



# SAFETY SPEAK!

Road and Traffic Safety Newsletter

Volume 5, No. 1

March 2010

## *From the Editor's Desk...*

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It seems especially appropriate at the start of a new year for me to say how proud I am of the way this publication has developed, of the topics we've tackled, of the responses we've received from you, and of the enthusiasm and dedication of my editorial staff. This will be *SafetySpeak's* fifth year of publication, and both the newsletter and the forces behind it—the inspired undertaking that is JP Research India—have come a long way since their early days.

In this issue, we take a quick look back at some of the more interesting JPR India events of 2009, a year that saw the start of many exciting new projects and directions for our company. Our overriding goal, past and present, is to improve safety conditions for the users of India's roads. We are not only striving to develop India-specific crash data collection methodologies and databases, but to spread the word about what our research has revealed and how others can undertake the same sorts of studies (don't miss the link on page 3, to our Crash Investigation and Data Collection Workshop). For those of you who were unable to attend December's SAE India Mobility Congress, this issue also includes an overview of (and links to) the technical paper and poster presentations given there by JP Research and JPR India staff.

Another "don't miss" feature in this issue is the newest offering in our "Infrastructure Analysis" series. The current installment focuses on the types of problems that can develop when the user-oriented details of new infrastructure projects are not well addressed in planning and implementation. The example project under the JPR India microscope this time is the Kathipara Cloverleaf Interchange, an impressive engineering project with a not-so-impressive traffic safety record.

And so we begin another year here at JPR India, full of excitement and promise and looking for new ways to interest, inspire and inform. As always, we hope you enjoy our articles, and we look forward to hearing your responses and suggestions throughout the coming year!

Drive safely.

*-Jeya*

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No. of Crashed Vehicles Investigated  
by JPR India Researchers as part of  
our Tamil Nadu Crash Study

## *Rules You Should Know...*

Rules of the Road Regulations, 1989

### ***Rule 24: Abrupt braking***

No driver of a vehicle shall apply brake abruptly unless it is necessary to do so for safety reasons.

### ***Rule 25: Vehicles going uphill to be given precedence***

On mountain roads and steep roads, the driver of a motor vehicle travelling downhill shall give precedence to a vehicle going uphill wherever the road is not sufficiently wide to allow the vehicles to pass each other freely without danger, and stop the vehicle to the side of the road in order to allow any vehicle proceeding uphill to pass.

## 2009: A Year of Accomplishment and Adventure

### January: SIAT 2009

The year started off portentously with JPR India's crash investigation expertise and research work gaining recognition at the SIAT 2009 conference in ARAI, Pune. While Ms. Jeya Padmanaban (President, JP Research) and Dr. Hassan (Crash Research Fellow, University of Birmingham) presented a paper on our "Accident data collection methodology for building a traffic accident database for Tamil Nadu", JPR India researchers had an opportunity to interact with engineers, professionals and students at our Expo stall.



