**Capacity and LoS of signalised intersections with non-lane based mixed traffic**

Presented by [Prof K.V.K.Rao](http://www.civil.iitb.ac.in/~kvkrao/index.html), Head of Civil Engineering, Indian Institute of Technology (IIT), Bombay

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**Road network critical state: its applications for network resilience and link criticality**

Presented by [Dr Gopal Patil](http://www.civil.iitb.ac.in/~gpatil/index.php), Assoc. Prof, IIT Bombay & Chair of WCTR 2019

**Date:** Monday 24th July

**Time:** 11.00-12.30

**Location:** rm1.11 [Institute for Transport Studies](http://www.its.leeds.ac.uk/map/), University of Leeds

**Capacity and LoS of signalised intersections with non-lane based mixed traffic by Prof K.V.K.Rao**

**Abstract:**

The speaker will be presenting the capacity and Level of Service (LoS) aspects of signalised intersections which is one of the outcomes of the multi institutional research project “development of Indian Highway Capacity Manual (IHCM 2017)” sponsored by Council of Scientific and Industrial Research, Government of India. The speaker will draw some parallels between IHCM 2017 and Highway Capacity Manual (HCM 2010) of USA and highlight the essential differences in the capacity and LoS analysis. Indian traffic facilities, in general, and signalised intersections, in particular, are characterised by a wide spectrum of vehicle types trying to use every available road space coupled with an exclusive road user behaviour. This kind of phenomenon is often described by the phrase “mixed traffic condition without lane discipline”. The concept of a base intersection and the methodology of determining passenger car equivalencies/units (PCE or PCU) for converting all other vehicle types into standard passenger car based on saturation flow will be presented. The concept of “movement group”, replacing the concept of “lane group” (of HCM 2010), is introduced to address the non-lane based shared operation. The method adopted for measurement of saturation flow in the field, the details of the model developed for the estimation of base saturation flow and the adjustment factors to be applied for estimating the saturation flow at prevailing conditions will be presented in this talk. The speaker will also talk about how the initial surge in the discharge flow, which is due to the presence of approach flare and early movement of the queued vehicles in anticipation of green initiation, is taken care through one of the adjustment factors. The speaker will then dwell up on the model developed for estimation of control delay and the criteria arrived at for determining the Los of signalised intersections by incorporating users’ perception. The talk concludes by summarising the overall procedure prescribed for determination of LoS of signalised intersections in India.

**Brief bio:**

Dr. K V Krishna Rao is a Professor of Civil Engineering at Indian Institute of Technology Bombay. He has over 30 years of teaching, research and consultancy experience in Transportation Engineering. He completed his PhD in Urban Transportation Planning in 1996 and Masters in Transportation Engineering in 1986, both from Indian Institute of Technology Madras, India. His research interests include sustainable urban transportation planning, travel demand modelling, land use transport modelling and traffic analysis and design. He has supervised 12 Ph.D. theses and 75 M.Tech. dissertations so far and completed several sponsored research and consultancy studies in his areas of research. His contribution in the preparation of master plans for metro rail systems in the cities of Mumbai, Navi Mumbai and Pune are noteworthy. He has also contributed majorly in the just concluded sponsored research work for the development of an exclusive highway capacity manual for India. He has several publications in refereed international journals and conferences. He has served also in several administrative positions at IIT Bombay. Currently he is the head of civil engineering department, IIT Bombay. He has served as Vice-Chairman of the prestigious Joint Entrance Examination (JEE) for the year 2005. He has served as Associate Dean and Dean of Infrastructure Planning at IIT Bombay during 2006 to 2012 and implemented much needed building infrastructure adopting green norms. He was conferred with Excellence in Teaching Award in 2008, 2012 and 2016 by IIT Bombay. He is a member of professional bodies like ASCE, IRC, WCTRS, etc., and represented on several technical committees of Government Agencies. Dr. Rao is the Director of the 15th edition of World Conference on Transport Research (WCTR 2019) which will be held at IIT Bombay, Mumbai, India during 26-31 May 2019.

**Road network critical state: its applications for network resilience and link criticality by Dr Gopal Patil**

**Abstract:**

Roadways are susceptible to a variety of disruptions. Most frequent disruptions are non-severe ones, but occur at multiple locations simultaneously. Capacity disruptions, if left unaccounted, will result in suboptimal network design decisions. The objective of this work is to study multiple simultaneous disruptions and to establish a consequent critical state on the network. A critical state is such where the network bears the worst possible operable cost at a given level of service. From the critical state problem, one can find the network operational cost—at the critical state— which is irreducible even by re-assignment. The critical state is identified using a minimax optimization problem that is solved employing a two-space genetic algorithm. The relative difference of the critical value and the best possible value is interpreted as the network’s resilience. This resilience measure is demand-specific. To generalize the resilience measure, its sensitivity to change in demand is studied. Using two-space genetic algorithm, which belongs to the class of co-evolutionary algorithms, computational experiments are performed on different network sizes and topologies to bring out a relationship between network resilience and demand. Also, it is found, upon analyzing different solutions that certain links contribute more to the critical state. This observation is used to identify link criticality on urban road networks. Weighted fictitious play algorithm is used to solve the formulations on bigger net-works.

**Brief bio:**

Dr. Gopal R. Patil is an Associate Professor in the Department of Civil Engineering at Indian Institute of Technology (IIT) Bombay. He received his M. Tech degree in Transportation Systems Engineering from IIT Bombay in 2002 and PhD from Rensselaer Polytechnic Institute, Troy, NY in 2007. Dr. Patil worked as a Transportation Consultant in Frischmann Prabhu (India) Pvt Ltd, Mumbai for about one and half years after M. Tech and he was at the University of Vermont, Burlington working as researcher and lecturer before joining IIT Bombay in May 2009. Dr. Patil’s areas of interest includes transportation systems planning, net-work optimization, freight transportation modelling, and traffic operations. He has published more than 50 papers in reputed journals and conference proceedings. Dr. Patil was instrumental in organizing many work-shops and conferences including international conference ‘Transportation Planning and Implementation Methodologies for Developing Countries 2016” (12th TPMDC) for which he was chairman. He also organized an Indo-US workshop on ‘Urban Freight Transport: A Global Perspective’ in April 2014 in association with Volvo Research and Education Foundation’s Centre of Excellence for Sustainable Urban Freight Systems, Rensselaer Polytechnic Institute, Troy, New York. He is currently a member of the scientific committee of World Conference and Transport Research Society (WCTRS) and chair of the Conference Program Committee for WCTR 2019.

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