Planning of Basic Pedestrian Facilities at Selected Intersection of Rajkot City

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Abstract

Now a days, in urban areas facing problems is traffic congestion. Vehicular traffics are increasing on day to day. Vehicular traffic is directly effect on the pedestrian's movements, safety and comforts. Pedestrian is one of the big road user group. Different needs of pedestrian should be considered in the design of the road transportation facilities. Rajkot is a main developing city in the region of saurashtra. It is attracting the peoples for doing different kinds of activities. Such as, finding new jobs, business, education and cultural activities etc. Now a day's municipal corporation and government are focusing in the area of effective transportation facilities for road user. The pedestrian facilities are observed poor in some of the areas in Rajkot city such as Hospital Chowk etc. In this work, basic pedestrian traffic planning is taking for improve and effective pedestrian facilities at these intersections. By using the various types of traffic surveys, to check the pedestrian facilities and its behavior.

Keyword- NMV, DPR, LCMP

I. INTRODUCTION

India is the second most populous country in the world, with over 1.28 billion people. India is an also one of the developing country. Our nation plays important role in the entire world market. Transportation facility is a first requirement of any nations for the social and infrastructure development. Many people in India do not have access to the transportation at all; they simply walk or by use of NMV for their daily transportation needs. Walking is important mode of transport. In urban areas, a significant proportion of trips up to 1-2 kms. in length is performed on foot. Every journey necessarily starts and as a walk trip. Since pedestrians are more vulnerable to being involved in accidents. A well-functioning road infrastructure must fulfill requirements of all road users. In the context of the present socio-economic realities of most developing countries, pedestrians, bicyclists and other slow moving vehicles cannot be eliminated from urban landscape. Pedestrians, bicyclist and non-motorized rickshaws are the most critical elements in mixed or homogeneous traffic. If the infrastructure design does not meet the requirements of these elements all modes of transport operate in sub-optimal conditions. In urban areas, there is a positive correlation between accessibility and income security. Accessibility not only determines the place of work and time taken to reach the place but also in many cases, the type of availability of work. With fast urbanization in low income countries and in India particular, the demand for whole set of service is increasing. Many people either walk to work or use bicycle to commute to work. It generally involves travelling to short and medium distance. It including going to schools/colleges, delivering goods etc. however pedestrians and NMV's presence is often ignored by policy makers, planners, and engineers. Therefore there are no policy, plans and programs for NMV's in Indian cities.

A. Objectives of Study
1) To identify the problems related to pedestrian at hospital chowk.
2) To determine existing vehicular flow characteristics.
3) To recommend appropriate facilities or measure at the studied intersections.

II. TYPES OF PEDESTRIAN FACILITIES

A. Overview
Walking is an important node of transportation. An important consideration that has to be faced by an engineer in designing of Non-Motorized transport planning but ignore the infrastructure for pedestrians, cyclist and all types of non-motorized vehicles in developing countries. Study of This problem is important for safe and effective transportation system. The planning of pedestrian and NMV Transport System in urban area Help to Decrease the accidents on road, improve in air-quality and reduce the noise level in urban area.

B. Pedestrian Facilities

1) Foot Path (Side Walk)

Sidewalks are provided on most urban arterials, Collector Street and in commercial and residential areas. Sidewalks and walkways function as integral components of pedestrian friendly street systems where pedestrians can experience safety, comfort, accessibility, and efficient mobility. Sidewalks and walkways increase pedestrian safety by separating pedestrians from vehicle traffic. The width of foot-path depends upon the expected pedestrian flows and could be fixed with the help of guidelines given in a table 1, subjected to a minimum width of 1.5 m.

Width of side walk (meter)	*Capacity in number of persons per hour*	
	All in one direction	*In both direction*
1.50	*1200*	*800*
2.00	*2400*	*1600*
2.50	*3600*	*2400*
3.00	*4800*	*3200*
4.00	*6000*	*4000*

Table 2.1: capacity of side-walk (As per IRC: 1989)