Jeya Padmanaban

Dr. Ahamedali Hassan

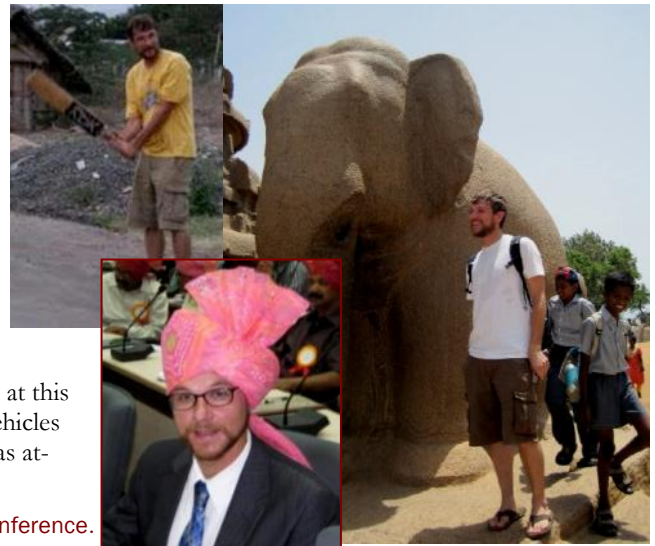


### April: New Safety Engineer joins JPR India

In another stroke of fortune for JPR India, Mr. Swastik Narayan (pictured left) came onboard as an Automotive Safety Engineer. A mechanical engineering graduate from Dr. Ambedkar Institute of Technology, Bangalore, and formerly with Infosys, Mysore, Swastik has proved to be a valuable addition to our crew. In addition to conducting (sometimes daring) on-scene crash investigations, he has been working closely with government officials and vehicle manufacturers to help ensure safer roads for India (and for crash investigators).

### June: US Crash Investigator Falls Hard for India

JP Research's senior crash investigator, Mr. Greg Stadter, came over to India on a six-month sojourn to train JPR India researchers on the finer aspects of crash reconstruction and to develop pedestrian crash and injury coding methodologies responsive to Indian crash situations. While here, Greg not only got a feel for crash issues unique to Indian roads, but also developed a real love for the country itself. He took time out to travel across India, enjoying the local cuisine and diverse cultural experiences each locale had to offer.



### National Conference on Road Safety & Best Practices

Also in June, Greg gave an invited presentation on "Accident Analysis" at this national conference, organized by the All India Federation of Motor Vehicles Department, Technical Executive Officers Association. The seminar was attended by transport officials from across the country.

Greg, wearing the traditional turban at the national conference.

### July-August: Coimbatore Project—Preparation and Phase 1 of Data Collection

For this project, preparations involved meeting with top police officials, studying accident-prone areas, managing logistics, and a whole lot of planning. Generally, the better the preparation, the smoother the investigations, resulting in good quality data. Over the past two years JPR India has become rather good at this, yet the learning never stops. Every crash we examine provides a greater understanding of the Indian traffic environment.



JPR India researchers fabricated our very own crash jig for deformation measurements. All the parts were sourced locally, and the complete fabrication work was carried out in-house, giving this product a "100% Made in India" tag!



### The Coimbatore Project Team

(From left) Swastik, interns Raamprakash and Bharat, Easwar (driver), Greg and Ravishankar

## 2009... (continued)

### September-October: Conferences Galore!

JPR India participated in 3 conferences, gaining attention for our work not just in India but in other Asian countries as well. JPR India researcher Ravishankar Rajaraman was especially pleased at the opportunity to network with so many other safety experts and professionals.



GRSP Asia Seminar and IRAP Workshop, Singapore



4th IRF Regional Conference, New Delhi



4th IRTAD Conference, Seoul (shown: Gyeongbok Palace)

### October: Crash Investigation and Data Collection Workshop

Greg Stadter and JPR India developed a practical workshop focused on local (Indian) crash data collection. This workshop is now being offered to parties interested in this area of research. More details are available at the link below:

<http://www.jpresearch.com/Docs/Crash-Investigation-Workshop.pdf>

### October-November: Coimbatore project—Phase 2

Police officers, most of whom do not carry reflective jackets, often put themselves at risk of traffic injury, especially during the night, while ensuring the safety of others at a crash site. When our researchers brought this to the attention of JP Research president Jeya Padmanaban, she immediately approved the idea of providing

**reflective safety jackets** to all the police stations and highway patrols in our study area on the occasion of the festival of Diwali in October.



It is opportunities like this that make our “hands-on” safety research so rewarding. Phase 2 of the project meant being away from home and available to go onsite at numerous crashes. However, while the crash investigations were often sobering, the research work itself is a gift, of sorts, to society, and for our team it was a source of pride and a great deal of satisfaction.



