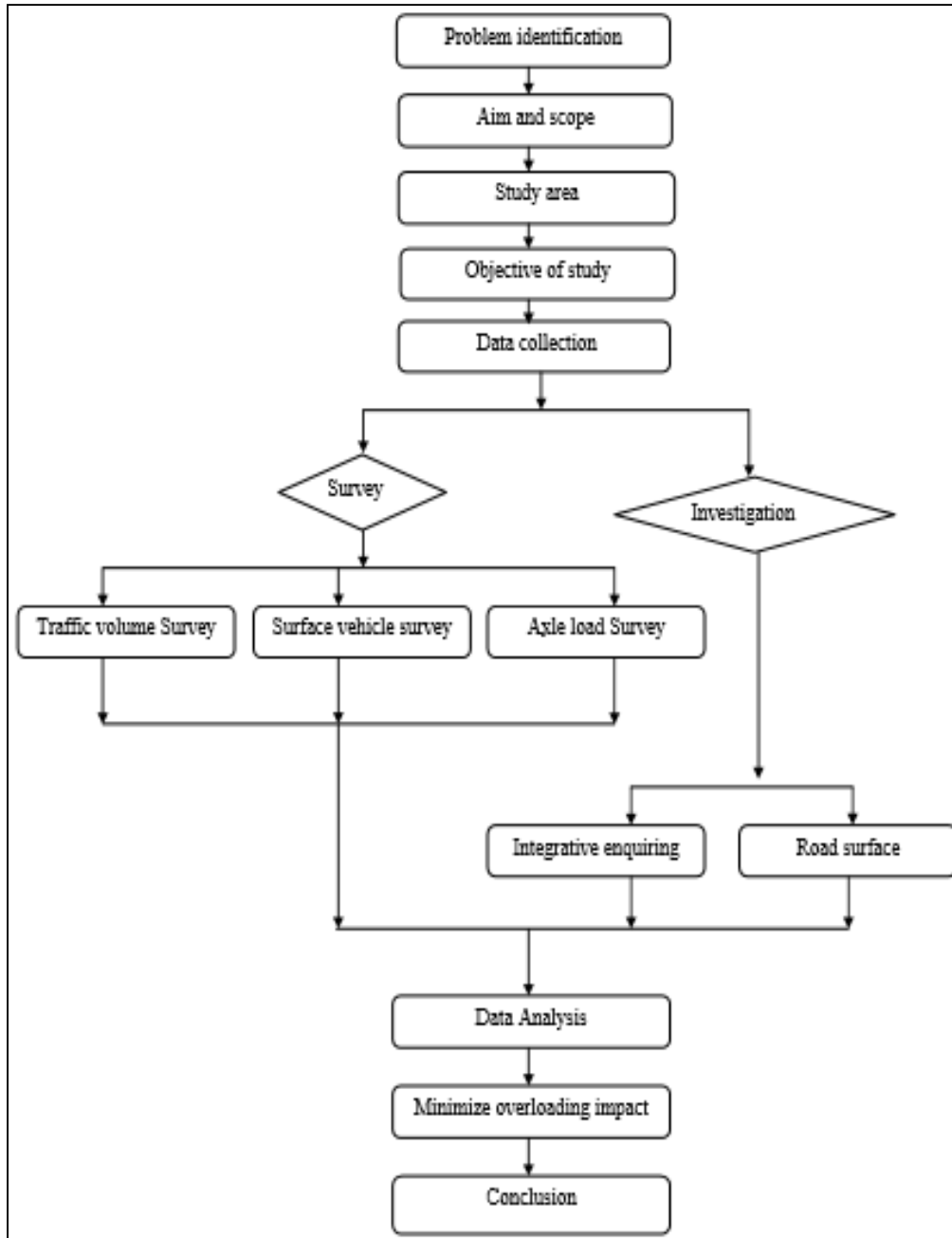


Fig. 3.4: Flow Chart of Methodology

#### V. DATA ANALYSIS

##### A. Axle Load Survey

The axle load of a wheeled vehicle is the total weight felt by the roadway for all wheels connected to a given axle. Viewed another way, it is the fraction of total vehicle weight resting on a given axle. Axle Load survey was carried out at the selected location wherein larger sample size of the trucks have been weighed. At this selected survey location, arrangements were made for the installation of the weighing pads. The top surface of the weighing axle pad was kept in level with the road surface. The survey was conducted for both up and down directions.