2) Pedestrian Crossing

1) At – Grade Crossing: At-Grade pedestrian crossings are those where the pedestrian cross the carriageway at the same level as that of vehicular movement.
2) Grade Separated Crossing: grade separated crossing are those where the pedestrian are require to cross the carriageway at a level different from that of vehicular movement.
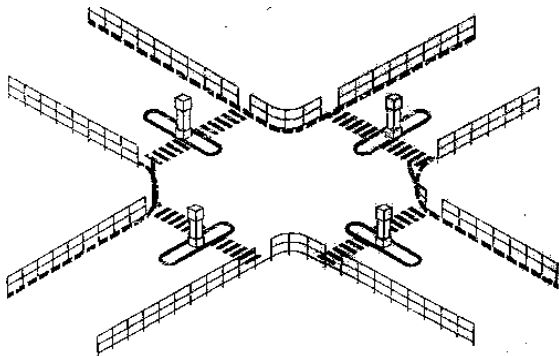

Fig. 2.1: Zebra Crossing With Guard Rail

Fig. 2.2: Typical Foot Over Bridge

3) Pedestrian Island & Signal

A refuge island is also known as a pedestrian refuge or pedestrian island, is a small section of pavement , completely surrounded by asphalt or other road materials, where pedestrians can stop before finishing crossing a road. It is typically used when a street is very wide, as the pedestrian crossing can be too long for some individuals to cross in one traffic light cycle.

Fig. 2.3: Pedestrian Refuge Island

Fig. 2.4: Pedestrian Signal

Fig. 2.5: Pedestrian Sign

III. LITERATURE REVIEW

A. Construction and Improvement of T.P. Schemes Road Network for Rajkot City (2008) Rajkot Municipal Corporation

The broad objectives of the Detail Project Report (DPR) were to determine a technically and economically viable Rajkot Comprehensive Plan to meet the requirements of the year 2021. The major objectives of the research were Assess the existing road

network, traffic and travel characteristics of the study area, forecast travel demand up to the horizon year 2021 and identify transport system requirements. The Different types of surveys were carried out for the different types of data collection. Report was show that the major 29 city roads have nearly 71% of the road length does not have footpath facilities thereby forcing the pedestrian to walk on the carriageway there by, reducing width of vehicular movement. About 7 % of total road length have footpath on one side only. This means that even the major corridors of traffic movement have no pedestrian facilities. Report was show that the Maximum pedestrians flow per hour across the road was observed at City Hospital (3,010Pedestrians/hr.). The CMP report was concluded with major immediate improvement measure (2007-2008).

B.   Low-Carbon Comprehensive Mobility Plan: Rajkot (2014) Dr. Talat Munshi & UNEP/CEPT University
In this report/research work was carried out on the bases of vehicles carbon emission. The vision of LCMP's plan was to provide technological as well as planning strategies to meet the mobility and accessibility demands of all people irrespective of their socio-economic profile and gender by the least carbon emitting modes of transport and to map the existing transport situation, including Non-Motorized Transport & PT infrastructure with road infrastructure. It was indicate different scenarios. It was conclude with improved walk and PT infrastructure, improved walk and bicycle infrastructure and Improved PT, walking and cycling infrastructure.

C.   Study of Pedestrian Flow/ Behavior on Indian Roads (2015) Sachin Dass, Dhirendra Singhal, Praveen Aggarwal
The study/ paper were an effort to gather information about the way the people think for the pedestrian's facilities they are using day to day. It will provide an insight into the people's mind what they think about the facilities and what are the mind blocks for them to discard those facilities leading to accidents. This study was done in Ambala, kurukshetra, and Chandigarh. There were mainly three methods adopted for data collection. (i) Interview survey (ii) inventory survey and (iii) speed study. This study was concluding result for foot over bridge and under bridge.