A truck loaded with custard apples swerved off the highway at night. Next morning, researchers saw hoards of people stopping by to collect the fruits. Note the caution sign and the parked vehicles on the shoulder posing a traffic hazard to passing motorists.

### December: A Growing Team at JPR India

One of our interns, Mr. Bharat Ramesh, found working in JPR India so exciting and fun-filled that he decided to become a part of our permanent team. A former Accenture software engineer, Bharat successfully finished his internship with us and then joined the company on 1st December, 2009. Just two months into the job, he already finds himself playing an important role in our crash research initiatives.



## *JPR India at the 2009 SAE India Mobility Congress*

Before bidding farewell to 2009, JPR India added a final feather to our cap by participating in the SAE India Mobility Congress held in Chennai on 13-15 December. JPR India researcher Ravishankar Rajaraman presented a paper on “Analysis of Road Traffic Accidents on NH 45 (Kanchipuram District)”. The paper, based on our 45-day crash investigation study on the NH45, gave an in-depth look at the type of accidents we saw on the divided 4-lane highway and the road users involved. Well over half (59%) of the accidents examined were front-rear collisions, mainly involving trucks parked, slowing down or broken down. Apart from highlighting the benefits of in-depth crash investigation studies, the paper also brought to light the effects of infrastructure on road user behavior and traffic accidents. The presentation can be downloaded from the link below:

<http://www.jpresearch.com/Docs/Dec-09-SAE-NH-45.pdf>



JPR India researchers also presented a technical poster on “Analysis of Truck Accidents on NH45 and the Urgent Need for In-depth Truck Accident Data Collection on National Highways”. The poster illustrated our investigation methodology and data analysis, inspection results for the 25 crash-involved trucks, infrastructure deficiencies identified, and the poor working conditions and lack of training of truck-drivers. Throwing light on District Crime Record Bureau data, the poster shows that truckers account for the highest percentage (23%) of all Indian road fatalities, and hence truck accidents need to be addressed urgently. The poster presentation is available at the link below: <http://www.jpresearch.com/Docs/posterSAE.pdf>

## *Infrastructure Analysis: Kathipara Cloverleaf Interchange*

Over the past few years, India has seen the birth of many traffic infrastructure projects. For the most part, these projects have improved traffic congestion compared to earlier conditions, but have they significantly impacted road safety by making it *safer* for motorists and pedestrians to travel? To understand the distinction, we need to take a closer look at a few of these projects. In this series, we will study the safety problems by analyzing newspaper reports and using tools such as Google Earth. To begin with, we take a look at the Rs. 260 crore (US\$ 52 million) Kathipara Grade Separator (cloverleaf interchange) in Chennai. Pictures below show the transformation of Kathipara junction from a roundabout to a cloverleaf interchange.



(Photo “21 April 2005” is from [http://commons.wikimedia.org/wiki/File:Kathipara\\_junction.jpg](http://commons.wikimedia.org/wiki/File:Kathipara_junction.jpg); photo “21 April 2009” is from Google Earth.)

### CHRONOLOGICAL REVIEW OF NEWSPAPER REPORTS

Our analysis begins by following the sequence of events, as reported in newspapers, to understand how the new cloverleaf interchange performed since its opening in October 26, 2008. The next few newspaper reports are from *The Hindu* (online edition).

#### **October 27, 2008: New traffic arrangement comes into effect at Kathipara junction**

CHENNAI: A few changes in the movement of traffic have been introduced at the Kathipara junction, where Chief Minister M. Karunanidhi inaugurated a grade separator on Sunday (October 26, 2008). The new arrangement came into effect after 9 p.m. on Sunday, a press release issued by the suburban commissionerate said.

Vehicles proceeding from Guindy towards Vadapalani shall proceed straight along the ramp beneath the flyover, which leads to the Vadapalani side, and merge with the traffic on the main flyover. Traffic proceeding from Guindy towards Porur shall keep right and proceed straight along the ramp beneath the flyover...