Fig. 4.1: Axle load survey at Jetalpur circle Ahmedabad ring road

**B. Axle Load Survey Analysis:**

Axle load survey test was carried out on selected study area location and the data was collection by various techniques like axle pad, WIM (weight in motion) .In my study are data collect use for axle pad equipment. In this study there are 629 vehicles (truck) to be survey for axle load. In my study are there are 451 three axle, 266 four axle, 88 five axle and 37 six axle trucks. The axle load analysis shown in details below.

Table - 4.1  
Axle load analysis

AXLE LOAD	TOTAL AXLE WEIGHT: NO OF VEHICLES											
	FRONT			REAR								
IN Ton	F1	R1	R2	R3	R4	R5	R6	R7	LEGAL	ILLEGAL	LEGAL	ILLEGAL
1.0-2	23	66	20	7	3	2	0		23		98	
2.1-3	224	92	28	10	2	0	0		224		132	
3.1-4	340	121	59	26	11	2	0		340		219	
4.1-5	32	151	158	77	24	7	0		32		420	
5.1-6	3	150	133	91	24	4	0		3		402	
6.1-7	3	30	44	49	21	2	0			3	146	
7.1-8	3	12	3	5	1	1	0			3	22	
8.1-9	2	2	5	1	1	1	0			2	10	
9.1-10	0	1	0	0	1	0	0					1
10.1-11	0	0	0	0	0	0	0					0
11.1-12	0	0	0	0	0	0	0					0
12.1-13	0	0	0	0	0	0	0					0
13.1-14	0	0	0	0	0	0	0					1
14.1-15	0	1	1	0	0	0	0					2
15.1-16	0	0	0	0	0	0	0					0
16.1-17	0	0	0	0	0	0	0					0
17.1-18	0	0	0	0	0	0	0					0
18.1-19	0	1	0	0	0	0	0					1
19.1-20	0	0	0	0	0	0	0					0
20.1-21	0	0	0	0	0	0	0					0
21.1-22	0	0	0									0
<b>TOTAL</b>	<b>629</b>	<b>629</b>	<b>451</b>	<b>266</b>	<b>88</b>	<b>37</b>	<b>0</b>	<b>0</b>	<b>621</b>	<b>8</b>	<b>1451</b>	<b>4</b>