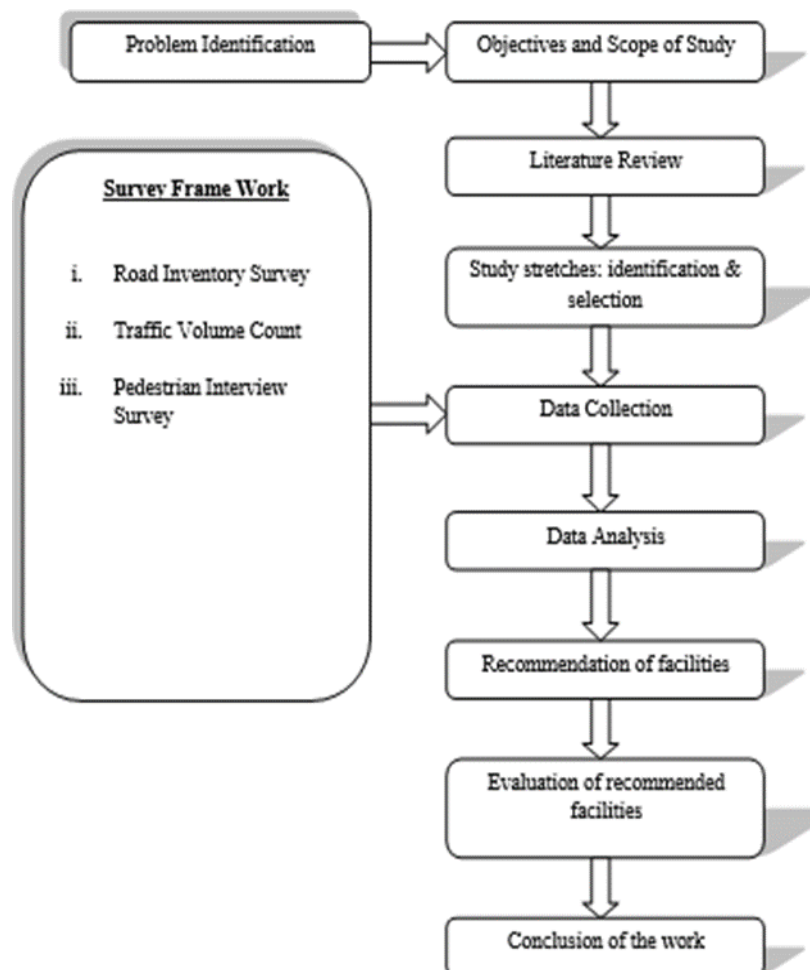## IV. METHODOLOGY AND STUDY AREA SELECTION

A.   Methodology

Fig. 4.1: Methodology of Study

B. Study Area

1) Role of Transportation in Rajkot

The rapid industrial development, agriculture production coupled with rise in population over the past decade has contributed in a large-scale increase in traffic in the city. This increasing intensity of traffic has resulted in the manifestation of a number of problems like traffic congestion, delay, accidents, pollution etc. which poses a potential threat to the economic vitality and productive efficiency of the city. The city has a dense road network. Because of the concentration of various commercial and industrial activities in Rajkot and surrounding towns, the city road network leading to the surrounding towns is heavily congested. The regional network includes NH-8B, State Highways (SH-26, SH-27, and SH-42) and District Roads.

2) Population

Rajkot is a fourth largest city in the state of Gujarat (India). Rajkot is the 35th largest agglomeration in India with a population more than 1.4 million as of 2015.

Year	Population	Growth rate
1961	194145	47.00
1971	300112	+54.58
1981	445076	+48.30
1991	559407	+25.69
2001	1002000	+79.12
2011	1390640	+38.06

Table 4.1: Population Growth of Rajkot City (Source RMC)

3) Details of Study Area

− Hospital Chowk Intersection

Fig. 4.3: Map of Hospital Chowk (Google Map)   Fig. 4.4: Satelite Map of Hospital Chowk (Google Map)