**[Directions don't make sense to you? You are not alone.]**

## Infrastructure Analysis: Kathipara Cloverleaf Interchange (cont'd)

### CHRONOLOGICAL REVIEW OF NEWSPAPER REPORTS ... (CONTINUED)

#### October 29, 2008: First fatal accident on Kathipara grade separator.

Victim, not clear about the route, was travelling in the wrong direction. Boards indicating routes, ramps for different directions were yet to be installed. The boards will be installed in a couple of days.

CHENNAI: A 65-year-old man, who sustained injuries after he met with an accident on the Kathipara grade separator on Monday evening, died on Tuesday morning. It is the first fatal accident on the facility, which was inaugurated on Sunday. The victim, riding a two-wheeler, had taken one of the ramps leading to the grade separator from the wrong side, as he was not sure about the route in the absence of direction boards, the police said. **[Why was the project open to public without proper signage?]**

#### October 31, 2008: "Confusion at grade separator will end soon"

90 boards indicating routes for different locations have been installed. "Work on two pedestrian subways proposed for the benefit of those walking across GST Road will begin shortly".

CHENNAI: The confusion prevailing at the grade separator in Kathipara will end in a couple of days, P. Sreenivas, Project Director, National Highways Authority of India (NHAI), said here on Thursday. Talking to reporters after a joint inspection of the facility... he admitted that there was confusion among motorists on the ramps to be taken to different destinations...

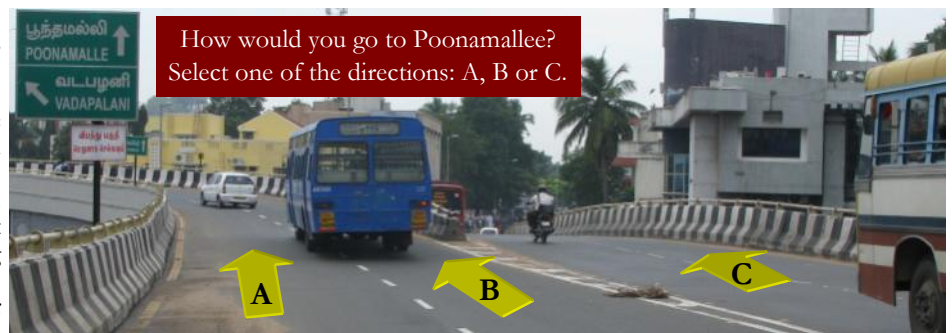
**[Why weren't these inspections conducted before opening the road to the public?]**

### ROAD SAFETY... LOST IN COMMUNICATION?!!

It is evident that negligence in communication with road users played a critical role not only in motorists' confusion but in an unfortunate accident as well. The events reported above could have been avoided by:

1. Providing clear illustrations and diagrams in the media to educate much of the public before new interchanges open.
2. Installing clear road signs and direction indicators to aid motorists in deciding their path of travel well in advance.
3. Painting lane markings that guide road users through the interchange without obstructing the flow of traffic.
4. Performing safety inspections and audits to determine effectiveness of road design and clarity of signage.

An example of this lack of communication is illustrated in the photo at right, which shows the approach to one of the direction boards. Because of the placement of this sign, many people assume that direction B (straight ahead) would take them to Poonamallee, but the correct direction is C (to the right). A and B are both exits towards Vadapalani. It is common to see vehicles slowing down or stopping, at this point on the interchange, while the confused driver tries to make sense of the directions.



### ONE YEAR LATER... HAVE THE PROBLEMS BEEN RESOLVED?

#### December 15 2009: Flyovers yet to smoothen motorists' path

From the *Deccan Chronicle*, Chennai Edition:

... But, these grade separators seem to have made driving more hazardous for motorists who are still confused about their usage ... [Motorists] claim that driving over the Kathipara grade separator is chaotic at the entry and exit points for new vehicles that enter the grade separator when they have to merge with vehicles that are already speeding on the flyover... Another serious complaint of the motorists regarding all the major grade separators is that vehicles ride over the flyovers at top speed and are suddenly forced to reduce speed as they merge with more congested roads. ... NHAI authorities claimed that they have initiated efforts to identify safety loopholes on all the major grade separators...