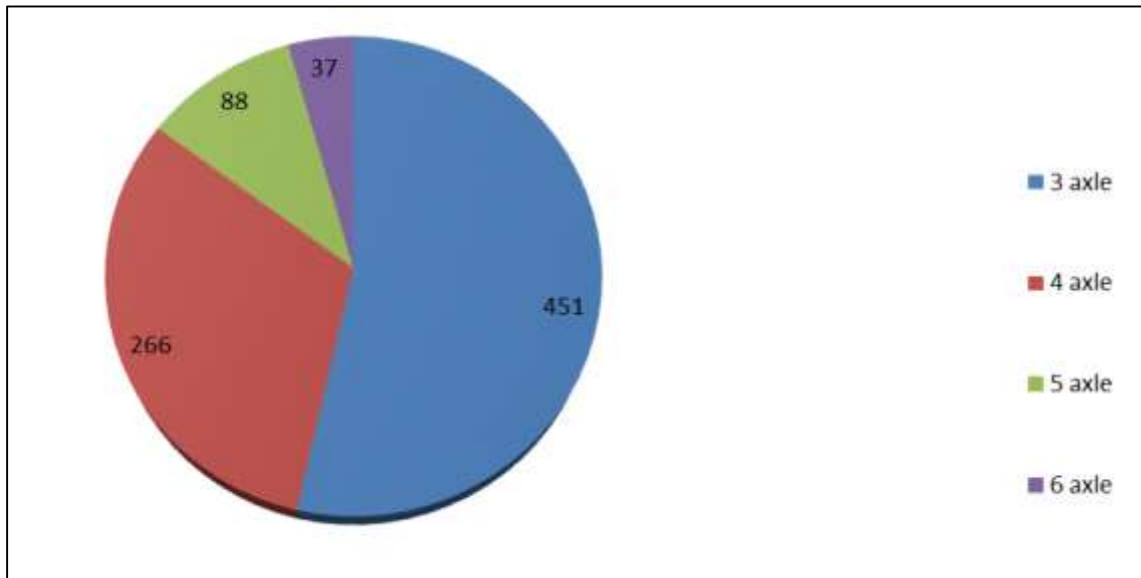


Fig. 4.2: Different types of trucks

### C. Surface condition survey

Surface condition survey shall precede the actual deflection measurement and consists primarily of visual observations supplemented by measurements for estimation of cracking, rutting and other distresses in the pavement. It may be prudent to identify possible causes of distress using visual observation of surface of the road.



Fig. 4.3: Measurement of rutting condition

In this visual observation we find the rutting on the surface due to overloading of truck in my study area location. This survey is carried out by measurements of the rutting by wooden stick transversely place on the rutting section and measure depth of the rutting and this rutting is compare with the IRC:81-1997.



Fig. 4.4: Rutting condition

Analyses rutting on all section is mostly fair and poor condition because depth of rutting is more than 10 mm and in some section is more than 20 mm. Rutting on my study area and its measurements are shown in figures.

## VI. CONCLUSION

In this semester I have collected data and analysis for the truck overloading in ahmedabad ring road. I have collect the data from Ahmedabad ring road and find the truck overloading issues in Ahmedabad ring road. For minimize this effect here are enforcing for different techniques.

## ACKNOWLEDGEMENT

First and foremost, I would like to thank God, The Almighty, for blessing me with the opportunity and ability to complete this work. I would like to express my sincerest appreciation, solemn gratitude, and heartiest thanks to my guide Professor Srinath Karli for his thoughtful guidance, unparalleled support, constant encouragement also thanks to my head of department prof. Vrundani Vaidhya.

## REFERENCES

- [1] P. Ram Mohan Rao and Venkat R Sheela "EFFECT OF COMMERCIAL TRAFFIC OVERLOADING ENFORCEMENT ON PAVEMENT PERFORMANCE"( case study SH-49 section from Hopset to Sandur of 27.275 km).
- [2] Dou Yuanming, Zhang Jingjing and Hu Chao "The Improvement of the Design Standard of Overloaded Highway" International Journal of Security and Its Applications Vol. 10, No. 2 (2016).
- [3] Anthony Nkem Ede "Cumulative Damage Effects of Truck Overloads on Nigerian Road Pavement" International Journal of Civil & Environmental Engineering IJCEE-IJEN
- [4] K PILLAY and DR. J BOSMAN "HEAVY VEHICLE OVERLOAD CONTROL IN THE CITY OF TSHWANE" (case study Tshwane)
- [5] Chhoeuy Roeun , Mom Mony "Damage Effects of Road Pavements due to Overloading"
- [6] L. Kiggundu and C Lutombi "REGIONAL INITIATIVE ON HEAVY VEHICLE OVERLOAD CONTROL: NAMIBIAS PROGRESS TOWARDS CONTROLLED PAVEMENT CONSUMPTION"
- [7] Southern Africa Transport and Communication Commission, 1994, "Overload Control in Southern Africa", Report of the Five Country Special Working Group.
- [8] aman kishor, rod klashinsky.2000.pavement of highway infrastructure damage through commercial vehicle weight enforcement in annual Indian congress (IRC) section . culctta
- [9] Urban Management Centre (UMC) as a part of Mega Cities....Poised For Change - Leading Practices Catalogue – 2007 "Public-Private Partnership for Road Infrastructure Development"
- [10] strathman, james G 2001 Economics of overloading and the effect of weight enforcement Portland: centre of urban studies collage of urban and public affairs Portland state university.
- [11] Ceallach levis, Anthony ockwell.2000 truck: the road to ruin on increased efficiency. <http://www.oecdobserver.org/news/fullstory.php/aid/236/truck: the road to ruin or increase efficiency.html>.
- [12] IRC 3-1983 Dimensions and weight of road design of vehicle.
- [13] IRC 37 -2001 Guidelines for the design of flexible pavement.