V. DATA COLLECTION AND ANALYSIS

A. Road Inventory Survey

This survey is to be carried out at selected intersections on up to 100m distance. There collecting data of existing details of road characteristics.
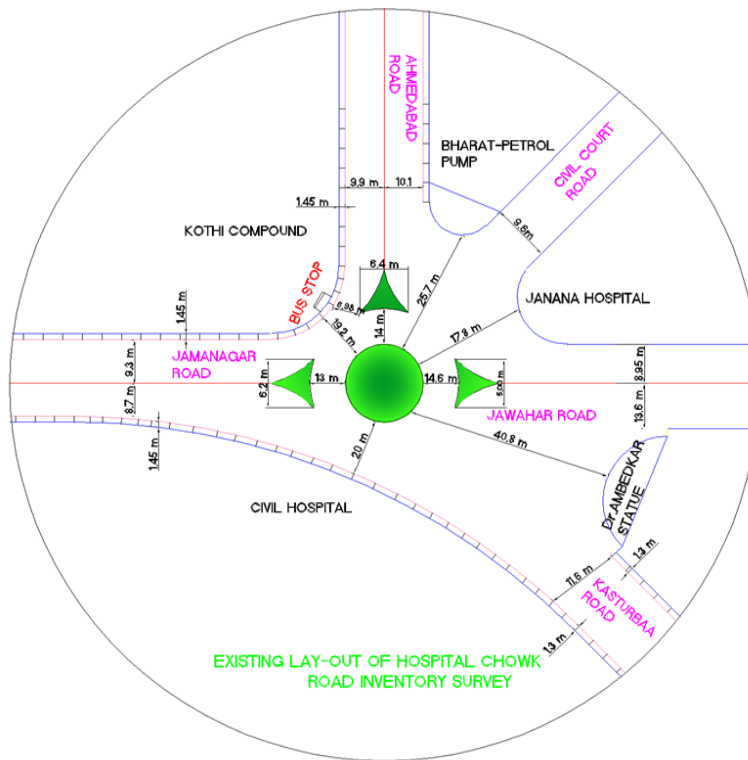
Fig. 5.1: Existing Lay-out of Hospital Chowk Intersection

B.   Classified Volume Count Survey (By: Videography Method)

TOTAL VEHICLE COMPOSITION IN (%)		
Vehicle Type	Volume	% Share
T/W	57172	54.12
CAR	14713	13.93
BUS	1545	1.46
AUTO	25311	23.96
LCV	4194	3.97
HCV	29	0.03
BICYCLE	2680	2.54
TOTAL	105644	100

TIMING FOR DATA COLLECTION

- MORNING TIME
  8:00 a.m. TO 1:00 p.m.
- EVENING TIME
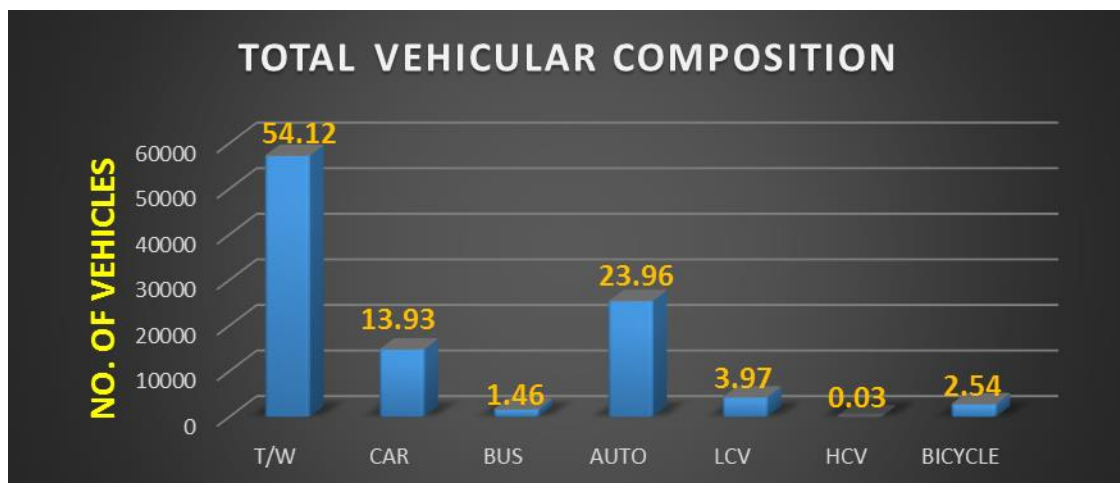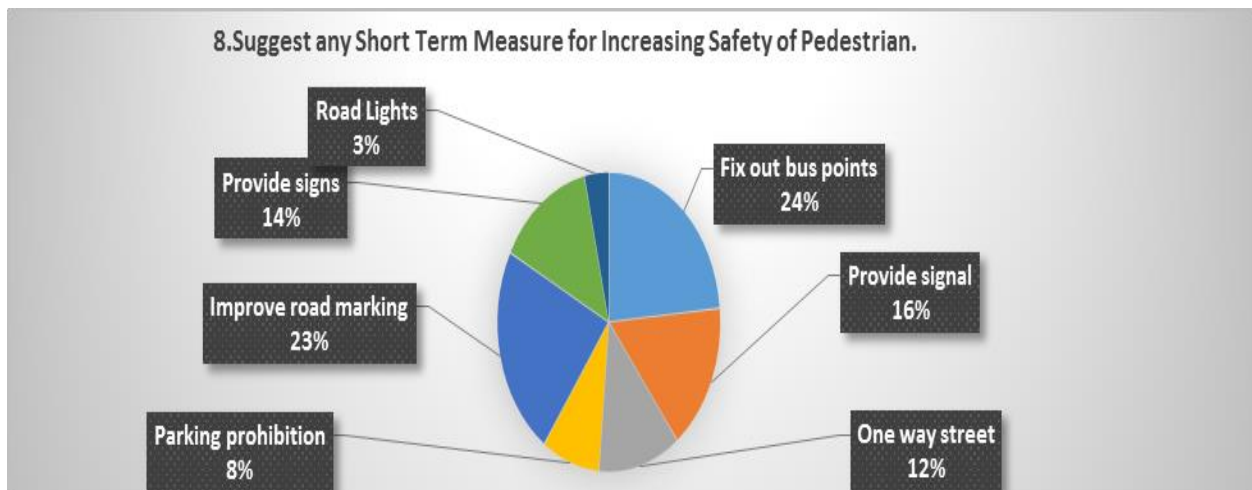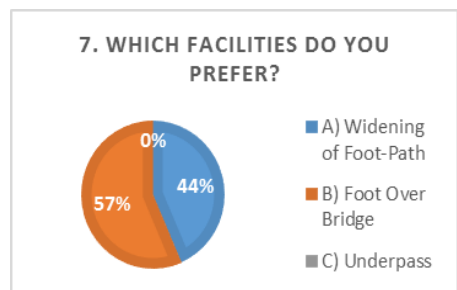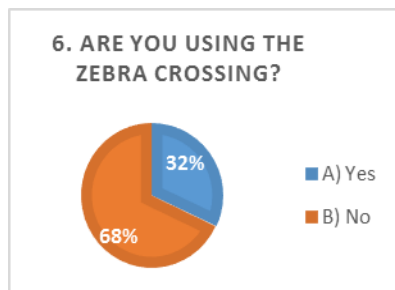 3:00 p.m. TO 8:00 p.m.