From this report, it is evident that communication problems have not yet been resolved, and there is a need for providing clear direction boards and entry/exit guidance. Locating the boards just at the turns (instead of well before them) is one problem, and the confusion of vaguely pointing arrows is another, especially for first time users of this interchange. Adding to this, drivers face the problem of lane merging (see right). Is this another communication and road design fiasco? *Read on!*



**Entry (left) and Exit (right) lanes are barely visible and confusing to the eye.**

## Infrastructure Analysis: Kathipara Cloverleaf Interchange (cont'd)

### 3 + 3 = 4??? AND 3 - 2 = 3???... THERE GOES OUR ARITHMETIC!

The photo diagrams at right show close up views of the interchange, and the circled areas indicate entry or exit points. At entries, to accommodate vehicles joining into the main road, the number of lanes should be increased for some distance to allow the traffic to merge in easily:

**Number of lanes before entry + Number of entry lanes**  
**should = Number of lanes after entry**

Thus, in the circled area marked "1", when 3 entry lanes join into 3 lanes, provision should be made for (3+3) or 6 lanes. But we see only 4 after the entry. Traffic from 3 entry lanes is being squeezed into a single lane, leading to a bottleneck. Fast-moving traffic along the 3 running lanes raises the risk of a serious accident. In reality, this design allows for only 1 entry lane. Similarly, when exiting a road (see circled area "2") lanes have to be dedicated for vehicles that are slowing to exit:

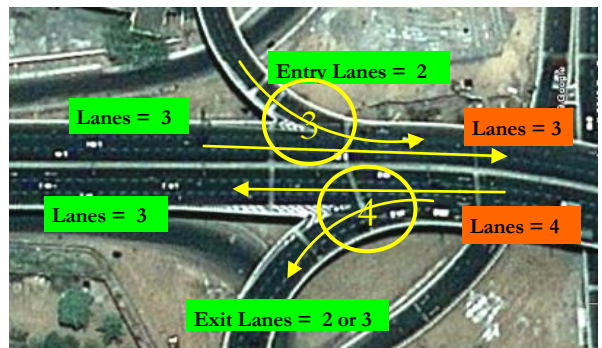
**Number of exit lanes + Number of lanes after the exit**  
**should = Number of lanes before exit**

Hence, in circled area "2", the number of lanes before the exit should be (3+2) or 5. But there are only 3 lanes before the exit. This indicates that traffic in only 1 lane (the lane towards the divider) would be able to move through without being hindered by exiting (slowing) traffic in the other 2 lanes.

Now apply this math to circled area "3" and begin to see that a design flaw exists. Circled area "4", conversely, seems to have an *extra* exit lane. Closer inspection will reveal numerous other flaws in lane markings and increasing/decreasing number of lanes in a short span of roadway.



Lane merging analysis: 1 and 2.



Lane merging analysis: Do it yourself — 3 and 4.

### SO WHAT DID WE LEARN FROM ALL THIS?

The above analysis shows that communication with road users is still a serious unresolved issue on the Kathipara junction. Road design, especially at merging or exiting lanes, needs to be looked into and improved. More importantly, this review highlights the lack of implementation of uniform road engineering standards or road-user-oriented safety inspection/audit techniques. Implementing these simple reforms would help to ensure that new roads opened to public would be safer right from the beginning.

### Visit us on the web!

<http://www.jpresearchindia.com>

<http://sites.google.com/site/saferroadsproject>

### JPR India Mission Statement

To mitigate accidents and injuries to road users in India by helping local automotive safety organizations, government agencies, and manufacturers through accident and safety research and training, and creating public awareness of automotive safety issues.

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