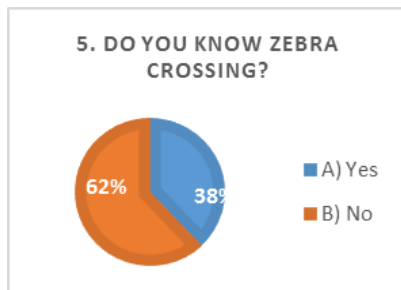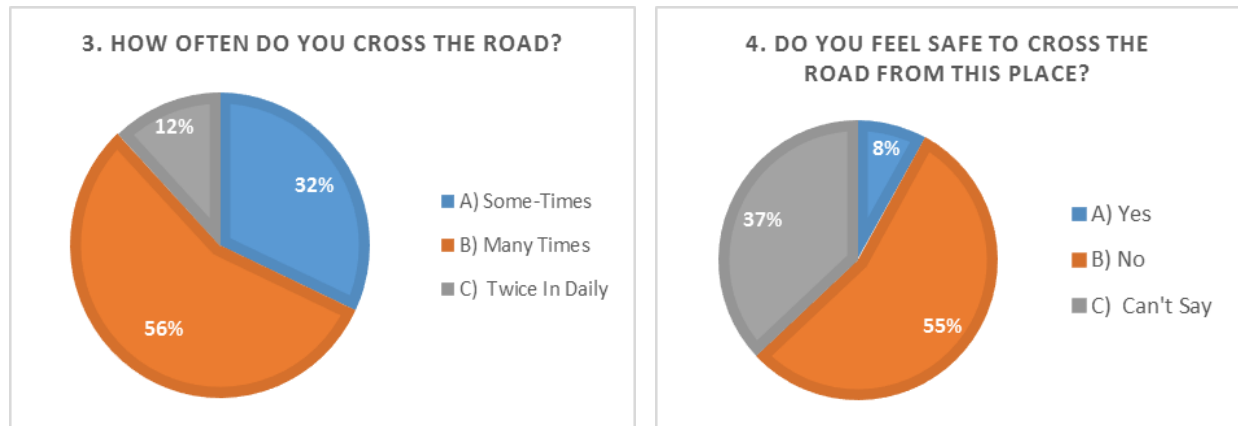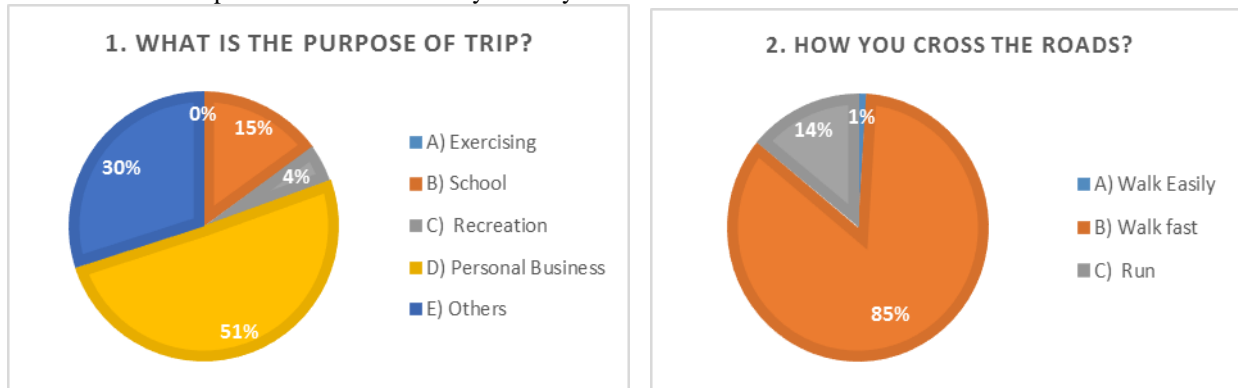Table 5.1: Vehicle Composition

Fig. 5.2: Total Vehicular Composition of Hospital Chowk Intersection

C. Pedestrian Interview Survey

In this survey, mainly collected 200 samples from pedestrians, which data is useful for planning of basic pedestrian facilities. Major 8 questions were asked to pedestrian and then analyze every answers.

1. WHAT IS THE PURPOSE OF TRIP?
- A) Exercising — 0%
- B) School — 15%
- C) Recreation — 4%
- D) Personal Business — 51%
- E) Others — 30%

2. HOW YOU CROSS THE ROADS?
- A) Walk Easily — 1%
- B) Walk fast — 85%
- C) Run — 14%

3. HOW OFTEN DO YOU CROSS THE ROAD?
- A) Some-Times — 32%
- B) Many Times — 56%
- C) Twice In Daily — 12%

4. DO YOU FEEL SAFE TO CROSS THE ROAD FROM THIS PLACE?
- A) Yes — 8%
- B) No — 55%
- C) Can't Say — 37%

5. DO YOU KNOW ZEBRA CROSSING?
- A) Yes — 38%
- B) No — 62%

6. ARE YOU USING THE ZEBRA CROSSING?
- A) Yes — 32%
- B) No — 68%

7. WHICH FACILITIES DO YOU PREFER?
- A) Widening of Foot-Path — 44%
- B) Foot Over Bridge — 57%
- C) Underpass — 0%

8. Suggest any Short Term Measure for Increasing Safety of Pedestrian.
- Road Lights — 3%
- Provide signs — 14%
- Improve road marking — 23%
- Parking prohibition — 8%
- Fix out bus points — 24%
- Provide signal — 16%
- One way street — 12%

VI. CONCLUSION

- Road inventory survey is clearly show that the actual condition of road marking, foot-path conditions, bus-points etc. there is observed no markings on the road. So, there are first requirement of pedestrian is to provide proper road markings (e.g. zebra crossing) at intersection.
- Traffic volume count survey indicates the actual volume of traffic on the intersection. Which is directly affects on the pedestrian movements.
- Based on all the pedestrian opinions and analysis, various recommendations and pedestrian facilities are proposed on the selected intersections. 92% pedestrian sample gives the negative feedback on the safety questions. There is also required public awareness program because 62% have no idea about the zebra crossings.
- On this data collections, required basic facility of pedestrians required are zebra crossing, pedestrian sign & signal for safety, foot-path widening and foot-over bridge. Civil court road have no foot-path. So, there are required foot-path for easy pedestrian movements.

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[7] The Indian road congress, IRC: 103-1988